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Empowering fisher women community through makhana production system

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Abstract : The project on “Empowering the fisherwomen community through Makhana Production System in Andhrathari block of Madhubani District” which was implemented in the area for three years by a Non Government Organization with technical support of technical experts from ICAR, Government of Bihar, Banks, NABARD and Cooperatives has given good results and the outcome has added in livelihood of fisherwomen in the area. The work on all the objectives leading to Fisherwomen Community and goal set up for the project was properly taken care with satisfactory output. This can be a role model for other NGO for initiating good work in remote rural area. Similar project with enlarged mandate and clear-cut objective, well defined activities may be extended for next three years adding some newer area and incorporating integrated farming systems model for small & medium farmers for its horizontal and vertical expansion. The empowered fisherwomen community now enjoys much better social and economic status by harnessing prosperity through application of scientific management of makhana production system and coming together under cooperative and self help group. Beside impact of the empowerment on social status of women of fisher community, changes at individual level also took place significantly, especially on their age of marriage, education, health, enhance of income, decision making process, right to entitlements and participation in community activities. Similarly changes in family level was evident in respect of education within family - boys and girls, health status and health seeking behavior, decision making regarding matters of property, marriage and building of confidence.

Key words :

INTRODUCTION

About 4 million fisherwomen are engaged in fisheries sector which are facing gender inequalities. Gender development constraints need to be identified and addressed. The World Bank, IFAD, ADB and IFPRI has played significant role in development of fisheries and aquaculture in India. The fishery sector is a source of livelihood to over 14 million people and equal population is engaged in ancillary activities. Freshwater agriculture resources of the country have been estimated of the order of 13.67 million ha of which 2.25 million ha area in the form of ponds/tanks, 8.27 million ha beels / Jheels / derelict

water bodies and 3.15 million ha reservoir.

Makhana the livelihood support of fisherwomen:

Makhana (*Euryale ferox*) is a very valuable cash crop of Bihar, more particularly in the Mithila region. It is a priced delicacy with very high market demand in both national and International market fetching a very lucrative price. At present makhana cultivation is done mostly as monoculture fetching limited income. If it is integrated with fish culture it will greatly increase the profitability. This integrated farming of fish with makhana will result in most economical utilization of the water body. As the same pond would be utilized for the production both makhana and fish. Since makhana and fish culture would be done at same time, it will reduce the extra labour cost as well. No supplementary feeding is required in this integrated farming as falling and rotting makhana leaves

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will act as excellent organic manure which intern would facility the production of planktonic and other fish food organism, thus reducing the cost of fish production.

Most suitable fishes for integration with makhana culture air breathing fishes like singhi (*H. fossils*), Mangur(*C. batrachus*), Kawai or koi Anabas testudineus, Garai/Saur (*Channa spp.*). Some other fishes like mud eel (*Macrognathus aculaetum*), Gainchi (*Mastacembalus armatus*), Chelwa (*Oxygaster bacaila*), *Channa spp.* and a fresh water prawn Ichna M. lamerri. Indian major carps and exotic carps are usually not suitable for culture with makhana. Since, use sprawling leaves of makhana plant keep the water surface almost shaded for most part of the year, thereby greatly reducing the dissolved oxygen content of the water, which makes the environment unfavorable for the Asiatic carps.

Singhara scientifically called *Trapa bispinosa* is also an important crop of Bihar. Normally singhara culture is done in water impoundments along the railway line and roadside alos in larger water bodies. The fresh fruits of singhara are brownish green or red in colure and roughly triangular in shape. It is a delicacy and can be eaten either raw or boiled during an auspicious occasions or functions times people of Mithila prepared sweet dishes like Pudding, or Halwa out of this fruit. Singhara has good domestic

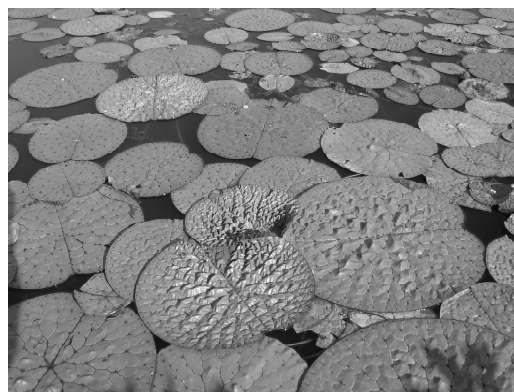


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domestic market. Singhara cultivation can also be integrated with fish culture to generate more income from the same water bodies, thereby improving the lot of rural prosperity and livelihood security.

Makhana a wonder crop of North Bihar:-

- Gorgon nut or fox nut, commonly known as makhana, is an aquatic crop with large floating leaves producing bright purple flowers. Botanically, it is known as *Euryale ferox* and it belongs to family Nymphaeaceae. Distribution of Makhana is limited to tropical and sub-tropical regions of South East and East Asia. However, it occurs in wild form in Japan, Korea, Bangladesh, China and Russia etc.
- Makhana is a high value commodity commercially cultivated only in Bihar and certain parts of eastern India. Besides this, it grows as a natural crop in Madhya Pradesh, Rajasthan, Jammu & Kashmir, Tripura and Manipur. With abundance of many natural and man-made water bodies' rich in organic detritus makhana grows profusely in the static water of wetlands, tanks, ponds, lakes and ditches in the northern parts of Bihar. Besides stagnant water bodies, it is also cultivated in paddy fields and low-lying areas.
- Cultivation of Makhana is highly cumbersome, labour intensive and involve human drudgery while sweeping bottom of the water body for seed collection. It is followed by processing of raw seeds, which is equally a painstaking activity. Fishermen community belonging to the weaker section of the society is mainly involved in makhana sector. These fishermen are organized into fishermen cooperative societies and the government ponds earmarked for fish cum makhana cultivation are leased to the cooperative societies and these cooperatives further distribute it among their members.

Table 1:SWOT analysis of Makhana Sector

STRENGTHS <ul style="list-style-type: none"> • Unique product of the state/clusters • Major production hub in the country • High nutritive and medical value • High potential of growth • High demand in local and export market 	WEAKNESSES <ul style="list-style-type: none"> • Poor market linkage • Manual harvesting and processing of makhana • Allocation of pond is replete with rigidities • Silting and eutrophication of water bodies
OPPORTUNITIES <ul style="list-style-type: none"> • Value added makhana products • Commercial production of makhana • Mechanized processing • Scope of area expansion and yield improvement • Improved packaging for long shelf life 	THREATS <ul style="list-style-type: none"> • Migration of skilled workforce to other states for employment • Shifting beds of river Kosi, Bagmati etc. • Recurrent floods Growing level of urbanization leading to shrinkage of water area

Table 2: Description of the area Madhubani:-

• Jhanjarpur	• Andhrathari
• Total population-162743	• Total population-147091
• Rural population-138631	• Rural population-147091
• Urban population-24112	• Literacy rate-41.1%
• Literacy rate –44.0%	• Sex ratio-963
• Sex ratio –980	• Main worker-34530
• Main worker – 21.7%	• Marginal worker-15186
• Marginal worker – 10.4%	• Non worker-97375
• Non worker –67.9%	

- As per estimates of the National Research Center for Makhana, Darbhanga (ICAR), total area under makhana cultivation in India is estimated to be 15000 Ha. It yields 1, 20,000 MT of makhana seeds, which after processing yields 40,000 MT of popped makhana pop. The estimated value of the production at farmers end is Rs 250 crore and it generates revenue of Rs 550 crore at trader's level.
- Based on the results of diagnostic survey and inputs from various stakeholders, it is estimated that the total area under makhana cultivation and production of makhana pop in the state is around 23,000 Ha and 15000 MT, respectively. The average productivity of ponds is around 1.5 MT of makhana seeds per hectare.
- District Madhubani occupies the highest share in total production of makhana pop. It is estimated that the production of pop in the district is around 3500 MT and it holds a share of 22% followed by Purnea district, which accounts for 18% of the total makhana production of the state.
- Since makhana is a cash crop, it is exported from Bihar to different parts of India and even outside the country and the major consuming markets are Delhi, Kanpur and Varanasi etc. Makhana is a highly nutritious crop and the main edible part is popped seed which is used for preparation of *kheer*, snack items etc.

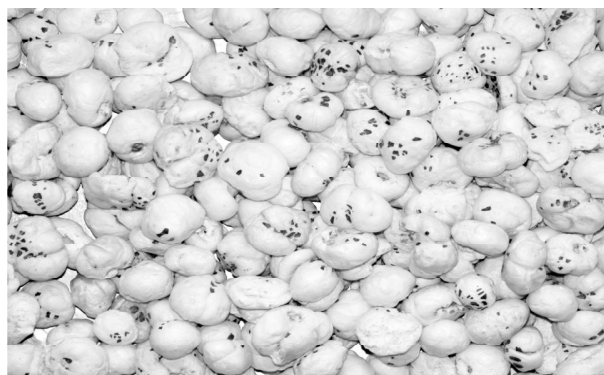
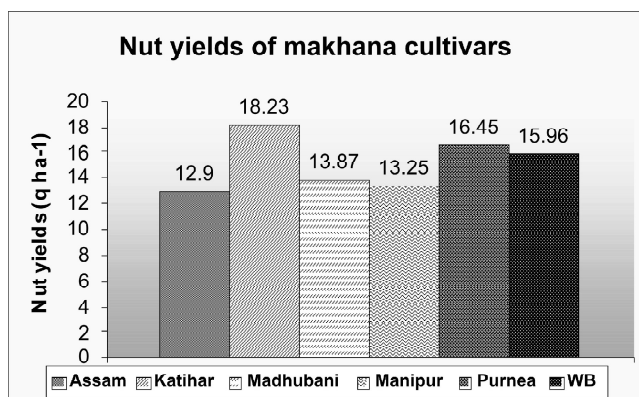
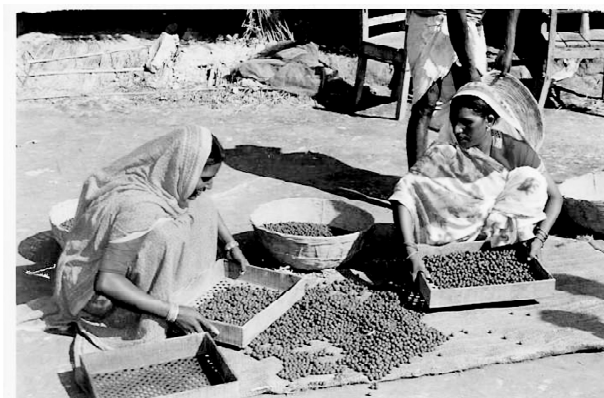
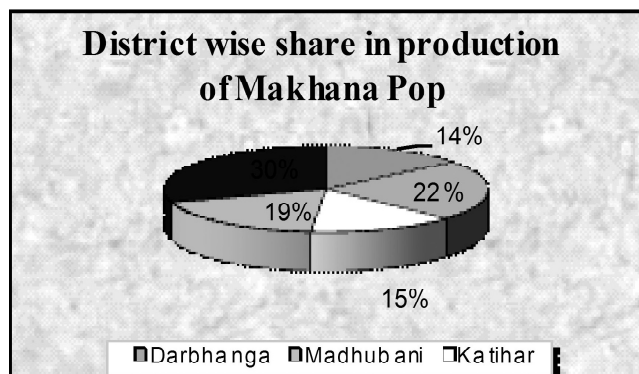


Table : A brief profile of these districts and identified clusters is mentioned below:

	Darbhanga	Madhubani	Katihar	Purnia
Total Area in sq km	2279	2501	3057	3229
Sub-divisions	3	5	3	4
Blocks	18	20	16	14
Total Population	3295789	3575281	2392638	2543942
% of urban population	8.11	3.48	9.12	8.74
Literacy rate in %	44.3	42	35.1	35.1
Sex ratio	914	942	919	915
Industry	Paper Mill, Handloom.	Handicraft	Jute, Paper mills	Jute Mills

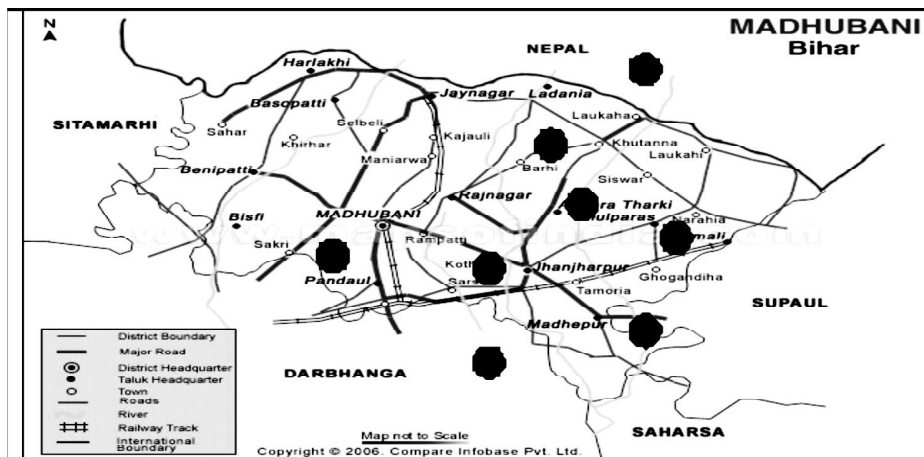
Source: www.bihar.nic.in

Major Findings: Field Survey

Based on the sample survey of 42 villages in makhana clusters of Madhubani district, major catchments in each

cluster, average pond size, no of families engaged in makhana cultivation, pond ownership etc was assessed. A summary report of the field survey is given below:

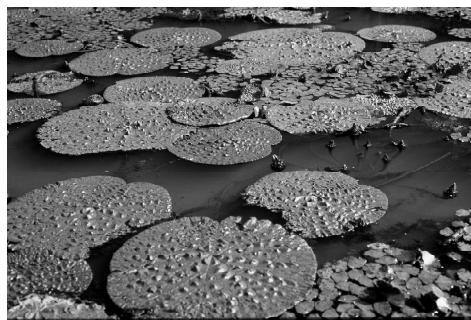
Clusters	Sample Villages	No of family engaged in makhana cultivation	No of Ponds	Average Pond size in Ha	Pond Ownership (Govt)	Pond Ownership (Private)
Rahika	7	377	48	1.1	62	38
Bhisphi	5	80	21	1.5	68	32
Rajnagar	5	190	46	1.0	27.6	72.4
Jhanjharpur	5	42	30	1.1	53.2	46.8
Pandaul	5	80	19	1.0	88	12
Andhratarhi	5	57	83	1.1	75.9	24.1
Ladania	5	50	40	0.9	56.6	43.4
Khajauli	5	103	23	1.4	82.3	17.7
Total	42	979	310	1.1	82.3	17.7



Around 1000 families are engaged in makhana cultivation in the sample villages, of which Rahika, Rajnagar and Khajauli clusters constitute around 70% of the total population of makhana growers. The average pond size in all the clusters vary from 1 to 1.5 Ha. Though the government owns 80% of the ponds, yet clusters of Rajnagar, Jhanjharpur and Ladanika have sizeable presence of private ponds also.

The clusters are also prone to floods due to Kamala and Bhutani Balaan rivers. The economy is primarily agrarian with pisciculture as an important source of revenue for farmers. Makhana is native to Madhubani and adept processors of the clusters are well acknowledged outside the district for their processing skills. However, absence of industries and unemployment has led to considerable out migration of local work force to other states. Madhubani town is a major trading center for makhana clusters with presence of five major wholesalers. They procure makhana seeds as well as pop from the farmers and hire skilled processors for processing operations. Approximately 3500 MT of makhana is traded in the district. The produce is transported to other states through surface transport.

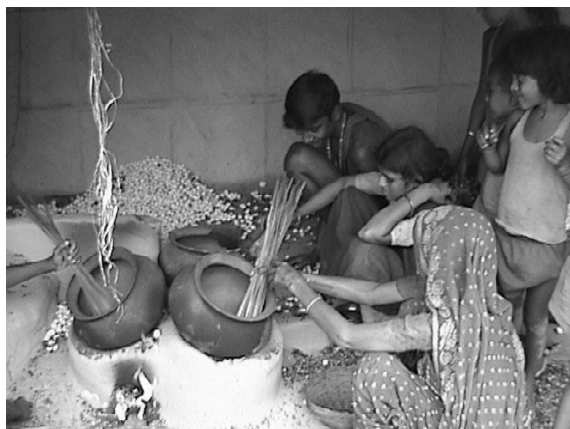
Fisherwomen Perception on Makhana Cultivation



- No improved variety of makhana seeds has been released so far; hence productivity of the crop is stagnant for years.
- Eutrophication of water bodies due to rapidly growing aquatic weeds like *Eichhornia*, *Salvinia* and *Lemna* etc adversely affect the aquatic environment of the plant. The gigantic leaves act as a barrier and obstruct light penetration during the growing stage of the crop and thereby suppress the growth of the plant.
- Lack of improved crop management practices like weed management, pest management for makhana.
- Recurrent flood devastations lead to siltation of ponds, which is the precursor for virtual disappearance of makhana from many water bodies and hence acreage under makhana cultivation is dwindling.
- Due to urbanization around clusters, land reclamation, encroachment, pollution of water bodies by domestic refuse, sewage and field outwash etc, considerable number of makhana water bodies were totally converted for other uses.
- Shifting beds of river Kosi, Bagmati and gandak has filled in many of the natural and man-made water bodies with salt and sand and several new water logged sites have emerged where makhana cultivation has been started a fresh.
- The process of seed collection is strenuous involving a thorough sweeping of the entire bottom floor of the water area. Sweeping of the floor, making heaps and their on retrieval requires several dives inside the water that makes the job really difficult.
- Processing of makhana seeds is laborious, time-consuming process and causes pain, burns and injuries to the processors hands as it involves handling of hot roasted nuts manually.
- Women and children are involved in roasting of seeds and hence spend sizeable time near fire, smoke and heat which leads to many health hazards.
- Availability of skilled workforce is a constraint because of their considerable migration to other states for employment. The people traditionally engaged in makhana cultivation have shifted to more lucrative engagements because of jobs with better wages and working condition.

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- The entire operation involves human drudgery to a great extent with unremunerative returns and hence the new generation is looking for other employment opportunities.



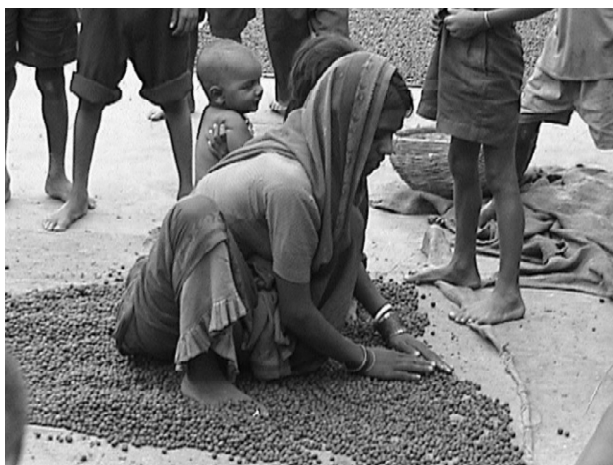
- **Steps Taken to Empower Fisherwomen:**

- A voluntary organization 'Sakhi' collected valuable information from the Project site by surveying large number of beneficiaries in Andharathari Block of Madhubani District, which is presented in the report. This structured survey using the 'Participatory Rural Appraisal Technique generated use full data about the area and created a data bank on infrastructural, agricultural, social, educational, cultural, Human Resource, natural resources aspects of this area in North Bihar, which is a disadvantage area as per Planning Commission categorization of the districts.
- Project assisted the fishermen (mallah community) of the area to enhance the Productivity sustainability and Profitability of fish and Makhana by using scientific and standard technology of fish and makhana production as recommended by ICAR and SAU's.

- Twelve Cooperative of the fisherwomen of the project site has been got registered, as a result of persistent effort under the project under Societies Registration Act of govt. of Bihar, which have over 250 female folk membership.
- Effort were successful is getting the legal right of over 16 ponds by 21 groups of fisheries and on 14 ponds by 8 groups of makhana cultivator of the area. This is not a mean achievement. It has opened the eyes of the fisher folk community on the right of pond issue and how they are empowered and better educated on the subject of lease of ponds of production purposes.
- The district and the state authorities are now agreed on granting lease of fishery and makhana ponds to the fishermen community through fishery promotion cooperatives. Special emphasis will be given to allot ponds of lease to women cooperative society, as and when the present lease of pond will expire with the proactive support and sensitization by project, four all women Cooperative Societies have been awarded lease of 11 pounds during the current financial year in the project implementation area.
- Project developed very good liaison with the District, Commissioner and state level functionaries and officials. The Director Fishery govt. of Bihar, ICAR Research Complex for Eastern Region, Patna, National Research Centre for Makhana, Darbhanga are extending praiseworthy support in their programme implementation and helping them in their capacity building programme, farmers Trainings, demonstrations and interface with scientist programmes.
- Project has made considerable dent in training the fishermen of the area about their rights and duties as per the Society Act. The members have been educated in Society functioning, documentation, govt. rules, regulation and especially in process of formulating lease amount. Regular trainings, society meetings, core group meetings, exposure visits, interactive programmes help the beneficiaries to know were about cooperative and self help group formation.
- Now the members of the cooperatives are

knowledgeable, able to conduct their meetings independently and also record keeping of the cooperative.

- Skill development training conducted for various target groups of the project site has resulted in up gradation of expertise level of the fishermen. They are now well versed with the package of practices of fish and makhana cultivation. The scientific information and knowledge on various aspect of fish & makhana is available with the groups and they cooperate each other in sharing the knowledge and getting out of these.



- For capacity building programme and demonstration of appropriate technology leading to increased productivity is being run by specialized and highly skilled technical man power of project. The personnel are well trained in induced breeding and culture of carps and organic cultivation of makhana.
- However, some advanced trainings such as management in diseases of carps, brood stock

maintenance of Chinese carps & Indian carps, processing & value adding of makhana, packaging & effective marketing technique are required to be given to the beneficiaries, which will result in increased activities of fishery & makhana culture thereby enhancing the livelihood and profitability of the farmers & members of the cooperatives.

- One advanced training on composite fish culture was organized during the whole project period, which is insufficient. It should be a regular activity in the area which will go long way in enhancing fish production. CIFE/CIEERY/ICAR-RCER, Patna can be contacted to provide faculty support for organizing such trainings in the area.
- A good number of trainings on makhana cultivation, processing, value adding and marketing have been arranged and the makhana growers are having good knowledge of makhana cultivation methods. NRC Makhana, Darbhanga is constantly providing necessary academic support for such trainings to the beneficiaries through Sakhi and other NGOs.
- Integrated farming of fish with Duck, Poultry, Dairy and Horticulture is the demand of the day. ICAR has demonstrated a successful model of integrated farming system based of aquaculture it has all infrastructure and other pre-requisites for developing a demonstration model for less than one acre, which will benefit the beneficiaries of the project area and neighboring villages.
- Similarly, ICAR has perfected the technology of Fresh water prawn culture, which can be implemented in the area. One model at Sakhi at Antrathary, own premises is operating, but it is not enough.
- Project successfully demonstrated the harvesting of a profitable yield of carp grow-out in ponds (16 ha) settled to the all Women Cooperative Society and SHG, formed with efforts from the project. This is having a overwhelming impact in whole area and is talked as a success story by people concerned.
- The awareness development programme and sensitization programme taken up in the project are praiseworthy. It is difficult to meet any fisherwomen farmer of the area who do not know the project progress and not aware of the good technology

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application work going on in the area for the betterment of the poor rural women / farmer.

- Tremendous efforts have gone to eradicate the non-productive ponds of the area from obnoxious weeds and making them productive, suitable for production of Fish/Makhana. However, still there are large number of ponds in the area which requires energizing by removal of weeds and proper maintenance of the pond for ensuring good and remunerative productivity.
- Six new ponds have been developed in the project area through community effort which is now being used for fish cultivation. However, being new ponds the productivity of these ponds is much below the desired level.
- The interview with the beneficiaries clearly indicated that the awareness level of farmers on scientific fish culture and makhana cultivation is quite high. However, in the fast changing scenario of technology development, regular training and up gradation of knowledge is a must and up scaling of technologies related to fish and makhana is necessity.
- The makhana growers of the project site reaped a good harvest during last makhana season in technical guidance of sakhi beside empowerment, as the prices of makhana pop was comparatively high this season, the farmers earned good profit from Makhana crop. However, the Makhana growers conveyed their need of having some high yielding improved varieties of the crop, which is presently not available. NRC Makhana, Darbhanga has initiated research programme for developing new variety, integrated fish makhana culture and enhancing livelihood through Aquaculture based farming system, which will cater the need of the makhana growers in near future.
- The farmers of the project site are able to get the benefit of various governmental scheme of fishery and other department, viz. loan and subsidy for construction of houses, hand pumps etc. were provided to over 120 farmers of the area.
- It is also necessary to demonstrate the composite fish culture technology with combination of 6 species in at least 5 centers so that the villagers can replicate the same in their ponds. Once the composite culture is successful the other concepts of integrating fish farming with other livestock's could be introduced.
- Adequate brood stock of Catla, Rohu, Mrigal is available at the farm but brood stock of Chinese carps needs to be augmented. Sterile common carp should be introduced. Aerator in brood stock pond is a new addition in farm accessories that will maintain oxygen level favorable for brood stock. Space for rearing of spawn to fry and fry to fingerlings can be made available by judicious use of ponds in farm by producing spawn in batches.
- Anticipating the success of the programme, fisherwomen may mobilize support from Government to start an Ice factory & cold storage in the region. Women groups should monitor growth of fish and keep a strict vigil over the ponds to prevent thefts.
- Fisherman community of the project area participated in various Transfer of Technology programmes and extension programmes conducted by public & private organization which could lead to upgrading the skill and enhancing profitability from their produce.
- Project could rope in various govt. & non govt. organizations visiting the project area time to time for interaction and Technical support. Banks, ICAR, ATMA, BAMITI, MANAGET, NABARD, Govt. Department official frequently visit the area and follow up the technology provided and cooperatives formed and its functioning. One up scaling Technology of water productivity was organized at Andhrathari in Sakhi compus by ICAR-RCER, Patna which was attended by over 75 participants. Such programmes make the area vibrant and development oriented.
- The productivity of the area can easily be doubled by application of appropriate technology. However, hindering constrains viz. awareness and education of fishermen communities, availability of trained manpower, credit facilities, inputs, availability of fish seeds of desired species and size at given time, availability of other inputs such as organic and inorganic manures, good quality feed, processing and storage facilities, Transport, roads, proper marketing

facilities, promoting public private partnership, formation of cooperative societies, SSG, setting up of agro based industry are required to be removed.

- The Fish/Makhana is highly profitable. Assuming an average fish production of 3 tonnes/ha from composite fish culture and sale price of a minimum



Rs.70/-kg, aquaculture can fetch net profit up to 1 lakh/ha better than any agricultural crop. Similar is the story of Makhana which gives wonderful return after difficult cultivation/harvesting work.

Socio-Economic Empowerment and changing of face of fisherwomen community:

- Peoples are engaged in the activity of fisheries, agriculture, vegetable cultivation, vending.
- Fishermen and women got training in different activities of fisheries.
- Cooperative societies of men and women are functioning at block level.
- The production level has enhances. Income of the people engaged in different activity increased which enable them to meet their daily requirement.
- Awareness among the fisheries community is increasing. They are aware about their rights and the different government programs.
- Decreasing migration, particularly of the farmer class and fishermen community.
- Involvement of women in decision-making process of the society.
- Awareness in the society about the vaccination and proper health facilities.
- Enjoying prosperity, progress and peace by using appropriate technologies.

Fisherwomen are a new force of the rural area ready to take up any challenge.

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