

‘Sustainable Rural Livelihood Security in Backward Districts of Maharashtra’

National Agriculture Innovations Project, Component 3, ICAR

Sustainability Approach



Consortium Leader

BAIF Development Research Foundation, Pune

Consortium Partners

PDKV, MPKV, HSS, BVU, MAFSU

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A. Introduction

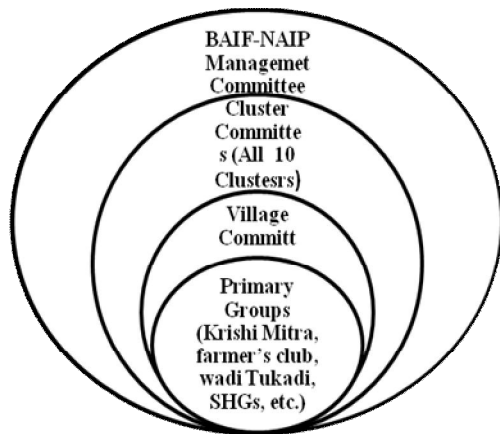
National Agricultural Innovation Project (NAIP) is a major initiative of Indian Council for Agricultural Research (ICAR), New Delhi with the mission of establishing a system and action-based research consortium for improvement in livelihood in 150 backward districts of country. Under this, BAIF Development Research Foundation, Pune has been working as a Consortium Leader to implement the Sustainable Rural Livelihood Security Project (SRLS) in five backward districts of Maharashtra viz., Yeotmal, Gadchiroli, Chandrapur, Nandurbar and Ahmednagar. The project coverage is 76 villages divided in 10 clusters from five districts of Maharashtra. The overall objective of the project is to develop replicable and holistic approach for promoting sustainable livelihood for tribal and remote areas of Maharashtra through integration and blending of tested technologies and strategies of family focused and area based programmes. Project implementation period is five years i.e. from 2007-2012.

Project interventions	Expected Outputs
Improved cultivation practices (INM, IPM, seeds)	Increase in agricultural yield on the farms of participant families
Water resource development	Availability of protective irrigation so as to increase cropping intensity
Tasar	Additional employment generation through horticulture and forestry, value addition & allied activities
Wadi / Orchard	
Livestock development	Improved health of cattle and goat
	Improved breeding efficiency of cows and buffaloes
	Enhanced milk production

B. Sustainability Strategy

Project design is based on a solid foundation of people's participation and developing strong institutions of people for ensuring the sustainability. Project sustainability here means continuity as well as escalation of development process initiated through project interventions even after withdrawal of implementing agency. Initially, during the project period BAIF is playing the role of direct implementer of some of the activities and facilitator for some others, and later on entire responsibility will be handed over to the People's institutions formed during the project period. Most significantly, efforts to improve self-esteem, technical capacities, and socio-economic status of community inculcated during the project will ensure sustainability of development.

BAIF has adopted three-tier model of people's institutions. At community level there will be common interest groups; members of which come together to implement project activities. At second level, village level committees constituted of representatives from primary groups which coordinates interventions in village and act as a link between



primary group and cluster committee. Cluster level committee comprises representatives from village committees in a cluster which will work for and ensure continuation of project activities after completion of project. From sustainability point of view; it has been thought of organizing one formal central management committee for all 10 clusters. Members of this central committee would be

representatives from cluster committees that would work as branches of central committee. The central committee would work in close association with cluster committees so as to enhance their capacities for post project management of the programme and successful running of enterprises established through project contribution. From sustainability point of view, small scale enterprises have been planned at clusters. Scoping exercises with cluster committee members were undertaken and accordingly necessary equipments are installed through project support such as decentralized feed mix units, Urea-DAP briquetting machines, Bulk Milk coolers, poly houses etc.

Planning with participants, tapering of support, community empowerment through creating institutions and their capacity building for development management are the major sustainability initiatives facilitated by BAIF. Strategies adopted for making the different interventions initiated through project operations sustainable are elaborated below.

- a) **Improved agriculture:** The aim of the improved agriculture component of the BAIF-led NAIP project in Maharashtra is to improve the productivity of crops through technological interventions. This component has reached to 3500 participants. The key activities envisaged under this component are conducting trainings, establishing demonstrations and introducing a range of improved agricultural practices for major crops in the area.

Improved paddy cultivation practices, Urea-DAP Briquettes, Optimum plant spacing, IPM for cotton, Integrated Nutrient Management are the major

technologies introduced at field level. Improved practices introduced are timely pre-sowing tillage operations, Region specific Improved Seed Varieties, Seed treatment, timely and appropriate fertilizer application, timely application of Micronutrient sprays.

Interventions for improved agriculture are linked with **water resource development** and management. WRD primarily includes construction of check dams, harvesting of runoff water, construction and/or repairs of wells. The water utilization activities include the pumps, water lift arrangements – pipelines, micro-irrigation systems.

Due to adoption of new technologies and following of improved practices average increase in productivity for all major crops for last 2 years is 40% against yields through existing practices. It has also led to availability of the protective irrigation to total 3022 acres of land.

- b) **Livestock Development:** Increasing productivity of livestock; Genetic improvement of cattle and goat through specifically designed breeding efforts for productivity enhancement of livestock is the major aim of this intervention. Development of backward linkages such as fodder cultivation, supply of complete feed and mineral mixture, provision of preventive health services along with forward linkages for marketing such as bulk milk coolers has been undertaken through project operations.
- c) **Sustainability Fund:** To develop ownership of farmers towards interventions and to create fund for post project management; all participants are expected to contribute 10% costs of the interventions. Services like AI are made available on charging basis. The amount collected is deposited into a common sustainability fund. However sustainability cannot be ensured through creation of funds only. It is necessary to support these committees for fund management as well as for increasing the corpus during the project period itself. Establishment and strengthening of people's institutions that can work towards management of development is crucial for making these sustainability efforts successful.

C. Operational Strategies envisaged for sustainability

Ongoing project activities are mainly focused on providing the technical inputs and services to enable participant farmer families to adopt these innovations and systems. During the project period these technical services and the critical inputs are being made available to them through project interventions. However because of enhanced economical gains getting generated through adoption of these practices; the participants are getting convinced about, and are gradually developing their mindset to avail of these services on actual cost basis.

It is envisaged that after completion of project; participants will avail of some of such services on direct charging basis and other kind of services such as agriculture advisory services may be made available to them on community basis.

The people's institutions mainly cluster committees will hire consultants for offering the advisory services to their members. In case of certain other services such as agriculture inputs, they will also arrange for procurement of various inputs and will undertake its distribution on cost basis. These committees will also carry out certain commercial operations such as production of urea briquettes, running of feed mixing units etc. These operations would yield them income.

Based on the keen interest shown by the participants in adopting certain activities have been identified for continuing those on sustainable basis even after completion of project period. These are:

- 1. Cattle breeding centers**
- 2. Goat Development Programme**
- 3. Bulk Milk Coolers**
- 4. Urea-DAP briquetting plant**
- 5. Shed net houses for nursery raising**
- 6. Seed Production**
- 7. Forest based intervention: Tasar Sericulture**

Operational strategies for continuation of these activities are elaborated as follows;

1. Cattle breeding centers

After withdrawal of the project activities the center management will be taken over by the apex body of the cluster level management committees. Practice of levying the service charges for AI services has been already started during the project phase only on nominal basis in initial period. These rates are being increased gradually for smooth acceptance by the user group. The revenue thus realized through service charges collection will be used for running the cattle breeding centers. To make the centers economically sustainable on these lines, only seven out of existing 10 centers will be continued after project phase. Three of these centers will be from Ahmednagar district and two from Nandurbar.

Projected economics of operation of the centers on these lines is given below.

Projected center economics after withdrawal of project activities.

Name of the center	Projected annual AI	service charges rate / AI	No. of Semen doses used	Budgeted annual expenses							deficit/ surplus
				receipts						Total	
					M/C running	Semen cost	LN	Others	AI worker remuneration		
Devthan	1200	100	1260	120000	16000	12600	9000	1200	60000	98800	21200
Gardani	1200	100	1260	120000	16000	12600	9000	1200	60000	98800	21200
Khandbara	850	75	892.5	63750	12000	8925	9000	850	60000	90775	-27025
Khivire	1200	100	1260	120000	12000	12600	9000	1200	60000	94800	25200
Mandane	850	75	892.5	63750	15000	8925	9000	850	60000	93775	-30025
Samsherpur	1200	100	1260	120000	0	12600	9000	1200	60000	82800	37200
Pimpalgaon	1200	100	1260	120000	16000	12600	9000	1200	60000	98800	21200
Total			8085	727500	87000	80850	63000	7700	420000	658550	68950

It is planned that the service charges being collected during project period will be put in corpus fund that will be used to support the centers for meeting out the deficits in case there is budgetary variance.

2. Goat Development Programme

Base goat population in the project area at inception was about 6500. With the objective of motivating the people to adopt Osmanabadi goats in place of local nondescript animals, 630 pure Osmanabadi goats were inducted. 'Goat Bank' approach is adopted for this. The goats were given to selective participants with an understanding that they will give one female kid born to each goat they received; to the other non recipient family and these new recipients will continue the same practice so that over a period of time large number of participants in the project area will own purebred Osmanabadi goats.

Projections about the estimated purebred goat population then existing in the operational area by the end of project period is given in the excel file attached herewith. It is estimated that base goat population existing in the area will nearly be totally replaced with purebred Osmanabadi goats.

In view of this eventuality; goat development activity has been planned to continue with some modifications. As the total base goat population by this time in the area might have been upgraded with Osmanabadi breed. Maintenance of special breeding bucks by buck keepers will not be required, because male kids born during this phase will be of Osmanabadi breed and breeding requirement of their goat stocks may be met through their own bucks. As such the role of buck keepers will become non relevant in these conditions.

Secondly, monitoring of weight in the kids may not be essential during this phase. However the needs of the goat keepers regarding preventive health cover such as vaccinations and regular de-worming will continue to exist.

It is planned that the activities will be planned accordingly so as to cater these needs of the goat keepers through goat group leaders who will be working on similar lines as they earlier used to work during project phase. They will be continued to pay some amount in kind of honorarium through the cluster committees who will be handling this activity.

Role of People's institutions in this can be:

- a. Providing the required veterinary advisory services through engaging hired consultants.
- b. Procuring and making available the vaccines and medicines for preventive and primary health care.
- c. To explore the possibilities of expanding the goat development activities in the neighboring villages.

The vaccines and medicines required for in these operations will be made available to the participants on 5% commission basis. Income thus derived will be source of income to the committees for providing the monthly honorarium at fixed rates. Source of income for the goat keepers will be this amount of honorarium and the service charges being collected from the goat keepers for providing them vaccination, deworming and primary veterinary health services.

3. Bulk Milk Coolers

Bulk Milk Coolers have been established in two clusters with an objective to reduce the vulnerability of the producers in markets and eliminate their losses due to sourage of milk. These are plants of 2000 liters capacity. This is a step taken to establish forward linkage for marketing for the milk produced.

With the estimated daily procurement potential of 2000-3000 liters from the respective cluster areas, quantitatively it may not be feasible to send the cooled milk in retail outlets. Quality wise also it may not be advisable to send this produce in retail market without pasteurizing it. In view of this it is planned that the plants will be run in association with the existing dairy units in that area. These units are having with them the pasteurization plants and direct marketing linkages. Local units have shown their willingness to take these units for operations on contract basis. Financial terms for which they are agreeable are payment of rental charges to respective committee at the rate of Rs. 0.25 per liter of milk processed by them in these units.

It is estimated that they will be processing about 720000 liters of milk on each plant per year. Through this the POs will generate a substantial income of Rs.180000 per annum which can be made use of by these POs for carrying out other developmental activities in their areas.

Budgeted Income Generation through Bulk Milk Coolers

Item	Details
Plant Capacity	2000 liters per day
Estimated quantity of milk processed annually	720000 liters
Annual processes charges obtained through leasing @ 0.25 per liter	180000
Total processing charges acquired through operation of two BMCs	360000

4. Urea-DAP Briquetting Plant

When urea is applied to the crop significant quantity of it is lost either due to leaching out or due to degradation and losses of the urea in ammonia form. However such losses can be arrested to a great extent provided the urea is applied in briquetted form thus leading to slow release of it in the soil and resultantly avoiding losses due to above reasons. This innovative practice of applying urea in briquetted form has been introduced in the field area. The practice is being adopted by the farmers. Hence it became imperative to make provision of such facility at local level. For this purpose urea briquetting plants have been established at three places. After completion of the project period these plants will be handed over to the respective cluster level apex bodies of the POs in these areas.

As elaborated above it is envisaged that operations of this plant will be handled by the respective cluster committee. It is estimated at moderate scale that in the beginning plant may operate in a year at 30% level of its installed capacity. In view of this it may not be economically viable to recruit the labor exclusively for this purpose. The plant may be operated by the staff available with the committee for which the committee will get the labor charges from plant account at the rate of 10% of the total variable costs. It is expected that through this operation the committee will generate an income of Rs. 54000 per annum @ Rs. 10 per bag as management commission over and above actual manufacturing cost from 5400 bags of urea briquettes produced annually.

Projected operational economics of the plant operation is given below.

1. The plant will be operated at the 30% level of its installed capacity that is, in a year plant will be run for 90 days.
2. Per day production capacity of the plant is 1200 kg.
3. Total production in the year will be 10800 kg.

Economics of Urea DAP Briquetting machines is given on next page

Economics of Urea DAP Briquetting Machines

No.	Details	Cost in `
Fixed costs. (`)		
1	Machinery depreciation @15% of the cost Rs. 1,31,000	20550
2	Annual maintenance charges	5000
3	Rent of the shed @of Rs. 500/month	6000
4	Sub Total	31550
5	Fixed cost per 20 kg of urea briquettes (31550/5400)	5.85
Variable costs. (`)		
6	Material cost (Urea and DAP in proportion of 60:40 in 108000 Kg.)	
6.a	Urea – (64800 kg in total briquette quantity of 108000 @ Rs.6.00/kg)	388800
6.b	DAP- (43200 kg in total briquette quantity of 108000 @ Rs.10.50/kg	453600
6.c	HDPE bags for packing Size 20kg. - No. 5400 bags for 108000 kg briquettes – Cost Rs.2/bag	10800
7	Total material cost	853200
8	Power cost 35 units per ton of production for 108 tons @ Rs.4 /unit (35 X 108 X 4)	15120
9	Total material and power cost	868320
10	Handling losses @ 2.5% of the total material cost (a+b+c)	21330
11	Labor cost 10% of total material and power cost	86932
12	Total variable cost for 5400 bags production(9+10+11)	976582
13	Per bag variable cost for 20 kg urea briquette bag (955252/5400)	180.85
14	Per bag total production cost (4+11)	186.7
15	Sale receipts through sale of 5400 bags @ `240/bag	1296000
16	Net income	319418
17	Cumulative figures for three units at Devathan, Pombhurna and Indaram	
18	Total variable cost for 5400 x 3 =16200 bags production.	2929746
19	Sale receipts through sale of 16200 bags @ `240/bag	3888000
20	Net income	958254

Three units at Devathan, Pombhurna and Indaram will be operated during post project period.

5. Shed net houses

To cater the need of agri-horti-forestry saplings; shed nets have been established at five clusters. These shed nets have been erected at the campus of community resource centers and care is taken by respective village committees. At some places; SHGs are encouraged to take up nursery raising at this shed net.

Operational details and Economics of Shade net house - 2000sq.feet: Crop –Tomato, Cauliflower, Cabbage, Brinjal and Chilly

No.	Item	Unit Cost (₹)	Total cost (₹) for 1000 sq. feet
1	Land preparation / Bed preparation (labour – 8 persons)	80	640
2	Seed 30 packet (10gm)		10500
3	Farm yard manure (FYM)- 600Kg		300
4	Soil sterilization/Bav isten/pesticide etc.		200
5	Seed sowing ,seed treatment, fertilizer application and watering charges		1000
7	one Labour required for 30days for watering, weeding, application of pesticide and selling seedling etc.	100	3000
	Total cost for 1000 sq. ft.		15640
9	Sale receipts from sale of 90000 Seedling from farm of 2000 Sq. feet @ 0.75 paisa per seedling.	0.75	67500
10	Net income (67500 -15640)		51860
Totals for four units at Mandane, Devthan, Pobhurna and Indaram			
	Total cost		62560
	Total sale receipts		270000
	Total net income		207440
Seed sowing distance:- Row to Row – 10cm / Plant to Plant – 2 cm 45 seedling/ sq. feet, thus seedling can be raised from 2000 sq. feet			

6. Seed Production

Availability of quality seed at local level is a prerequisite to increase crop yield. It is observed that timely availability of reliable good quality seeds at reasonable costs has become a common problem in many areas. Therefore selected farmers are encouraged to take up seed production with technical consultation and close monitoring by Technical staff and scientists of BAIF.

- Seed production is taken on 57 acres of land (45 acres soybean + 12 acres gram)
- Seed Production: Total 6 quintal of soybean and 15 quintal of gram was qualified as seed. The seed was procured @ Rs. 3018/q for soybean and Rs. 2160/q for gram

Response from the participants both the seed cultivators and seed utilizing community has been quite satisfactory. This experience reflects that farmers are inclined to buy the seed that is grown in their own area, though it may be made available to them under truthful category. Therefore it is envisaged that cluster committees can take up seed production as a commercially sustainable activity. As the prospective sale of the seed will be mostly restricted to local areas it can be easily managed by committee. Instead of growing through the cumbersome process of seed certification the produced seed will be sold under truthful category.

Economical viability and sustainability of the operation is shown in the table given below.

No.	Item	Cost/ day (₹)	Total cost/acre (₹)
1	Land preparation		
a.	cleaning		640
b.	Ploughing		1000
c.	Harrowing		500
d.	Farm yard manure (FYM)- 5 Tone 50% for one crop		1250
2	Spreading of FYM (1 labour)	100	100
3	Mixing with harrow (5 male)	100	500
4	Sowing ½ day (3 labourers)	100	300
5	Seed Cost (40 Kg)		1200
6	Fertilizer application cost/ seed treatment		1500
7	Weeding (10 labourers)	60	600
8	Application of pesticide/ Fungicide		300
9	Irrigation charges (6 irrigation: 6 labourers)	100	600
10	Electricity charges		200
11	Harvesting		1200
12	After care drying		100
13	Seed plot registration		200
14	Seed processing @ 150 per quintal with expected yield 14 q / acre		2100
15	Bagging, tagging (35 bag , 40 Kg packing)		1050
16	Transportation charges		1000
17	Other charges		500
18	Total cost		14840
19	Sale receipts through sale of 35 Bag (40Kg packing) @ 1100 / bag		38500
20	38500-14840 =23660 Net income		23660

7. Forest based intervention: Tasar Sericulture

Success of Tasar activity at Gadchiroli district as a supplementary livelihood has been amply demonstrated under NAIP-3 project. Within two years of implementation the number of participants has gone up from 63 to 133 meeting the physical target as well objectives of income from Rs2000 to Rs 6000/crop. Of this a two year old group of 11 participants earned Rs 26000/person during the 2009 -2010 as compared to previous Rs 2000/person. This programme could have far reaching advantage when Tasar activities become family enterprising by undertaking both farm and non-farm activity. Worm rearing provides seasonal cash income as well as employment during lay of period while non-farm activities like reeling and spinning give regular income. Anticipating the potential of Tasar Activity in Gadchiroli district, it is envisaged to promote it in integrated manner comprising of Seed production, egg preparation, silkworm rearing and reeling leading to creation of byproducts. It has more marketing opportunities being non perishable product and its linkages with weaving activities.

7.1 Potential for replication:

This year more than 150 families have expressed their interest to undertake Tasar rearing within the project area along with 70 people from nearby blocks reflecting that successful demonstration can be replicate. Gadchiroli district has potential to absorb 500 participants/families in tasar. Availability of abundant forest with host trees is the most favorable point for this prospective situation.

7.2 Sustainability strategy for continuation of this activity in post project period:

It is anticipated that about 200 families would participating in the programme. The tasar activities carried out in two parts, one is that of egg and seed production and another is post cocoon activities.

About 20 Sericulture Farmers Groups of 10 participants each will be formed in the area. Out of these; ten would involved in post cocoon activities and 10 others would be involved in seed/dfL production activity.

These groups will be linked to cluster level committee which in turn will be linked with project level apex body that will be involved in organizing the marketing activities and arranging for required input supplies to the SHGs through the cluster level body.

Core staff will consist of two technical officers, one for dfl activities and another for post cocoon activities.

It is envisaged that total annual expenditure required for cluster level structure would around Rs. 300,000. This money would be generated through the operations of cluster level

committee, mainly that of production/procurement and sale of the dfls and purchase of cocoons.

It is visualized that about 1.5 million cocoons will be grown in the area per annum. Through procurement and sale of these cocoons, annual profit of about Rs. 300,000 @of Rs0.20 per cocoon can be generated. With the production of 1.5 million salable quality cocoons, simultaneously there will be production of about 300,000 to 400,000 cocoons of unsalable quality. These cocoons will be used for reeling and production of tasar silk locally. Selling price of these cocoons will be Rs.0.60 per cocoon. This will result in generation of additional income of about Rs. 2-3 lakhs. This is how the fund requirement for sustenance of the activity will be ensured.

7.3 Constraints and counterproductive issues and strategy to address this:

Severe shortage of dfls (Tasar eggs) due to shortage of grainages is the major constraint in promoting it. It planned to ensure the availability of dfls through setting up of more grainages at participant level and to meet out the dfl requirement through this captive seed production instead of relying upon external sources for this supply. The process of capacity building of participants to take this activity is underway. It is being explored to develop the linkages with related government departments for obtaining some kind of help and support for setting up these grainages.

Projected Year wise/activity wise cash flow for the period 2012-2017

Year ↓	Activity						Total for all activities
	Projected income, expenditure & deficit/ surplus.	Cattle breeding centers	Bulk Milk Cooler	Urea briquetting	Shed net	Seed production	
2012-13	Income	727500	36000	3888000	270000	38500	4960000
	Expenditure	658550		2929746	62560	14840	3665696
	Deficit/surplus	68950	36000	958254	207440	23660	1294304
	Interest @8% pa						103544
	Total						1397848
2013-14	Income	800250	39600	4276800	297000	42350	5456000
	Expenditure	698063	0	3222721	68816	16324	4005924
	Deficit/surplus	102187	39600	1054079	228184	26026	1450076
	Interest @8% pa						116006
	Total						1566083
2014-15	Income	880275	43560	4704480	326700	46585	6001600
	Expenditure	739947	0	3544993	75698	17956	4378593
	Deficit/surplus	140328	43560	1159487	251002	28629	1623007
	Interest @8% pa						129841
	Total						1752847
2015-16	Income	968303	47916	5174928	359370	51244	6601760
	Expenditure	784344	0	3899492	83267	19752	4786855
	Deficit/surplus	183959	47916	1275436	276103	31491	1814905
	Interest @8% pa						145192
	Total						1960097
2016-17	Income	1065133	52708	5692421	395307	56368	7261936
	Expenditure	831404	0	4289441	91594	21727	5234167
	Deficit/surplus	233729	52708	1402980	303713	34641	2027769
	Interest @8% pa						162222
	Total						2189991
Total for five years	Income	4441460	219784	23736629	1648377	235046	30281296
	Expenditure	3712308	0	17886392	381935	90600	22071235
	Deficit/surplus	729153	219784	5850236	1266442	144447	8210061
	Management and other costs @ 400000/ per year						2000000
	Total interest						656805
	Total funds						6866866

Assumptions

1. **Cattle breeding centers:** Increase in work out in term of no. of AI will be @10% per year. Operational and other material cost escalations will be @ 7% per year.

2. **BMC:** Daily milk processing increase @10 % every year and proportionate increase in earnings through processing charges. Processing charges will be constant over the period.
3. **Urea DAP Briquetting:** This activity will be continued at both the existing units; Devthan, Pombhurna and Aheri. During the first year of operation the plant will be run at 25% of its installed capacity. However during post project period the production will increase @ of 10 % per year and the income will increase proportionately. Escalation of the cost assumed is @ of 7% per year.
4. **Shed net activity:** Shed activity will be continued at four places namely, Devthan, Pobhurna, Mandane and Indaram. Business operations will increase @ 10 % per year and operational costs will rise @7 % per year.
5. **Seed Production:** This will be continued at Ralegaon cluster. It will be taken up on one acre in the first post project year. It is assumed that the magnitude of operations will increase @ 10% per year and so the income will also increase at the same rate. Escalations in operational costs will be @ 7% per year.
6. **Management and other costs:** One person will be appointed to support the committees for smooth operations of these activities. The cost assumed for remuneration, travel and other expenses is Rs. 400000/- per year.