



**ADAPTATION FUND**

**REQUEST  
FOR PROJECT/PROGRAMME  
FUNDING FROM THE ADAPTATION FUND**

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. The final project/programme document resulting from the appraisal process should be attached to this request for funding.

Complete documentation should be sent to:

The Adaptation Fund Board Secretariat  
1818 H Street NW  
MSN P4-400  
Washington, D.C., 20433  
U.S.A  
Fax: +1 (202) 522-3240/5  
Email: [afbsec@adaptation-fund.org](mailto:afbsec@adaptation-fund.org)



## ADAPTATION FUND

**PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND****PART I: PROJECT/PROGRAMME INFORMATION**

Project/Programme Category:	REGULAR
Country/ies:	INDIA
Title of Project/Programme:	BUILDING ADAPTIVE CAPACITIES OF SMALL INLAND FISHERS FOR CLIMATE RESILIENCE AND LIVELIHOOD SECURITY, MADHYA PRADESH, INDIA
Type of Implementing Entity:	NIE
Implementing Entity:	NATIONAL BANK FOR AGRICULTURE AND RURAL DEVELOPMENT (NABARD)
Executing Entity/ies:	<b>TOWARDS ACTION AND LEARNING(TAAL)</b>
Amount of Financing Requested:	US\$1,790,500 (in U.S Dollars Equivalent)

**■ Project / Programme Background and Context:**

*Provide brief information on the problem the proposed project/programme is aiming to solve. Outline the economic social, development and environmental context in which the project would operate.*

**1.1 Problem Context****1.1.1 Fisheries in Global Context<sup>1</sup>**

Global fish production has increased at an average annual rate of 3.2% during the last five decades and has been estimated at 91.2 million tons in 2012. Within the global production of fisheries inland water capture fisheries was 11.6 million tons, which was 13% of total capture production. The increased production has been accompanied with an increase in per capita fish consumption from an average 9.9 kg per capita in the 1960s to 19.2 kg per capita in 2012. Fish represents 16% of all animal protein consumed globally.

<sup>1</sup> Global data has been taken from reports: *2014 State of World Fisheries and Aquaculture*, FAO; *Fish 2030 Prospects for Fisheries and Aquaculture*, World Bank Report no 83177-GLB

Fisheries and aquaculture provide livelihoods for 10-12% of the world's population. There are 58.3 million persons engaged in (primary sector) of capture fisheries in 2012 of which 37% were in full time employment, 23% part time and the remaining as occasional fishers. Employment in the sector has grown faster than the world's population and growth in the traditional agriculture sector. Women account for 15% of the persons engaged in fisheries primary sector and up to 90% in secondary activities.

Globally, the contribution of small-scale fisheries to poverty alleviation and towards food and nutritional security are being increasingly recognized<sup>2</sup>. Small-scale fisheries contribute about half of global fish catch. If we take into account fish catch for human consumption then the share of small-scale fisheries increases to two thirds. Further, small-scale fisheries employ more than 90% of the world's capture fishers and fish workers of which 50% are women. Most small-scale fishers are self-employed directly engaged in providing food for their households.

### 1.1.2 Fisheries in India<sup>3</sup>

India is the third largest producer of inland fish and second largest producer of farmed fish. Marine and inland fisheries are the two constituents of the fisheries sector in India. Marine fisheries are carried out in the 2.02 million sq. km. of oceanic resources. The declaration of the Exclusive Economic Zone (EEZ) has enabled India to have absolute rights to conserve, develop, and optimally exploit the marine resources. Inland fisheries resource include 1.96 million km stretch of rivers and canals, 29.07 million hectares (mha) reservoirs, 24.4 mha ponds and tanks, 7.98 mha of beels/derelict water bodies and 12.4 mha of brackish water areas.

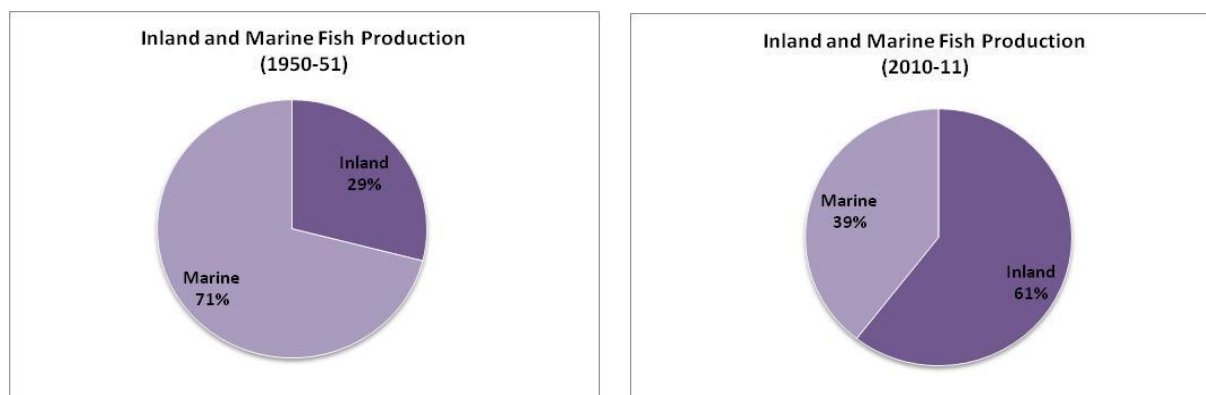


Figure 1 Proportion of Inland and Marine Fish Production in Total Fish Production

The proportion of marine and inland fish within the total fish production has changed significantly between 1950-51 and 2010-11. The proportion of marine production decreased by 32 percentage points in the past seven decades and the contribution of inland fisheries increased in the fish production portfolio of the country that was 8.33 million tonnes in 2010-11.

<sup>2</sup>The Future We Want, Rio+ Outcome Document; *Voluntary Guidelines on Responsible Governance of Tenure of land, fisheries and forest in the context of National Food Security*, FAO; *International Guidelines on securing sustainable Small Scale Fisheries*, FAO Feb 2014.

<sup>3</sup> Data has been taken from *Handbook of Fisheries Statistics, 2012*, Department of Animal Husbandry, Dairying and Fisheries, Government of India and *Report of Working Group on Fisheries for 12<sup>th</sup> Five Year Plan, 2012*, Planning Commission Government of India.

The fish production in the country has shown an increasing trend in the past five decades at an annual average growth rate of 6%.

The growth in inland fisheries reveals a low and steady rate in the first thirty years that underwent a quantum jump and increased at a high rate from 1980-81 onwards.

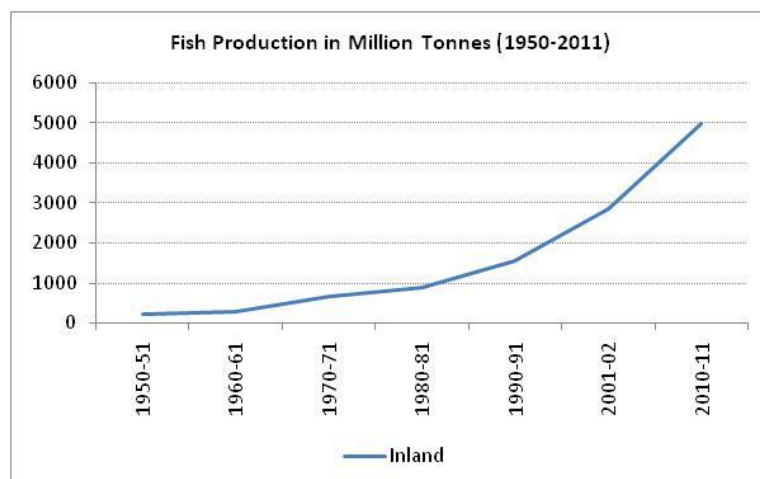


Figure 2 Inland Fish Production in India

A significant characteristic of inland fisheries is its small-scale nature. It is a traditional economic activity undertaken by fisher communities. Smaller water bodies in the form of ponds and tanks with a water spread area of 2.4 mha are the major aquatic eco systems for fresh water fish culture in the country. The sector is largely unorganised due to scattered and diffused activity in different regions of the country.

The water spread area under ‘tanks and ponds’ of about 24.14 mha offer immense potential for fish production. However, the gap between present and potential productivity is almost 5 to 7 times that, and indicates the potential for fisheries in small water bodies of which many are located in the rainfed areas.

Productivity gap in different water bodies (kg/ha/year)		
Water bodies	Present productivity	Potential yield status
Small reservoirs	50-100	250-300
Floodplain wetlands	250	1500-2000
Tanks	300-500	2000-4000
Ponds	400-600	3000-5000

Source: Sub-Group-II Report anchored by CRIDA for the Agriculture production system (12 V year plan).

The fisheries sector is a source of livelihoods for over 14.49 million people engaged fully (27%), partially (32%) or as occasional or in subsidiary activities (41%) pertaining to the sector. An equal number are engaged in ancillary activities in fisheries and aquaculture as well. The sector contributes to about 1.04% of the Gross Domestic Product of the country amounting to Rs.356.5 billion during 2007-08 (Govt. of India, 2008).

### 1.1.3 Fisheries in Madhya Pradesh<sup>4</sup>

Madhya Pradesh is situated in the central region of India. The state is mainly plateau land with the exception of valleys of Narmada and Tapti rivers and interspersed with mountains of Vindhya and Satpura ranges. The state gives birth to the Narmada, Tapti and Mahi rivers and contains sub catchments of the Ganga, and Yamuna rivers. The total river length of 17,088 km and 3.95 mha

<sup>4</sup> Source: Department of Fisheries, Government of Madhya Pradesh

of water spread area in reservoirs represent the available resources of fisheries in the state. Of the available reservoir area, 98% has been brought under fisheries that include 0.60 mha of rural ponds.

The fish production in the state was 56.45 thousand tonne in 2010-11 that represented 1.13% of the total inland fish production in the country. The total production of fish in the state has shown a variegated trend though during the decade, and total production has increased by 16% between 2000-01 to 2010-11.

Fisheries are a major source of employment for the rural population. It has generated 154.67 m person days of employment in 2010-11 and was identified as a critical source of secondary employment for families. The cooperative sector has 65,377 members in 1,911 cooperatives. Amongst these 2% were cooperatives comprising of women members only.

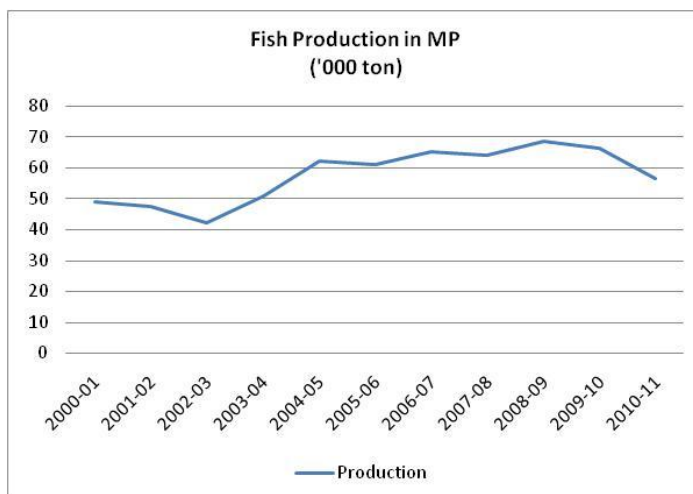


Figure 3 Fish Production in MP

## 1.2 Project Area

### 1.2.1 Geographical Coverage

#### Madhya Pradesh

The State of Madhya Pradesh lies between latitude 21<sup>0</sup>04'N-26.87<sup>0</sup>N and longitude 74<sup>0</sup>02' and 82<sup>0</sup>49'E, and is centrally located. The State physio-graphically has a varied land form with large plateau and numerous mountain ranges. Madhya Pradesh is the second largest state with an area of 0.3 m sq.km which constitutes 9.38% of the land area of the country.

The state is divided in to 11 agro-climatic zones which are the basic units that define micro climatic trends. The agro-climatic zones include the Chattisgarh Plains; Northern Hill Region of Chattisgarh; Kaimur plateau and Satpura hills; Vindhyan Plateau (hills); Central Narmada valley; Grid (Gwalior) region; Bundelkhand region; Satpura Plateau (hills); Malwa plateau; Nimar Plains; and Jhabua hills.



Figure 4 Map of State of Madhya Pradesh

The climate risks identified in the State Action Plan for Climate Change (SAPCC) with respect to temperature and precipitation indicate warming of the climate and an increase in intensity and frequency of precipitation along with the delay in the onset of the monsoon. The projected changes till the end of the century have been forecast as follows:

Parameter	2021-2050	2071-2100	Spread
Daily Max Temp	Increase by 1.8-2.0°C	Increase by 2.4-4.4°C	Across the state
Daily Min Temp	Increase by 2.0-2.4°C	Increase by > 4.4°C	Across the state
Monsoon Precipitation	Increase by 1.25 times	Increase by 1.35 times	No change in northern districts (2021-50) Excess rainfall in central, eastern and western part (up to 1.45 times)
Winter precipitation	Decrease	Increase between 1.45 to 1.85 times	Increase is in central, south and western regions

The vulnerability analysis of the state in SAPCC has mapped the districts and the agro-climatic zones on the socio-economic and biophysical indicators. Based on the vulnerability map three agro climatic zones of the state were identified as highly vulnerable on both the parameters: the Jhabua Hills, the Bundelkhand and the Vindhyan region.

The vulnerability rank of districts compiled at the national level ranked Jhabua district (including Alirajpur district that was carved out of Jhabua) as very high i.e. rank 48 out of 50 districts (hence highly vulnerable). The agro-climatic zone of Jhabua hill covers the entire districts of Jhabua, Alirajpur and extends up to southern part of Dhar district (including tehsils of Manawar, Gandhwani, and Kukshi).

### Project Districts

The project is proposed in the agro-climatic zone of Dhar, Jhabua and Alirajpur district. Amongst these districts Alirajpur was carved out of Jhabua as an autonomous district in 2008. As a result the data before 2011 the data for Alirajpur is included in Jhabua, though after 2011 data for Alirajpur is available separately.

**Dhar:** Dhar district is located in the south western part of the state. The district extends over three physiographic divisions: Malwa plateau in the north, Vindhya range in the central zone and the Narmada valley along the southern boundary. The district is generally dry except during monsoon months. The summer season sets in March and lasts till June where in the monsoon sets in lasting up to September. With October and November as transitionary months the winter months are from December to February.

### MADHYA PRADESH



Figure 5 Location of Dhar District in MP

The average rainfall is 875 mm with 91% of the rainfall being received in the monsoon months. May is the hottest month with mean daily maximum temperature remaining above 40°C. January is the coldest month with mean daily minimum at about 10°C. The district is dry with relative humidity less than 20% during summer months. Winds are generally light though they gain in strength in the summer and monsoon season.

**Jhabua (including Alirajpur):** Jhabua district is located in the south-western extremity of the state. It occupies the hilly tract along the western margins of Malwa plateau and north of Narmada river. Most of the area is covered by Archaeans and the Deccan Trap. As a result of differential erosion by major streams in the plateau region undulating valets have been carved out in the district.

The district is generally dry with summer and winter months recording relative humidity less than 20% in the afternoon. There are four distinct seasons in the district with summer months being March to May. June is when the monsoon sets in that lasts till September. The average rainfall of the district is 828 mm and 93% of it is received in monsoon months. May is the hottest month when the mean daily maximum temperature is 39.5°C though the district has recorded a maximum temperature of 45°C as well. January is the coldest month when the mean daily minimum temperature is 11.3°C though in the wake of cold wave temperatures have gone down to 2 or 3°C. Wind speeds are high during May and about middle of September.



Figure 6 Location of Jhabua District in MP

District Fact Sheet- 1				
Parameter	State	Dhar	Jhabua	Alirajpur
<b>Population</b>				
<i>Persons</i>	72,626,809	2,185,793	1,025,048	728,999
<i>Density (persons per sq kms)</i>	236	268	285	229
<i>% Rural Population</i>	72	81	91	92
<i>% Villages with Population</i>				
Less than 500	33	27	14	18
500-999	31	30	29	28
1000-1999	24	28	33	38
2000+	11	15	14	15
<b>Households – Rural</b>				
<i>No of Households</i>	11,080,278	339,173	175,934	113,129
<i>% Female headed household</i>	7	6	4	4
<i>Average Size of Household</i>	4.7	5.2	5.3	5.9
<b>Sex Ratio (Rural)</b>	931	964	990	1,011
<b>Rural Population</b>				
<i>% Scheduled Caste</i>	16	6	1	3
<i>% Scheduled Trine</i>	27	64	92	93
<b>Literacy</b>				
<i>Total</i>	54	45	31	25
<i>Female</i>	44	36	23	21
<b>Human Development Index</b>		0.596	0.398	Incl in Jhabua
Source: Census 2011; and Human Development Report 2007				

### 1.2.2 Social Context

The three districts comprising the project area, namely Dhar, Jhabau and Alirajpur are predominantly rural in composition with more than 80% of the population residing in the countryside. The districts are densely populated with density being higher than the state average, except for Alirajpur district. The villages are of smaller size with most of the population residing in villages with less than 2,000 persons.

The districts are predominantly inhabited by persons belonging to scheduled tribes with the Bhils and Bhilalas being the major

tribal groups in the district. The average size of household is bigger than the state average indicating a larger family size.

The situation of women seems to be better than the state average with a higher sex ratio and lower proportion of female-headed households than the state. However if the levels of literacy are taken as an indicator for status of women, then all the three districts perform poorly in case of female literacy. Alirajpur has the poorest literacy figures in the state.

Amongst the two districts Dhar fares better in Human Development Index (13<sup>th</sup>) with Jhabua coming last amongst all the districts of the state. Dhar and Jhabua have been identified as amongst the most backward districts in the country (by the Planning Commission of India), and these have been included in Backward Region Grant Fund programme and as districts with high out-migration under the MGNREGS programme.

### 1.2.3 Economic Context

District Fact Sheet- 2				
Parameter	State	Dhar	Jhabua	Alirajpur
<b>Working Population</b>				
<i>% Rural Population</i>	47	50	52	52
<i>% Main Worker</i>	68	74	71	71
<i>% Marginal Workers<sup>5</sup></i>	32	26	29	29
<b>Work Participation Rates- Rural</b>	41	46	54	54
<b>Main Workers</b>				
<i>Cultivators</i>	47	51	78	84
<i>Agriculture Labour</i>	38	39	14	10
<i>Household Industry</i>	2	1	1	1
<i>Others</i>	13	9	8	5
<b>Land holding</b>				
<i>Average landholding</i>	2.2	2.8	2.0	
<i>% Category of farmers</i>				
Less than 1 ha		31	38	28
1 to 2 ha		27	31	30
More than 2 ha		42	30	42
Gini Coefficient	0.5	0.596	0.398	Incl Jhabua
<b>Poverty</b>				
<i>% Below Poverty Line</i>	54	39	68	Incl Jhabua
<i>Below Poverty Line Households (2004-05)</i>				
Source: Census 2011; Poverty Estimates, State Planning Commission Madhya Pradesh				

More than half of the rural population of the project districts is working. Amongst the working population more than 70% are working for a large part of the year and have been identified as Main Workers. The work participation rates of women is higher than the state average and in Jhabua and Alirajpur more than half the women have been reported as main workers.

Agriculture is the main occupation of the inhabitants with 90% and more of the population in rural areas of the district is earning their livelihood from farm related activities, either as cultivators or as agriculture labourers. A significant fact is the presence of large proportion of cultivators who include farmers working on

their own land. It is more than 50% in Dhar and much higher in Jhabua and Alirajpur.

<sup>5</sup> Marginal workers are those workers who had not worked for the major part of the reference period (i.e. less than 6 months) are termed as Marginal Workers.

The presence of cultivators gains greater significance if their average holding is taken in to account which is higher than the state average in case of Dhar and lower in case of Jhabua and Alirajpur. This is again reflected in the proportion of farmers owning less than 1 ha of land and the percentage of farmers owning between 1 and 2 ha of land. The distribution of land among farmers is much more equal in Jhabua and Alirajpur than in Dhar given the value of Gini Coefficient in these districts. Despite inequalities being higher in Dhar the proportion of households below poverty line are lower than the state average as against Jhabua where more than two thirds of the population is estimated to be below the poverty line

#### 1.2.4 Fisheries in Project Districts

##### Target Group

There are five different types of fishers that operate in the project districts. The characteristics of these fishers are as follows:

Type of Fisher	Practice of fishing	Objective of fisheries	Proposed projects intervention
<b>Fish hunters</b>			
(a) Tribal Community	Catching fish from rivers and rivulets	Consumption and commercial is incidental	Project will <b>not</b> work with this group
(b) Traditional Fishing community	Catching fish from rivers and rivulets	Commercial gain	Project will <b>not</b> work with this group
(c) Tribal Community	Catching fish from ponds and water bodies. They do not practice fish culture.	Semi commercial (as an alternative short term gain)	Project will <b>not</b> work with this group
<b>Fish Farmers</b>			
(a) Tribal Community – Small and Marginal Farmers who take fishing lease rights over ponds	Practice fish culture	Commercial gain	Project <b>will work</b> with this group
(b) Non tribal community including traditional fishermen practicing <i>benami</i> fisheries	Practice fish culture	Commercial gains	Project will <b>not</b> work with this group as the leasing rights are in some other person's name (often a large farmer)

The project will work with members of scheduled tribe community fishers belonging to small and marginal farmer category. The main reasons for targeting this group are:

- the proposed project area in the three districts has been declared as schedule V area. In addition to the general provisions of the Madhya Pradesh Panchayat Raj and Gram Swaraj Act, the provisions of Panchayat Extension to Scheduled Areas Act will also be applicable. The latter

empowers the Gram Sabha to determine the manner in which natural resources will be used. In this area the first priority is for persons belonging to a scheduled tribe community who has to be the resident of the village<sup>6</sup>.

- the traditional fisher community in the three districts resides in block or district headquarters. They are not residents of the village, which is a major factor that excludes them from taking fishing rights over ponds. This community has moved towards trading in fish and they conduct regular shops in small towns and weekly markets. The members of the community sometime take leasing right through *benami* transaction (where the right is in the name of a tribal but actual fishing is done by members of traditional fisher community). It is for this reason that the project will **not** work with traditional fishers.
- Farmers with large landholding seek and procure fishing rights over ponds. These farmers do not undertake fish culture themselves but either sub contract the pond (a violation of lease agreement) or make minimal investments and employ fishers (traditional or other tribals) to harvest fish on royalty basis. The project will **not** target this group as it aims to work with fishers who are directly involved in and participate in activities related to fish culture.

### Scope for Fisheries

Dhar and Jhabua/Alirajpur have 899 and 629 rural ponds where fisheries can be taken up. This accounts for 8,403 and 1,734 ha of water spread area in the districts. The tribal groups residing in the districts are fish eating communities and there is regular demand for fish in the local markets. The local weekly markets and market places have shops for selling fish throughout the year though the demand during winters is much higher as fish with *tadi* (local liquor) is a popular combination during this period. The three districts are net importers of fish, mostly from Andhra Pradesh and Gujarat. This indicates that the present level of fish production in the project area is not able to cater to the local demand for fish in the districts.

The rights to give ponds and reservoirs for fishing are based on the size of the pond. According to the Policy guidelines of the Madhya Pradesh State Government the right for management of water bodies in the state for the purpose of giving rights for fisheries is as follows<sup>7</sup>:

Average Water Area (ha)	Institution Responsible to give Fishing rights
less than 10	Gram Panchayat
between 10 to 100	Janpad Panchayat
between 100 to 1000	Zila Panchayat
between 1,000 to 2,000	Department of Fisheries/ Madhya Pradesh Fisheries Federation
more than 2,000	Madhya Pradesh Fisheries Federation

<sup>6</sup> Refer **Annexure 3** Mapping Legal Provisions that are applicable for Fish Culture in Madhya Pradesh and Annexure Policy Guidelines and Subsequent Orders of the Government of Madhya Pradesh applicable for Fish Culture on Ponds less than 10 hectares

<sup>7</sup> Refer **Annexure 2** Policy Guidelines and Subsequent Orders of the Government of Madhya Pradesh applicable for Fish Culture on Ponds less than 10 hectares

The project will focus on ponds less than 10 hectares because:

- the impact of climate change will be more on small ponds as they do not have enough buffer to absorb the losses likely to take place in fisheries. Hence developing adaptive capacities for fisheries in small ponds will have greater significance and contribution toward practice of inland fisheries in the state and the region.
- the leasing rights for ponds of less than 10 ha are determined by the Gram Sabha and Gram Panchayat that work at the local level and the lease applicant is a member of the Gram Sabha and the resident of the Gram Panchayat;
- the potential lessee for the small pond will be the small and marginal farmer who is also the target beneficiary of the project. For such farmer a productive commercially viable fishery is a critical factor that affects their decision - whether or not to migrate?
- the management capacity of the small and marginal farmers and the time that s/he is willing to give is much better suited for small ponds than for large ponds or reservoirs; and
- small and marginal farmers tend to work as a family unit where women also contribute equally in conduct of livelihood activities. Targeting small and marginal farmers will facilitate increased involvement and participation of women in the project activities and their sharing in the benefits from project's interventions.

### 1.3 Climate Change

#### 1.3.1 Global Climate Change<sup>8</sup>

Global instrumental records of the past one and a half centuries reveal that earth has warmed by 0.74°C during the last hundred years. Temperature of extreme hot nights, cold nights and cold days have increased with increased risk of heat waves. Further the long term drying trends have been observed in precipitation over many large regions that include Sahel, Mediterranean, southern Africa and parts of South Asia. The records also show that intense and longer droughts over wider areas since the 1970s in the tropics and sub tropics have increased in frequency.

The global changes in climate have led to changes in atmospheric circulation, the intensity and variability patterns, and changes in hydrological cycles and seasonal patterns. The impact of changes in these physical forcing has a direct impact on biological processes supporting fish and fisheries production (Barange et al, 2009).

#### 1.3.1 Climate Change in India<sup>9</sup>

India's mean temperature showed warming trends of 0.51°C per hundred years during 1901-2007 (Kothawale et al, 2010). The INCCA 2010 has observed accelerated warming during 1979-2007 that is contributed by winter and post monsoon seasons that have increased by 0.80°C and 0.82°C respectively in the last century. The mean temperatures have increased by 0.20°C per decade during 1971-2007 with much steeper increase in minimum temperature than maximum temperature.

---

<sup>8</sup> Data from *Climate Change and India A 4x4 assessment, A Sectoral and Regional Analysis for 2030s*, INCCA, Nov 2010, Ministry of Environment and Forest, Government of India

<sup>9</sup> Data from INCCA, Nov 2010 unless referred otherwise

All India maximum temperature has shown an increase by 0.71°C per hundred years and the mean minimum temperature has significantly increased by 0.27°C per hundred years. The frequency of hot days show a gradual increasing trend and frequency of cold days show a significant decreasing trend during the pre-monsoon season.

The INCCA assessment reports an increased precipitation trend over the country. The mean rainfall has been calculated at 848 mm with a standard deviation of 83 mm. This implies increased uncertainty in prediction of rain due to its increased variability, a trend that is reflected in the fact that 43 out of 139 years were either in excess or deficient in rainfall for the country as a whole. The IPCC AR4 Climate Change projections indicate a decrease in number of rainy days, increase in the intensity of rainfall on a given rainy day, increase in extreme rainfall events and increase in the intensity of storms or monsoon depressions (Kumar, 2009). These projected Climate Change scenarios indicate a much greater potential of increased inflows into the water bodies fed by local catchments resulting in increased fillings and enhanced temporal storage.

### 1.3.3 Climate Change in Madhya Pradesh<sup>10</sup>

**Temperature:** The annual mean temperature of the state has increased significantly by 0.01°C per year during 1951-2010. Though no trend has been observed in mean minimum temperature the mean maximum temperature has however increased by 0.01°C per year. Seasonally the mean maximum temperature have increased for the summer and monsoon seasons by 0.01°C per year. The mean diurnal temperature range does not have an annual trend but it has increased by 0.01 and 0.02°C per year during summer and monsoon months.

**Rainfall:** The predominant rainfall in the state is during the monsoon months of June to September. The data for 1951-2010 reveals that there has been no trend in summer season rainfall though the winter rainfall has decreased by 0.06 mm per year. During the monsoon months there has been a decrease of 1.74 mm per year and annual the rainfall decrease is recorded at 1.81 mm per year.

The State Action Plan for Climate Change has assessed the trends of average annual monsoon for each agro climatic zone for the period 1961 to 2002. The assessment reveals that though there is inter annual variability of average monsoon rainfall in all the zones, the rain fall trend is decreasing in each of the agro climatic zones. The study by Goswami et al (2006) for data spanning 50 years that include data for the state as well concluded that extreme precipitation events (above 100 mm) are increasing in their intensity and frequency with low and moderate events becoming more and more infrequent.

### 1.3.4 Climate Change in Project Districts<sup>11</sup>

**Temperature:** The Participatory Rural Appraisal (PRA) exercises with the community in the area had concluded that the summer days are becoming hotter and that the duration of summer months is increasing. The temperature of Dhar and Jhabua were compared between the first and the second half of the 20<sup>th</sup> century. The comparison revealed that the average minimum temperature in the

<sup>10</sup> Data taken from *State Level Climate Change Trends in India*, Meteorological Monograph, Rathore et al, 2013 Ministry of Earth Science, Government of India

<sup>11</sup> The data in this section is sourced from India Meteorological Department (IMD)

second half was higher by 3% than the first half and the average maximum temperature was high by 1.5% during the same period.

The mean annual temperature of both Dhar and Jhabua districts show an upward trend as is evident from Fig 7. In both the districts the mean temperature has increased by 1°C during the past 102 years.

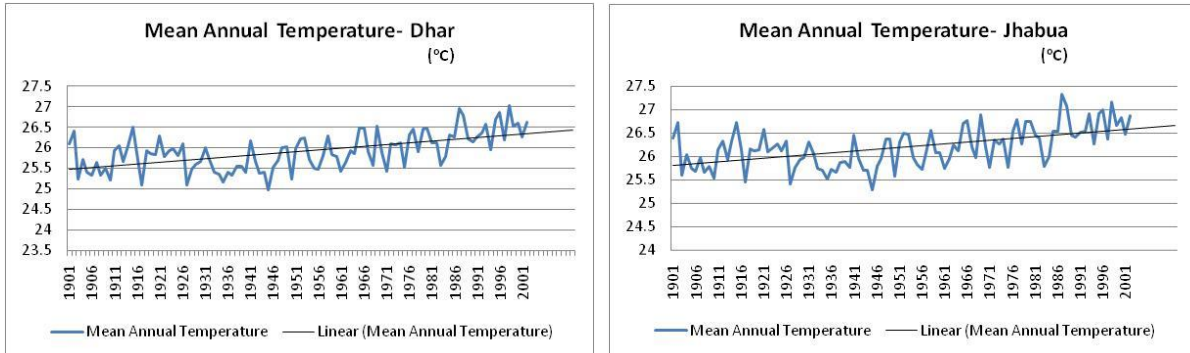


Figure 7 Mean Annual Temperature of Dhar and Jhabua

The increase in mean annual temperature has been on account of the increase in mean annual maximum and minimum temperatures in both the districts as is evident from Fig 8.

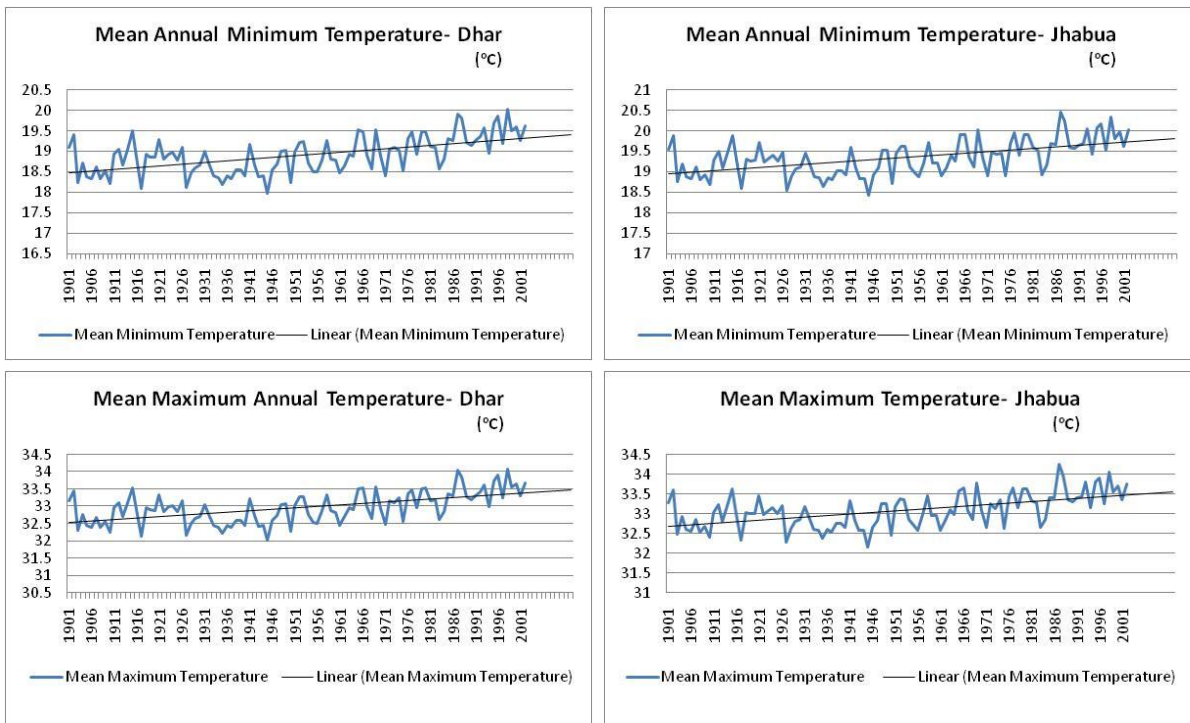


Figure 8 Mean Annual Maximum and Minimum Temperature in Dhar and Jhabua

The mapping of mean annual temperatures in summer (Mar-June) and winter (Dec-Feb) months for maximum and minimum temperatures in both the districts in Fig 9 reinforces the trend of temperature increase in both the seasons. That is, the summers are becoming hotter and so are the winters. In both the seasons the maximum and minimum temperatures show an increasing trend.

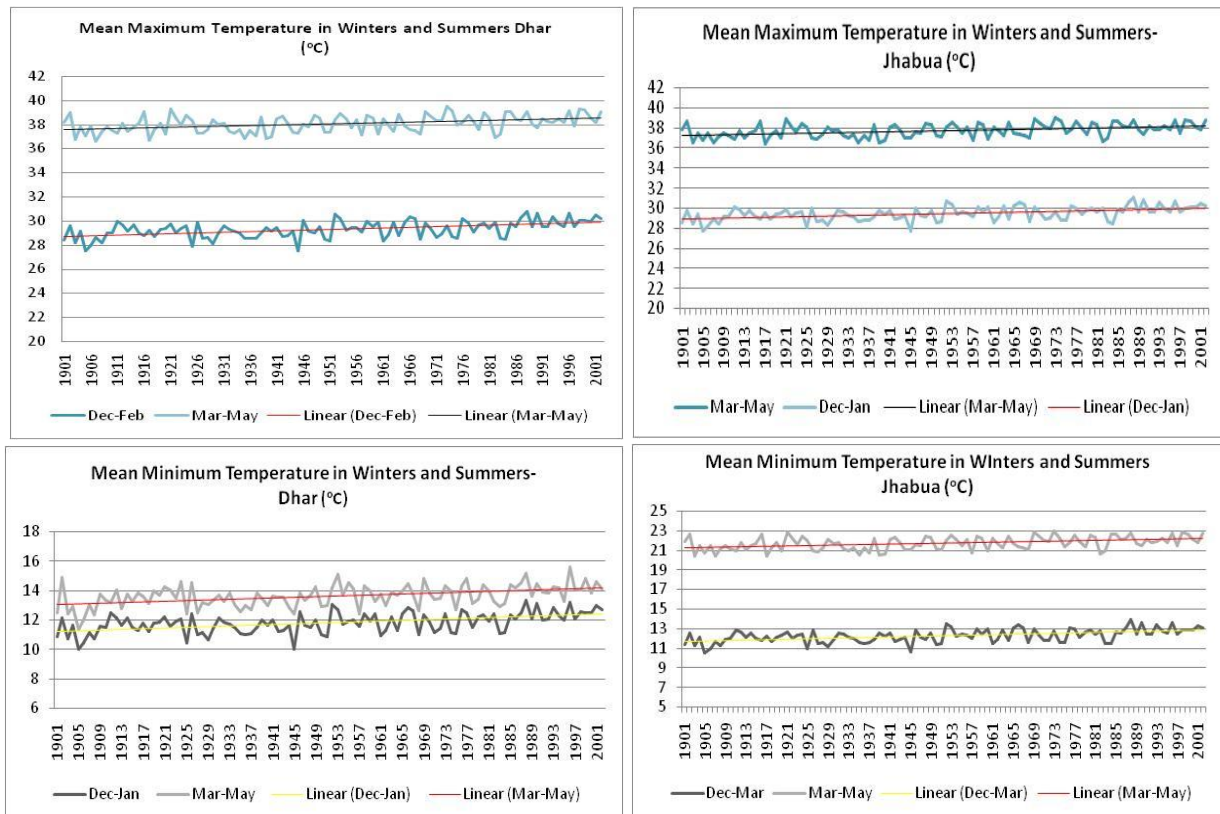


Figure 9 Mean Annual Maximum and Minimum Temperature for Summer and Winter Seasons for Dhar and Jhabua

The net result of observations of IMD data for the two districts supports the contention of the communities that the districts are becoming warmer and that the summer months are becoming hotter.

### Rainfall

The PRA exercises with the community pointed out that high velocity winds during summer months often blow away the rain bearing clouds thus lengthen summers and delaying the onset of monsoon. Another factor that has set in was the difficulty in prediction of monsoon for livelihood activities that are dependent on rains, like agriculture and fisheries.

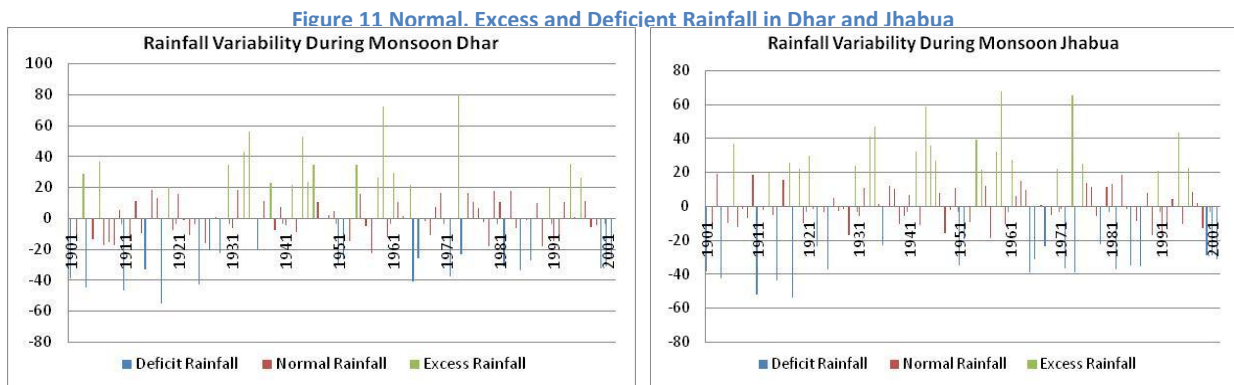
The 100 year India Meteorological Department (IMD) data from 1901 to 2000 reflects that the district receives mean rainfall of 834.2 mm. The district receives about 93.2% of the rainfall from June to September. The monthly rainfall variation between June to October is given in Table 1.

Table 1: Monthly Rainfall Variation in Project Districts

Rainfall 1901 to 2000- Dhar	Jun	Jul	Aug	Sep	Oct	Annual
Mean rainfall (in mm)	124.1	252.6	223.1	167.6	30.6	834.2
Standard Deviation (in mm)	77.1	97.1	118.8	125.6	42.5	236.9
Coefficient of Variation (in %)	62.1	38.4	53.3	75.0	139.0	28.4
Rainfall 1901 to 2000- Jhabua (including Alirajpur)						
Mean rainfall (in mm)	114.1	259.6	236.2	146.9	28.8	806.5
Standard Deviation (in mm)	83.7	126.8	149.5	124.3	49.8	286.2
Coefficient of Variation (in %)	73.3	48.9	63.3	84.6	173.1	35.5
<i>Source: IMD</i>						

The standard deviation calculated from 100 year data of rainfall indicates that the deviation from the mean is significant. It implies that the rainfall has been away from the mean indicating high variations. The coefficient varies from 38% to 75% in case of Dhar and 49% to 84% for Jhabua which points to low reliability of rainfall for all the districts.

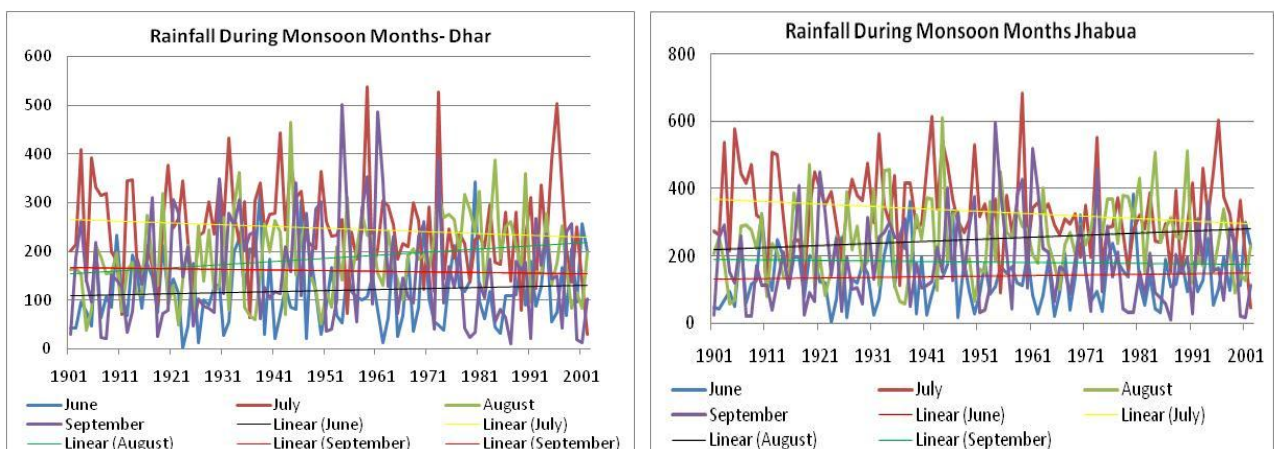
The low reliability of rainfall is further compounded by the extreme weather events that make prediction even more difficult. The departure of rainfall from normal ( $\pm 19\%$ ) leading to excess ( $>+19\%$ ) or deficit ( $<-19\%$ ) is mapped out in Fig 10. In Dhar 41 and in Jhabua 45 out of 102 years have been years of extreme rainfall variations. The excess rainfall in Dhar and Jhabua has



been in 20 and 23 years and deficit rainfall in 21 and 22 years respectively.

The behaviour of monsoon during the monsoon months has been undergoing a gradual change in both the districts. The average rainfall in June and July has been decreasing whereas it has been increasing in the month of August. The month of September in Dhar shows an increasing trend whereas in Jhabua it shows a decreasing trend. The observation of the people that the timing of onset of monsoon has been shifting is borne out by the hundred year data for both the districts. Both these factors have serious implications for inland fisheries as the onset of monsoon is a determining factor in introducing fish seed in the pond and increased rainfall in September implies risk of flooding that will lead to loss of fish as it will be flooded out from the pond.

The variation from the 100 year average rainfall in recent years is tabulated in Table 2. The data



**Figure 10 Trend of Rainfall During Monsoon Months Dhar and Jhabua**

indicates that the fluctuations are high implying high variability of rainfall. The issue of availability of water to carry out fisheries is becoming critical for the fishers, especially the small fish farmers.

<b>Table 2: Annual Rainfall Variation</b>					
<b>Annual Rainfall- Dhar</b>	2006	2007	2008	2009	2010
District Rainfall in mm	1137.3	1055	648.3	640.6	764.9
% Variation with respect to the 100 year average rainfall	36.33	26.47	-22.28	-23.21	-8.31
<b>Annual Rainfall- Jhabua including Alirajpur</b>					
District Rainfall in mm	1494.1	1188.6	632.2	622.6	639.8
% Variation with respect to the 100 year average rainfall	85.26	47.38	-21.61	-22.8	-20.67

The number of wet days during the monsoon months of June to September based on 100 year average data are 36 for Jhabua and Dhar. However from 1990 to 2002 the number of wet days has reduced from 42 to 29 days in Dhar and 40 to 27 days in Jhabua.

The variability of rainfall and the decrease in number of wet days indicates the need for adequate storage capacity of water that allows and enables productive fishery for most part of the year.

#### **1.4 Climate Change and its Impact of Inland Fisheries**

Climate change affects fishery production along many pathways. Fish reproduction and growth are affected by temperature, rainfall and hydrology. Changes in these parameters will therefore shift patterns of species abundance and availability. Patterns of change in fertility, nutrition and growth are also influenced by changes in climate. Extreme weather events could further harm fish production in rain-fed area by causing loss of aquaculture stock and destroying fishing and aquaculture infrastructure.

Some of the likely impacts of climate change/variability on inland fisheries can be as follows:

- Seed availability might be affected with warming as it has been observed that with increase in temperature there is a decrease in fish spawning and hence decrease in fish seed availability;
- Temperature increase will have an impact on the suitability of species for a given location with warm water fishes surviving more than the others;
- Growth retardation may take place in different inland water fish species suitable for the different temperature ranges;
- Seasonal shifts in the breeding period, as well as shortening or lengthening of breeding periods may occur for different types of fish;
- Geographical shift of fishes may also happen; and
- Increase in frequency and intensity of drought will decrease fish catch and thus pose a great threat to the communities which are dependent primarily on fisheries.

Fish farming entails production processes that include choice of fish species, feeding, harvesting, restocking that is under greater degree of human control. Increasing seasonal and annual variability

in precipitation and resulting flood or drought extremes become significant drivers of change in inland fisheries (Handisyde et al, 2006).

Small fishers operate in small ponds that dry up faster leading to shortened growing season and reduced harvest thereby narrowing choice of species for culture. There is lack of data on production of fish that is disaggregated for small pond fisheries. The main reason being that production from small pond fisheries is not transacted in the organised sector. Production is local and so is its sale and consumption. Hence it will be difficult to establish the impact of climate change on the livelihood security of small pond fishers. The proposal relies on the Vulnerability Assessment that was undertaken as part of the pilot project on climate proofing of fish farming under Meenakshi sub scheme of MGNREGS.<sup>12</sup> The observations and conclusions from the Vulnerability Assessment report are given below.

The PRA data collected from traditional fishermen in the pilot area revealed that there is a 20 to 40% fall in fish production in the area over a period of 25 years. The reasons for the decrease in production identified by them are:

- Delayed monsoon implies delayed introduction of fish seeds in the pond. The fishers anticipating low production tend to increase the density of fish seed in the pond so as to achieve the same level of productivity as before. This however has an adverse impact on growth of the fish and there is an overall fall in production. Traditional fishermen estimated that fifty percent of the fall in production is due to delayed monsoon.
- On account of extreme weather events like high intensity rainfall and floods, there is run off of excess water from the pond. This run off carries with it fish seeds/fingerlings resulting in total loss for the fisher.
- Decrease in post monsoon rainfall implies fast depletion of quantity of water in fish ponds. Fishers tend to over harvest fishes with the apprehension that the remaining water will evaporate quickly. As a result there are days when there is surplus fish in the market as the harvesting is not evened out throughout the season. The fishers, consequently, have to resort to distress selling on days when there is surplus fish in the market.
- The delay and fluctuation in monsoon creates pressure on existing water bodies to supply water for protective irrigation. Availability of water for fisheries decreases and in the absence of mediation mechanism between the fishers and farmers the use of water for irrigation takes priority over fishing.

The non climatic factors that further adds on to the vulnerability of small fishers is lack of market infrastructure and their lack of access to savings, credit and insurance products to compensate for their losses occurring due to factors of climate change. The institutional support to small pond fishers is not available as they are not linked to the Government schemes, if they are not part of federation or a common interest group. Even when they are part of the federation they lack capacities to fulfil the institutional and legal requirements.

### **1.5 Climate Change Adaptation in Inland Fisheries**

---

<sup>12</sup>*Vulnerability Assessment of Fish Farmers under MGNREG Scheme in Madhya Pradesh*, 2012 project implemented by TAAL and supported by GIZ in Gandhwani block of Dhar district

Small farmers in Dhar, Jhabua and Alirajpur districts traditionally depend on rain-fed agriculture for their livelihood. Some areas in these districts are irrigated with groundwater. However, groundwater extraction has reached a critical stage, since recharge rates are low. Lately, farmers have also been affected by changes in rainfall patterns, such as decreases in pre- and post-monsoon rainfall and a shift in the onset of the monsoon. Rising temperatures are another challenge. To increase livelihood options, small farmers have explored fisheries in small rural ponds as a viable option. The institutional processes allow the small farmers to gain access to these ponds by way of securing leasing rights, a decision that is taken at the Gram Sabha and Gram Panchayat level.

The small farmer turned small fisher has found income from fisheries to contribute significantly to their family income (between 25 to 40% of annual income). However the sustainability of small pond fisheries activities is threatened by changes in precipitation and temperature. Since high intensive rainfall events have become more frequent, causing surface runoff leading to high siltation rates of ponds. In addition, rising temperatures are likely to affect fisheries, e.g. changes in the breeding period, growth retardation and declining overall production.

There is substantial **Adaptation Deficit** in fish production in small water bodies. The system, stressed by climate variability, is operating under very low productivity regimes. It is important to fill-in the climate variability adaptation-deficit for the system to realize the opportunities open with Climate Change and to build resilience (Brander; 2007, Keptesky; 2000). In addition, the promotion of inland fisheries in rain-fed areas will add to resilience to climate change by diversifying the agriculture economy which is highly prone to drought conditions. These economies are net consumers of fish and hence increasing local fish production will reduce the carbon foot-print of fish transport.

The objectives of the project are to showcase climate-resilient<sup>13</sup> pond designs, institutional arrangements between farmers and traditional fishermen, and insurance schemes which will provide farmers with options for adapting more effectively with climatic variability. The project aims at implementing and testing adaptive strategies that aim at preventing risk (e.g. modification of pond design for larger and longer water retention); transferring risk (e.g. weather based insurance that absorbs losses from climate change) and by terminating risk (e.g. changing fish species or by introducing alternative technological options). The proposed project aims to develop and field test the adaptive strategies to create models that could be replicated and up scaled through government policies and programmes.

The proposed project aims at making the inland fishery sector more climate resilient and adaptive to the changing climatic scenario.

---

<sup>13</sup> Resilience has been defined as the capacity of a complex system to absorb shocks while still maintaining function and to reorganize following disturbance (Walker et al 2004)

## ■ Project / Programme Objectives:

*List the main objectives of the project/programme.*

The broad objective of this project is to make the fishery sector (captive inland fishery) adaptive to climate variability and enhance the adaptive capacity of the fish farmers to ensure their livelihood security in Madhya Pradesh, India.

*Project Objective:* Climate Change Adaptation in the fishery sector for secured livelihoods of small and marginal farmers

*Specific Main Outcomes:* The project has following specific outcomes:

*Outcome 1:* Increasing water retention capacity of the tanks as an adaptive measure to address rainfall variability by modifying technical specifications;

*Outcome 2:* Diversification of fish species and temperature regulation of ponds as adaptive measures to a warmer climatic regime;

*Outcome 3:* Making small pond fisheries climate adaptation resilient through productivity enhancement by capacity building and institutional linkages;

*Outcome 4:* Preparing and disseminating evidence-based resilient climate change adaptation strategies for inland fisheries for small pond fishers.

## Project / Programme Components and Financing:

Fill in the table presenting the relationships among project components, activities, expected concrete outputs, and the corresponding budgets. If necessary, please refer to the attached instructions for a detailed description of each term.

For the case of a programme, individual components are likely to refer to specific sub-sets of stakeholders, regions and/or sectors that can be addressed through a set of well-defined interventions / projects.

PROJECT/PROGRAMME COMPONENTS	EXPECTED CONCRETE OUTPUTS	EXPECTED OUTCOMES	AMOUNT (US\$)
<b>Component 1:</b> Adaptive measures to address rainfall variability	1.1 Ponds identified according to geo-hydrological protocol for fisheries and modified pond design implemented on selected ponds	Improved spatial planning for fisheries and decrease in risk of drying of ponds for fish culture	1,145,500
	1.2 Catchment treatment plan for each pond prepared and implemented	Increased water retention and improved water quality due to decrease in silt and organic load in the pond	
	1.3 Small-scale fishers linked to financial support systems to access resources for pond maintenance	Increased source of fund for the fishers to make own investment to modify the design of the pond to enhance its water retention capacity	
<i>The Resultant Outcome will be:</i> Increasing water retention capacity of the tanks as an adaptive measure to address rainfall variability by modifying technical specifications			
<b>Component 2:</b> Adaptive measures to address warmer climatic regime	2.1 Pond temperature regulating best management practices and greening the pond surrounds	Decrease in fish mortality and decrease in retardation of growth of fish due to regulation of pond temperature in summer	157,675
	2.2 Fishers trained in poly-culture fish culture and making fish seed for composite fish culture available to small-scale fishers	Fishers capacity to optimise their production and income through use of staggered harvesting methodology increased	
<i>The Resultant Outcome will be:</i> Diversification of fish species and temperature regulation of ponds as adaptive measures to a warmer climatic regime			

PROJECT/PROGRAMME COMPONENTS	EXPECTED CONCRETE OUTPUTS	EXPECTED OUTCOMES	AMOUNT (US\$)
<b>Component 3:</b> Building resilience for climate adaptation	3.1 Capacity building of Fishers on climate resilient fishing	Fishers developed as Climate resilient fish farmers and as Climate Champions	85,313
	3.2 Fishers trained on market analysis of fish and prepare their business plans	Strengthening of fishers institutions and improved linkages of these institutions with other players in the market	
	3.3.Panchayat representatives trained in climate change factors.	Increased capacity of the representatives of Local Governance Institutions to develop interventions that support fishers	
	3.4 Fishers made aware on the weather based insurance product for fish culture	Fishers risk taking capacity increased as they share their risk with insurance companies	
<i>The Resultant Outcome will be:</i> Making small pond fisheries climate adaptation resilient through productivity enhancement by capacity building and institutional linkages			
<b>Component 4:</b> Knowledge generation and management	4.1 Institutional Processes for multi-stakeholder learning are established and activated	Key stakeholders involvement in identification of learning ensured	119,020
	4.2 Evidence based learning documents prepared for dissemination	Key stakeholder participation in learning processes and in generating evidences ensured to contribute in the preparation of policy briefs	
	4.3 Learning from Project Disseminated	Project knowledge, experience and learning transferred to Civil Society Organisations	
	4.4 Knowledge Products developed printed	Knowledge generated by the project documented for replication and up-scaling	
<i>The Resultant Outcome will be:</i> Preparing and disseminating evidence based resilient climate change adaptation strategies for inland fisheries for small pond fishers			
6. Project/Programme Execution cost			<b>143,192</b>
<b>7. Total Project/Programme Cost</b>			<b>1,650,700</b>
8. Project/programme Cycle Management Fee charged by the Implementing Entity			139,800
<b>Amount of Financing Requested</b>			<b>1,790,500</b>

**■ Projected Calendar:**

*Indicate the dates of the following milestones for the proposed project/programme*

<b>MILESTONES</b>	<b>EXPECTED DATES</b>
Start of Project/Programme Implementation	October 2014
Project/Programme Closing	March 2018
Terminal Evaluation	May 2018

## PART II: PROJECT / PROGRAMME JUSTIFICATION

**A. Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.**

### Component 1: Adaptive measures to address rainfall variability

#### Activity 1.1 Protocol for prioritising rural ponds (less than 10 ha) for inland fisheries developed and implemented

There are no specific government guidelines that prioritise the location of sites for ponds for fisheries. At present the rural ponds for fisheries are selected on the basis of their ability to retain water for different periods of time. These ponds originally were designed and constructed for different purposes, e.g. irrigation, percolation tanks, *nistari* tanks and so on. Selection of such ponds for fisheries is not by design but is incidental to its existence. The project seeks to develop a protocol that will prioritise selection of sites where ponds for fisheries will be most suitable as the primary adaptive capacity strategy for small scale fisheries.

In the planning stage the project developed the protocol for one of the project districts so that it can be tested and replicated in other two districts as well. The protocol has three parts: **one**, geo hydrological assessment based on secondary data of the district so that cluster of areas can be prioritised for fisheries; **second**, ground truthing of the data for confirming the selection; and **third** active consultations with the community for finalisation of site selection.

**Geo-hydrological assessment:** The conventional method is to study the maps, analyse and synthesise the information to suggest the potential regions. The study is undertaken by the subject expert. The selected regions are then visited for ground truthing. It requires time and a big team to conduct the exercise. The other method is digitisation. In this process it requires a licensed software (unless there is human resource with is competent with open source software) for mapped and digitisation of data. Triangulation of the maps is undertaken with satellite data or with Google maps after making necessary corrections.

Maps for geo hydrological assessment include:

Map	Source
Topo Sheet	Survey of India
Revenue Map of District	SDM Office
Revenue Map of Tehsil	SDM Office
Resource Map	Survey of India and Geological Survey of India
Forest Map	Forest Department
Command Map	WRIS System

The geo-hydrological assessment is a three step process that collects information of geo hydrological parameters; gives weight to each of the parameters on the basis of locational suitability of perennial ponds; and assessing priority ranking on the basis of existing values.

The parameters used for developing the assessment include(a) Drainage density; (b) Lithology; (c) Geological Structure; (d) Hydrology; (e) Ground Water Potential; (f) Perenniality; (g) Slope; (h) Soil; (i) Structural (Lineaments and Dykes); (j) Land Use; and (k) Existing Water Bodies

Figure 12 Drainage Density

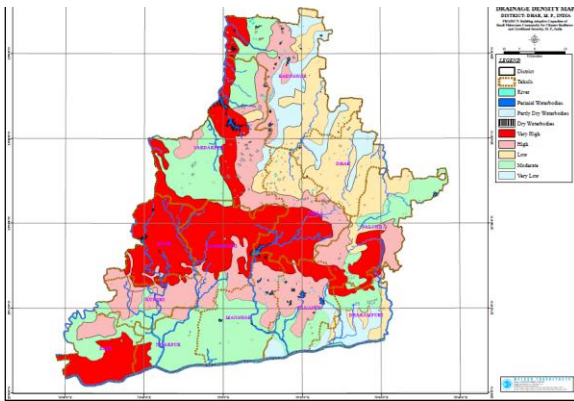


Figure 13 Lithological

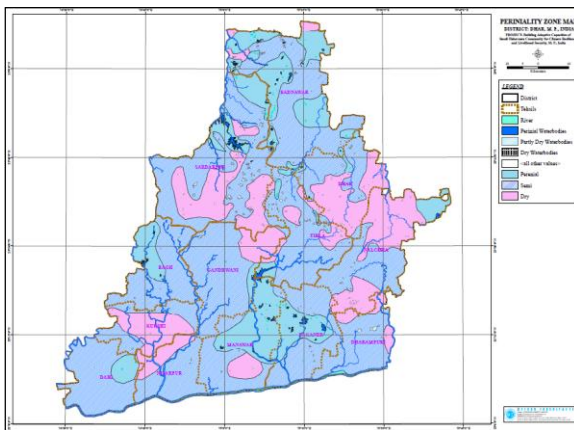
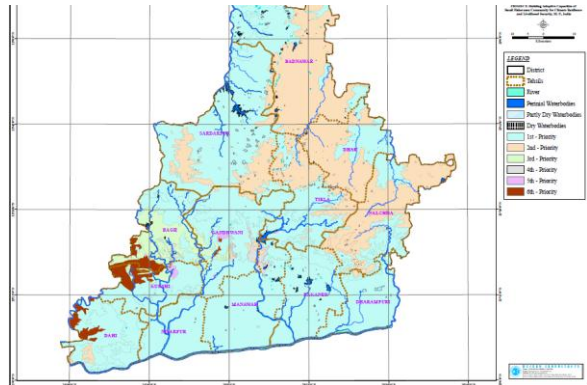


Figure 12 Perenniality

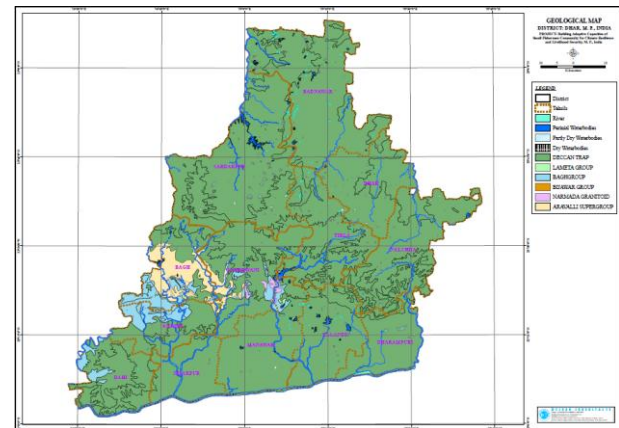


Figure 13 Geology

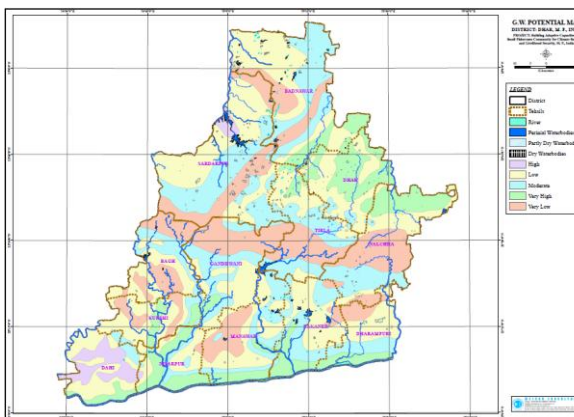


Figure 16 Ground Water Potential

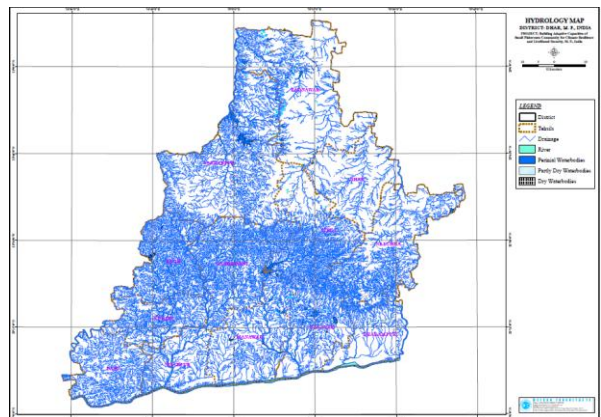


Figure 17 Hydrology

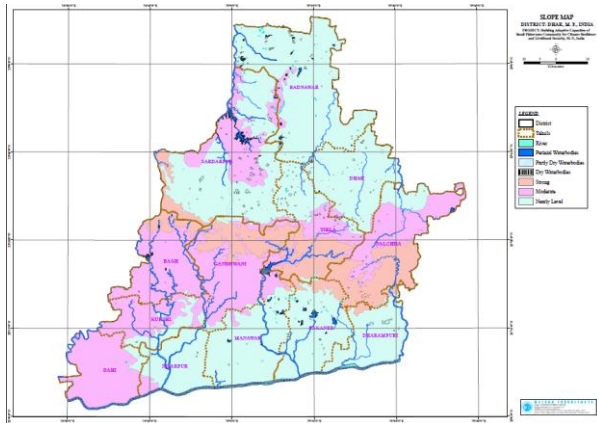


Figure 18 Slope

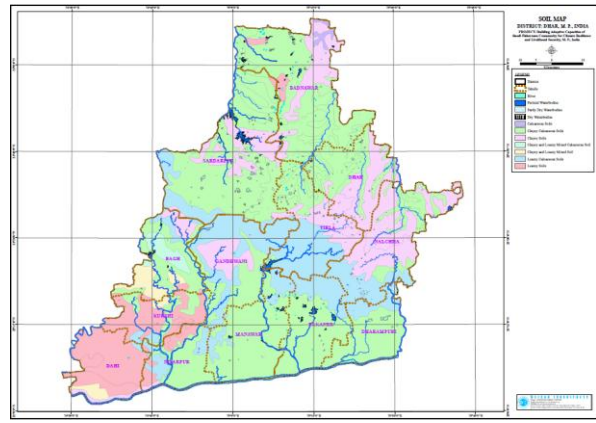


Figure 19 Soil

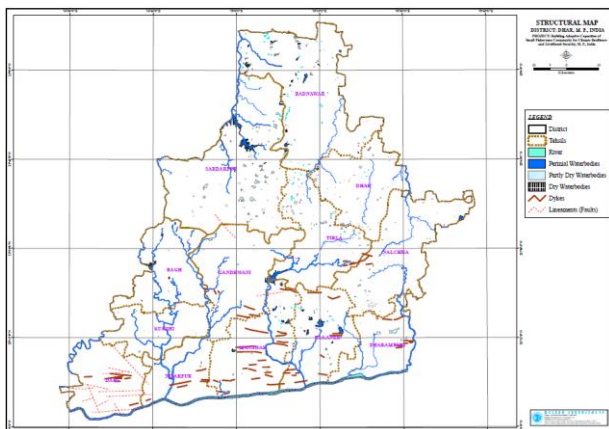


Figure 20 Water Body

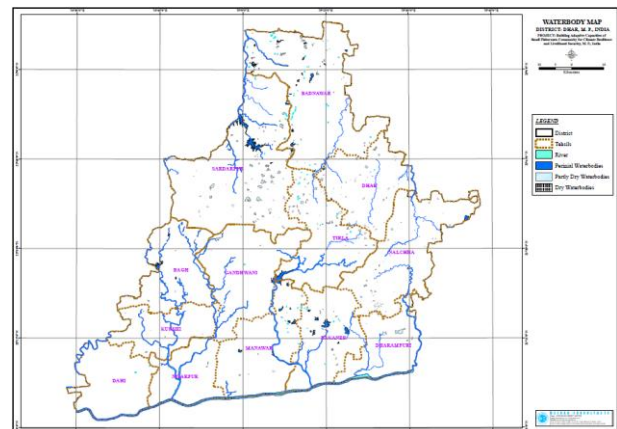


Figure 21 Structural

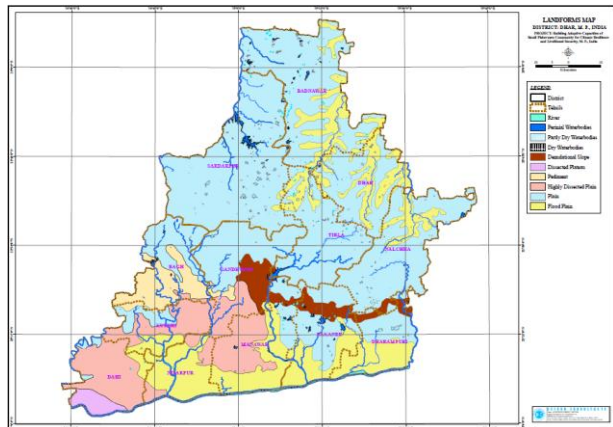


Figure 22 Landforms

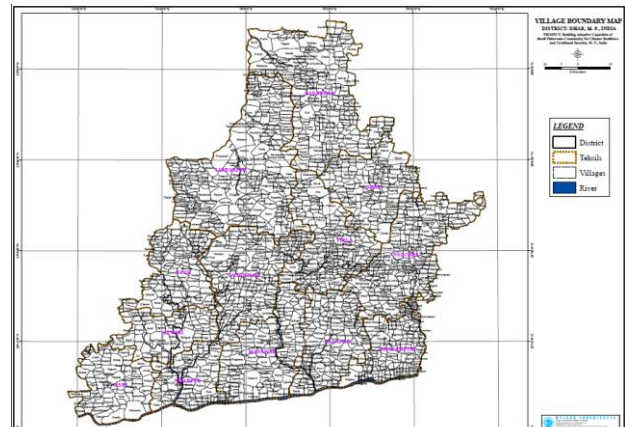


Figure 23 Village Boundary

The maps are superimposed so as to arrive at the most suitable cluster where fisheries can be carried out in the district. These clusters have been identified for Dhar and are given in Fig 24.

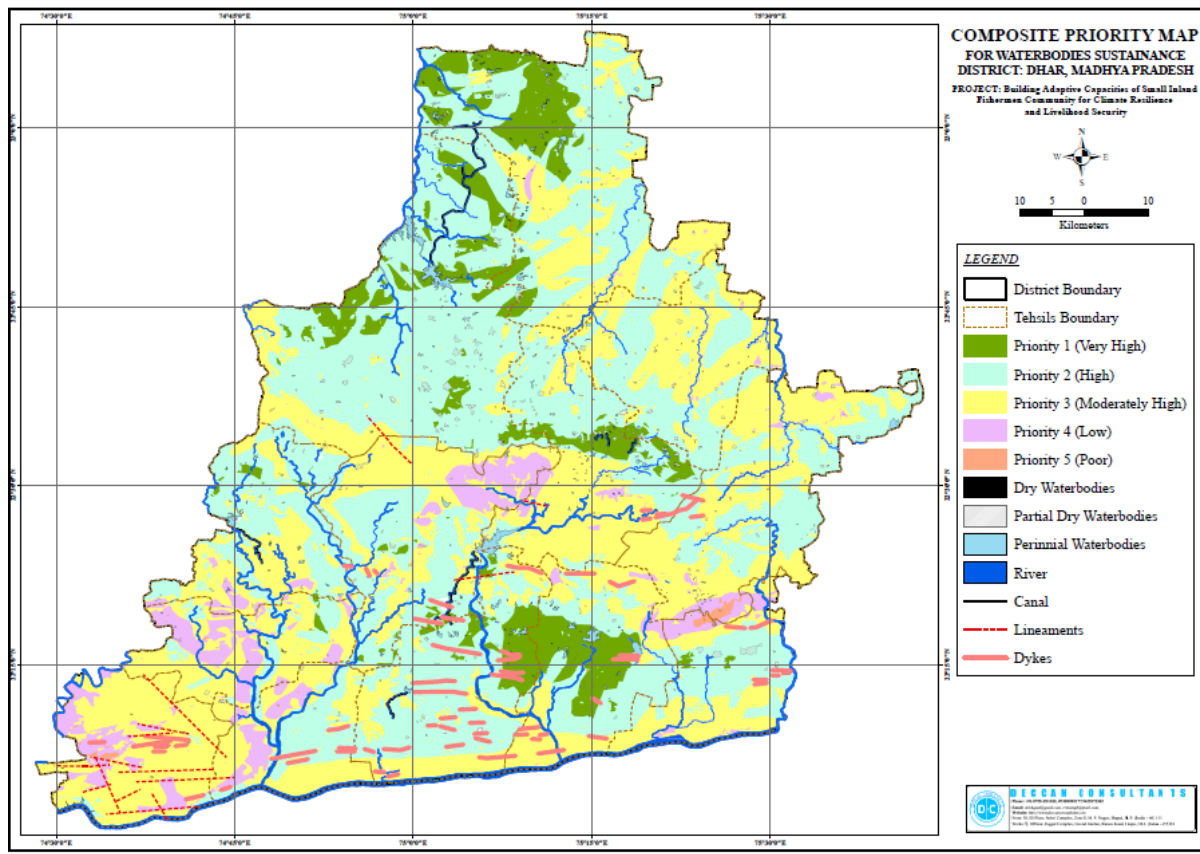


Figure 14 Composite Priority Map

The cluster shaded dark green indicate areas that are most suitable for fisheries in the district and area shaded as turquoise indicates second priority area. The project aims at focusing on these two areas for location if its site that will depend on verification through ground truthing and consultation with the communities for finalisation.

**Ground Truthing:** Ground Truthing includes field investigations that involve Geological investigations, Geo-morphological investigations and Hydrological investigations. This implies that surfacial distribution of rocks and their regional continuity is observed. The susceptibility of rocks to weathering is also observed through observation of dug wells. Detailed well inventory aquifer positions, rate of pumping, pumping duration etc are triangulated with digital data and maps. The field observations thus triangulate the geo hydrological assessments to narrow down on the sites for ponds for suitability.

**Community Consultation:** The process of accessing pond for fisheries is defined in the state act for Panchayats and the executive orders issued there in. The process is given in **Annexure 1** Process Leasing of Pond by Fisher from Gram Panchayat. The sites will be then finalized after the Gram Sabha have recommended the fisher for accessing leasing rights for fisheries for ponds on common land (below 10 ha area).

The aim of undertaking the detailed process is to reduce the risk of constructing ponds that would end up as seasonal ponds and not available for fisheries throughout the year. The same protocol also enables selection of existing ponds (less than 10 ha) for modification so as to make them suitable for fisheries.

The project proposes to roll out this protocol in all the three project districts (as the ground truthing and community consultation have not been done in Dhar so far). The protocol developed for Dhar will be repeated in Jhabua and Alirajpur. The output of this activity will be finalised selection of ponds, to determine where the project will target its intervention.

### **Activity 1.2 Modified Pond design specifically for fisheries developed and implemented on selected new and existing ponds**

The technical modification of pond design will address the climate stresses, namely the increased variability of precipitation, delayed monsoon, extreme weather events leading to high intensity rainfall, and lengthening of summer months. These climatic stresses here necessitated review of the present technical design of ponds in terms of their water retention capacity to enable conduct of fisheries for most part of the year.

At present the design and construction of ponds (less than 10 ha) on common land is not undertaken with the aim of conducting fisheries. The ponds are constructed as irrigation ponds, or as percolation tanks, or as *nistar* ponds to be used for washing, bathing and for providing water for animals. The government manual for design of these ponds does not specify factors that need to be taken in to account if fisheries is to be conducted in these ponds. In fact once the pond is constructed **and** if it retains water for most part of the year it is considered as an appropriate site for fisheries and subsequently the Gram Panchayat announces its intention of leasing the pond for fisheries.

Rural ponds appropriate for fishing should have the capacity to retain water so that fish culture can be practiced **throughout** the year and retain sufficient stock of fish so that the fishing cycle can be repeated the next year as well. This implies that the ponds should have minimum water depth of 1.82 m (or 6 ft.) even during dry periods. At present the design of ponds recommended for fisheries for the entire state stipulates pond depth of 1.5 m for fisheries and 1.2 m for nurseries. This recommended depth is not sufficient for retaining water during summer months as evaporation rate itself is 1.5 m in the project districts.

The Technical Plan<sup>14</sup> developed for the project recommends the following design consideration for **existing** ponds selected for fisheries under the project:

- Effective treatment of tank beds
- Deepening of tank beds/ increasing dead storage at specific location to enable easy harvesting
- Re-designing the sluice and spill ways in view of the potentially high storms due to climate change

---

<sup>14</sup> See **Annexure 5** Technical Plan

- Landscaping protocols for efficient fish production and accommodating various competing claims on water (washing, managing chemical pollutant loads, siltation etc.) and incorporating the requirements of *in situ* nurseries. Landscaping protocol is about management of water body for uses other than fisheries:
  - In small ponds of size less than 0.5 ha with clear ownership it is proposed to renovate them by making them rectangular with some dressing on the bunds so that they can be used as rearing ponds
  - In ponds with areas more than 1 ha and where water is retained till November – December it is proposed that bunds will be redesigned or renovated in such a way that floriculture cultivation can be taken up and flowers will be sold during festive season when prices are higher
  - In ponds with areas more than 1 ha and where water is retained till March, it is proposed that bunds will be used for horticulture [custard apple, lemon, papaya] as well as for vegetable cultivation. In western MP ponds are situated far away from dwellings and seldom do any family member made a daily visit. Putting bunds into use for horticulture and vegetables makes fishers or their family members visit the pond site at least once a day
  - De-silting and deepening ponds to increase their water capacity will in turn add to their capacity for use.

The construction of **new** ponds under the project will target “perennial ponds” with the aim of retaining water sufficient for fish rearing during the dry months as well (Jan to June). The technical design recommended is for the construction of pond with 4m depth and an average tank area of 0.5 ha that would be able to account for climatic factors and will ensure 1.82 m water in dry periods. The suggested designs of the pond are presented in **Annexure 10**, Pond Design.

The project will carry out a Technical Assessment of each of the selected sites which will make an assessment of individual ponds in terms of:

- Existing and proposed water bodies in the block
- Possibility of water logging in selected sites
- Existing natural habitats in the region
- Potential natural habitats which need protection
- Sites with unique natural value
- Physical Cultural resources
- Relevant and Important aspects of the Biodiversity of the area
- Relevant and Important aspects of the Eco services of the area

The assessment along with the proposed design will be presented to the Technical Advisory Committee for approval. The Committee will make recommendations based on the possibilities of conducting small pond fisheries in the area.

The project targets constructing/modifying 75 ponds (@ 25 ponds per district) that are less than 10 ha that are located either on Gram Panchayat land or private land of small and marginal farmers only (belonging to scheduled tribe community).

**Activity 1.3 Treatment of about 0.1 to 0.2 ha of catchment ponds/ tanks for each pond constructed modified**

The available catchment would be treated by plantation / soil conservation measures (vegetative and/or mechanical) and run-off check. The catchment treatment plan will be submitted to the project steering committee for their concurrence. The project plans to treat about 0.1 to 0.2 hectares of catchment of each pond / tank. The catchment treatment will address the climatic stresses as follows:

- The heavy silt load that accompanies high intensity rainfall will be arrested thereby protecting the pond from reduced water retention capacity
- The changing wind pattern as reported by the community carries top soil and increases the silt load of the pond reducing water retention capacity. This will be reduced with plantations working as wind breakers and protecting the pond from excessive silt
- catchment treatment leading to improved soil moisture will reduce the pressure on existing water bodies for drawing water for irrigation thus enabling the ponds to retain larger quantity of water than otherwise
- At the micro level plantations in the catchment area will regulate temperature there by reducing the rate of evaporation and thus enabling the pond to retain water for longer duration and hence the pond may not require further modifications when projected climatic stresses become frequent and real.

The catchment treatment will be based on the regional biodiversity and eco-services requirements so as to ensure enhancement of natural resources. The catchment plan would be evaluated to ensure that it does not create barriers for the poor, children, and differently abled and has necessary protections to be an inclusive intervention.

**Activity 1.4 Insurance product developed that provides resources for making modifications to the technical design of the pond after the projected climatic changes take place**

To deal with the projected climatic stresses two distinct yet related activities will be undertaken:

**One**, presently there is no exclusive insurance product to address the comprehensive requirement of fishers. The major insurance product under implementation covers accident, life insurance, agriculture crop insurance etc.

During the implementation of the pilot project supported by GIZ, a weather based fisherman insurance scheme was brought out by one of the major private sector insurance company in India (ICICI Lombard Ltd.). The product for small fish farmers compensated the fisher against losses due to water scarcity or excessive rainfall. The agency has tied up with SKYMET and National Collateral Management Limited (NCML) for sourcing weather data.

Another company, namely, Universal Sompo General Insurance Company has also developed the Inland Freshwater Fish Insurance Policy that provides insurance against loss of business that covers weather based factors as well.

The project will engage intensively with insurance companies to further develop products that are repackaged for the individual fisher so that the latter is willing to take risk to make investments for technical modification of their pond at a later date. This will be a long term insurance product that demands low premium and enables the fishers to mitigate the risk of making significant investments once the projected climate change factors come in to play and affect the production of fish.

**Two**, for individual fishers the project proposes to facilitate them to become members of existing/new fishermen cooperatives. These organisations, among other activities, will develop a fund to undertake technical modifications on ponds necessitated by changes in climatic factors. This fund will be formed out of contributions by individual members and would be used for leveraging funds from other institutions for individuals or groups of fishers. This would require working with all the institutional structures responsible for the fisheries activity as per the framework of the State Government. This would involve identifying the financial support system required by the federation of fishers and individual fishers in terms of services, incentives and issues of capacity building.

## **Component 2: Adaptive measures to address a warmer climatic regime**

### **Activity 2.1: Pond temperature regulating best management practices and greening the pond surrounds**

Death of aquatic organisms due to high temperature takes place during peak summer. It is significant that temperatures at which mortality occurs is so precise that change of even a fraction of degree of temperature can make difference of life or death of the aquatic organisms<sup>15</sup>. The adaptive mechanism is to ensure that temperature does not rise from a point level. The project will take the following measures to regulate the tank water temperature in peak summer:

- (a) Project will cover 20% of the pond area during summer dry months with water hyacinth. Since water hyacinth is an invasive species its spread will be strictly controlled and monitored. Bamboo stilts and nets will be used to ensure that the weed does not spread to larger area and fishers will be trained in the process of removal of the species once the dry summer months are over. These techniques have been used by fishers in Odisha where they have gone up to coverage of 33% of the pond area. The project will however take a conservative approach and restrict the usage to not more than 20% of the surface area.
- (b) Greening the pond surrounding area based on local geographical and environmental conditions to regulate the pond water temperature
- (c) Provision of shade over a part of the tank
- (d) Use of traditional techniques of creating water turbulence to circulate water across different thermal layers will also be used for regulating temperature.

---

<sup>15</sup>FAO Corporate Document Repository, Fisheries and Aquaculture Department

**Activity 2.2: Best management practices to decrease likelihood of oxygen deficiency along with use of oxygen tablets and solar powered aerators**

The oxygen concentration of the tanks goes down with increased temperature. The oxygen squeeze adversely affects the growth of fish and other aquatic organisms. As an adaptive measure, aeration of tanks is essential so that dissolved oxygen content is maintained throughout the year.

Artificial mechanized aerators require electricity, the supply of which is erratic in rural MP; secondly ponds are situated far way so security is an issue; and thirdly, ponds are situated away from agricultural fields so getting a electricity connection is a daunting task. The project alternatively proposes to go for the best management practices that are suitable for the situation. It is proposed that farmers will be given training on a package of practices that do not increase the load on the pond and which will reduce chance of oxygen deficiency. Other than aeration, it is less costly to introduce the concept of using oxygen tablets during cloudy days and summer time when mortality of fish occurs due to oxygen depletion.

The project will pilot solar powered surface aerators to maintain oxygen content specifically for ponds where the issue of oxygen depletion is likely to be high.

Good water condition is necessary for the survival and growth of fish as the entire life process of the fish is wholly dependent on the quality of its environment. The physical, chemical and biological qualities of water would be closely monitored by the fish farmers and the implementing agencies in a periodic interval. The parameters that will be monitored include:

- a) Transparency and colour of water
- b) Temperature of tank water
- c) pH level of water
- d) Biological factors
- e) Odour of the fish pond
- f) Dissolve Oxygen Level

Apart from monitoring the water quality in periodic interval, the quality of in-flow water would also be checked / monitored before it flows in to the tank.

Its effects on the public health will be assessed in the mid-term evaluation. The Gram Sabha will be informed and made aware of the potential health hazards and preventive measures for the same. Health camps by the health department will be facilitated to ensure adequate prevention from vector borne diseases.

**Activity 2.3: Composite fish culture practices with combination of intensive, semi intensive and extensive culture practices based on fishers capacity**

The existing recommendation of the Fisheries department for the project districts comprises of *catla*, *rohu* and *mrigal*. From a climatic adaptation perspective, especially to address the warmer climatic regimes, poly-culture farming system would be adopted in the tanks. Four different species of fish would be promoted in the tanks, namely *catla*, *rohu*, *mrigal* and common carp. The logic of

adapting these four categories of fish is based on their adaptive characteristic, feeding practices and the fact that they are native and endemic to the region.

**Table 3: Fish species to be promoted in the tanks**

Fish Species	Feeding Habit	Feeding Zone	Adaptive Aspect	Economic Value
<i>Catla catla</i>	Plankton Feeder	Surface Feeder	Survival in less water level	Local market demand and one harvest cycle
<i>Labeo rohita</i> (Local Name: Rohu)	Omnivorous	Column Feeder	Survival in medium water level	Local market demand and one harvest cycle
<i>Cirrhinus mrigala</i> (Local Name: Mrigal)	Detritivorous	Bottom Feeder	Survival in medium – deep water level	Local market demand and one harvest cycle
<i>Cyprinus carpio</i> (Common Carp)	Detritivorous	Bottom Feeder	Survival in medium – deep water level	Local market demand and one harvest cycle

The common carp and *Labeo rohita* (Rohu) are featured prominently in capture and aquaculture fisheries on the Indian subcontinent and are well adapted to increases in temperature, shows increased tolerance to elevated temperature following acclimatization to water temperature of 30°C and 35°C. The common carp is more thermally tolerant than the *Labeo rohita* (Chatterjee et al, 2004). *Catla catla* is hardy; natural temperature range 18-30°C; lower and upper thermal tolerance limits, 16.7°C and 39.5°C; sensitive to low oxygen conditions; tolerates pH 6.5-8.5 and salinity up to 5 ppt; prefers deep pools; breeds during the southwest monsoon (May - September) in water temperatures around 24-31°C.

Common carps are normally preferred by the consumers like earlier discussed species. They are bottom dwellers and breeds twice a year. It can be harvested when the water depth decreases and does not pose competition to the feed and space of other fishes. The Feed Conversion Ratio (FCR) is on the higher side and they can be harvested in 5 to 6 months. When water level is high in the pond, water at the bottom will be least affected with changes in temperature and Common Carp will be least affected with increase in water temperature. The ecological spectrum of carp is broad. Best growth is obtained when water temperature ranges between 23°C and 30°C and it can be achieved through the proposed temperature regulation mechanism. Apart from that the fish can survive cold winter periods. Salinity up to 5‰ and the optimal pH range of 6.5-9.0 can be tolerated by the common carps. The species can also survive low oxygen concentration (0.3-0.5 mg/lit) as well as super saturation.

The project proposes to introduce common carp in the region. The pilot conducted in Dhar district had led to the state government to recognise common carp as the species that is suitable for adaptation and have consequently issued notification that the species can be introduced in small pond fisheries being promoted under MGNREGS<sup>16</sup>.

<sup>16</sup>Mahatma Gandhi National Rural Employment Guarantee Scheme

The poly-culture fish culture practice will be specifically customized to the need of the fisher. The proposed fish culture strategies proposed under the Technical Plan<sup>17</sup> is as follows:

- Fishers that have the capacity to make investments on inputs will be encouraged to adopt intensive culture as these fishers can improve on their production through rational investments in inputs
- Fishers that do not have the capacity to invest but have access to common inputs like manures, cereal bran, oil cakes (e.g. mahua oil cake) will be facilitated to adopt semi intensive culture
- Small ponds 1 ha or less on lands belonging to small and marginal farmers that do not have the capacity to hold water perennially will be promoted and developed as nursing and fish rearing of fish seed ponds. If the water holding capacity of the ponds is longer or if there is alternative source of water then these ponds will be developed for fast growing fingerlings and production of common carp seed in the month of July-Aug and Feb-March.

Type of Culture	Species	Stocking Ratio	Stocking density (per ha)
<b>Intensive</b>	Indian Major Carp and Common Carp (CC)	Catla:Rohu:Mrigal:CC 30:20:10:40	10,000
<b>Semi - intensive</b>	IMC and CC	Catla: Rohu:Common Carp  40:30:30 in smaller ponds (3 months of water)  40: 20:20 (seasonal ponds with six month of water holding capacity)  30:20:10:40 (Perennial ponds)	5,000
<b>Extensive</b>	IMC and Common carp	30 : 20: 10: 40	8,000

**Activity 2.4: Seed hatcheries (3 units) 2 nurseries (0.1 ha) and 1 seed rearing unit (0.1 ha) per district established**

On-time supply of quality seeds/fingerlings to the fish tanks is a basic requirement and for that the hatchery/nursery establishment is essential at the cluster level. The current seed/fingerling production and supply capacity of the existing units is limited. Establishment of additional units is required to ensure on-time production of seeds / fingerlings and increasing the availability of fish seed, which is currently a major constraint.

In each district, one seed hatchery, 2 nurseries (0.1 ha) and 1 seed rearing unit (0.1 ha) would be established to supply fingerlings to the fish farmers. The project would promote farming of fingerlings for better harvest. An integrated fish husbandry system would be followed in the hatchery / nursery/ seed rearing unit. The husbandry system would the encompass nursery phase

<sup>17</sup> See **Annexure 5** Technical Plan

and grow-out phase i.e. spawn, fry and fingerling production. In the fish tanks, fingerlings would be released for rearing. The hatchery/ nursery/ seed rearing unit would be located near to the cluster of ponds so that the cost of transportation and allied expenses of farmers can be minimised, making the unit financially viable.

The hatchery/ nursery/ seed rearing unit would be established as common facility centre for the benefit of participating fish farmers under the project and would be operated by the group. The project will pilot test advanced low cost fish-hatchery technologies developed by CIFA such as a portable fibre glass reinforced (FRP) carp hatchery. For nurseries the options of cage nurseries for *in situ* nurseries will be explored and developed<sup>18</sup>.

The management practices that will be developed include:

- A system of advanced fingerling supply / stunted fish supply for realising production potential of seasonal water bodies
- Evolving optimal stocking and protocols for maintaining fish stock in tandem with available water levels
- Evolving and testing out viability of fish nurseries as business models serving a cluster of sites
- Developing a nursery network to support production adapted to local climatic conditions

### **Component 3: Building resilience for climate adaptation**

#### **Activity 3.1: Productivity of 75 fish farmers enhanced towards optimal level of production through training and capacity building on climate resilient fish farming**

Fishery is a climate sensitive livelihood activity. In the proposed project area the productivity of pond fishery is well below the national average. At low productivity the vulnerability of small and marginal farmers and fishers to climate stress is higher as compared to the regions where the productivity is higher. Making interventions in the package of practices in small pond fisheries to enhance productivity along with climate adaptation measures, will make the latter resilient and the increased productivity itself will work as an adaptive measure. Secondly, the increased productivity will enable the fisher to be better prepared when projected climatic factors become real at a future date.

Capacity building of fish farmers on responsible fishing and adaptive means of fish farming will be taken up in the three project districts. The capacity building will be on<sup>19</sup>:

- **Development as Climate Resilient Fisher**
  - Responsible Fishing
  - Factors of Climate Change
  - Impact of Climate Change
  - Alternative Strategies for responding to Climate Change

---

<sup>18</sup> See **Annexure 5** Technical Plan

<sup>19</sup> See **Annexure 7** Capacity Building Strategy

- **Development of Climate Adaptive Strategies**
  - Livelihood security and Adaptation
  - Coping vs adaptation strategies
  - Risk and Vulnerability assessment in fisheries
  - Identification and Implementation of Risk management strategies
  - Adaptive strategies and their adoption
- **Development of Fishers as Climate Champion**
  - Forging partnerships with other stakeholders
  - Networking skills with other fishers and fishing communities
  - Forums to address impact of climate change

The training will be conducted in different phases and will involve combination of class room, experiential learning and exposure visits. The aim will be bring the fish productivity to an optimal level so that it decreases the vulnerability of the fish farmer to climate stresses.

**Activity 3.2: Fish farmers supported through market infrastructure and value chain assessment done**

Market analysis, Value Chain analysis and infrastructure assessment of the different fish markets has been undertaken that forms the basis for making technological and market intervention for the small pond fish farmer<sup>20</sup>. The assessments provide inputs to the fishers in enabling them to develop their respective business plans and make the best possible use of the market opportunities. Training resources, Information Education Communication material and other informational materials will be prepared under the project for a wider use within the project districts.

Institutional strengthening of fishers, either as non formal groups or as formal institutions, will be carried out to enable them to become recognizable players in the fish market. In addition, their partnerships with other players will be forged and negotiating skills among the fishers will be developed so that they are able to develop fish culture on sustainable practices.

**Activity 3.3: 75 fish farmers prepare business plan based on local market and existing value chain**

Business Development and Market Analysis<sup>21</sup> exercise has developed model business plans for fisheries in the project districts. Based on these models the business plan for each of the selected fisher will be developed and the project will provide handholding support and mentor them to implement the business plan developed for them.

**Activity 3.4: Institutional support interventions so as to enable Local Governance Institutions and fishers to play the role envisaged in the legal framework of the State**

---

<sup>20</sup> See **Annexure 6**Business Development and Market Analysis

<sup>21</sup> See **Annexure 6**Business Development and Market Analysis

The Gram Panchayat is the nearest to fishers that affect their enabling environment to be able to develop and implement adaptive strategies. The project will provide training to members of Gram Panchayat on Climate Change and Livelihood Security<sup>22</sup>.

**Activity 3.5: Insurance coverage provided for risk minimisation of 75 fish farmers of the project**

Pilot project had led to the development of weather based insurance product for the small pond fish farmer. Other insurance companies have also developed insurance products for the fishers. Bundling of insurance products with saving and credit products of financial institutions and their customisation for the small fishers will be undertaken as advocacy effort by the project. The project will engage with financial institutions including insurance companies and establish their linkages with the fish farmers in the project area.

At each stage the fishers will be informed and consulted on the development of the product and the fishers will be encouraged to form their own opinion on the feasibility and viability of the product based on their own risk assessment of fisheries.

**Component 4: Knowledge Generation and Management**

**Activity 4.1: District Steering Committee Meetings**

The project aims at establishment of District Steering Committee in each of the three districts comprising of members from government and project team that will regularly review the implementation of the project. The DSC will be the multi-stakeholder body that will assess the benefits of project and the relevance of project interventions with reference to the district. The DSC will identify issues on which evidence needs to be generated and their deliberations will provide evidence on how specific interventions can be up-scaled and replicated within the district.

The meeting of the DSC will be convened every two months in each district. Thus in all there will be 36 meetings of the DSC during the course of project implementation. All the meetings of DSC will be documented as part of project processes.

**Activity 4.2 Technical Advisory Group Meetings**

Technical Advisory Group will comprise of group of specialists in the field of fisheries, geo hydrology, climate change, civil engineering, rural marketing and institution development. TAG will conduct field visits and assess the relevance and impact of climate change activities as a result of project's intervention. TAG will recommend the areas where evidence related to climate adaptation needs to be generated and provide linkages with other institutions and projects in the state/ country.

---

<sup>22</sup>*ibid*

TAG will visit the field and meet twice a year with the project team. Thus, there will be 6 meetings of TAG during the period of project implementation. The meetings of TAG will be documented as part of project learning processes and as evidences in to development of knowledge products.

#### **Activity 4.3 State Steering Committee**

State Steering Committee will be constituted comprising of senior level decision makers in the government with the twin aim of informing them of the project activities and outcomes and to identify policy level issues where the project can make its contribution. The evidences generated from the project will be placed before the SSC and will be further enriched by their inputs and experiences.

The project aims at 3 meetings per year of the SSC and each of these will be documented for further reference and for establishing institutional memory within the participating departments and institutions.

#### **Activity 4.4 Climate Change Observatory**

Climate Change Observatory comprise of practitioners (traditional fishers, beneficiary fishers, women engaged in fisheries) and decision makers at the district level (political and administrative representatives) and sector specialists (fisheries, financial services) that will assess the relevance and impact of adaptation strategies from the project's experience in the context of IMD data for the district. The CCO will meet once in six months and makes its own assessment of the signs of change and adaptation. These observations will be used as evidences for the relevance and effectiveness of strategies adopted by the project. The CCO will be developed and strengthened to undertake such assessments in other sectors as well as continue these processes beyond the project period.

CCO will meet twice a year in each district and will aim to involve a wider range of stakeholders at the district level. The meetings of CCO will be documented by the project.

Climate Change Observatory (CCO) will essentially contribute the following during the life of the project cycle:

- (a) Repository of data base on micro climatic factors, vulnerabilities and impacts of climate change locally. The data collected by the project during its preparatory phase and during implementation will be placed at the CCO that will be available to other stakeholders. Further the CCO will encourage other projects and members of civil society operating locally to collect similar data and enrich the data base at the CCO.
- (b) Develop Linkage with district level Krishi Vigyan Kendra (Agriculture Science Centre) that has the mandate for the preparation of Disaster Preparedness Plan on Agriculture, Animal Husbandry and Fisheries of the district. The linkage will involve sharing data and the experience generated from the project and similar such initiatives at the local level.
- (c) The KVK and Department of Fisheries have the mandate of providing training to their client groups on a regular basis. CCO will act as resource agency that will provide training on climate change to the trainees of both the institutions.

- (d) The two formal meeting of the CCO in each district will lead to development of Voices a paper on experiences of practitioners on the process and impact of climate change for each district every year. Thus there will be three such papers that will be developed for each district during the life cycle of the project. This paper will be shared with decision makers at the state level and with the members of the Technical Group.
- (e) CCO will make presentation of their role in the state and national level workshop. These workshops will express their opinion on the possibility of replicating/ up-scaling the role of CCOs in other parts of the state/country.

#### Activity 4.5 Action Reflection Meetings

Participatory Action-Reflection exercises will be facilitated by the senior management team of the project. These exercises will be facilitated at the community level primarily with the involvement of the fishers and other, members of the community associated with the project. The purpose of the exercise will be to:

- Create space for the target fishers and the community members to reflect on the project induced processes and to assess whether these processes are achieving their desired results
- Provide an open space to the project team and the community to critically review the progress of the project and identify constraints and opportunities;
- Use learning to provide feedback to the planning process and also in identifying or modifying existing activities; and
- Generate data and evidence that will validate learning and use that as knowledge product for advocacy and capacity building processes.

At least one Participatory Action-Reflection learning exercise will be carried out every four months in each of the three districts. There will be thus 18 such exercises within the duration of project implementation. The report of the quarterly exercise, however, will be prepared at the end of the six months after relevant evidence has been generated.

#### Activity 4.6 Systematisation

Systematization aims at improving practice based critical reflection and interpretation of lessons learnt from practice. The process describes the experience and result and provides insight in to what worked and what did not, what were the key factors for success and how it could have been different? Systematization will be used for:

- Revisiting frameworks and hypotheses on which the project has been designed and developed
- Identify successes and develop knowledge products based on them
- Contribute to advocacy and policy debates on adaptive capacities related to climate change

There will be three systematization exercises that will be undertaken during the period of project implementation: **one**, at the beginning of the project to identify reflection spaces and milestones in the project cycle; **second**, after 18 months when the project has been implemented for half of its duration to check on the relevance and usefulness of strategies adopted by the project; and

**third** in the last quarter of the project to consolidate learning and identify and develop knowledge products. The process of systematization will be facilitated by an external expert, who will be identified at the beginning of the project.

#### **Activity 4.7 Process Documentation**

Documentation of the processes adopted by the project will be base document to provide evidence for the development of knowledge products in the project. The project will develop process guideline as the reference framework within which the project processes will be developed and implemented. The Process Document will be a consolidated report of these processes and will be prepared annually. The PD report will also synthesise the processes to develop the process map and pathway followed by the project.

#### **Activity 4.8 Policy Briefs**

Based on the recommendations of the State Steering Committee, TAG and CCO the project will prepare at least three policy briefs based on the projects experiences and impacts. The broad areas of policy briefs have been identified as (a) climate change and impact on women and measures to enhance their productivity in small-scale fisheries; (b) climate adaptation strategies in small scale fisheries; and (c) risk management strategies in small scale fisheries.

The policy briefs will be prepared by external resource persons. These briefs will be presented to the SSC and will be widely circulated among different stakeholders.

#### **Activity 4.9 Training of Civil Society Organisation**

The project will organise two training for the members of the civil society organisations, namely, to understand the trend and different dimensions of climate change and to develop knowledge and skill in developing climate adaptation strategies with specific reference to small-scale fisheries. The former training will be conducted for senior functionaries of civil society organisations and the latter training for the middle management and grass root functionaries of the organisation. The aim training civil society organisations is to disseminate projects learning and to develop a cadre of persons within the civil society that can take the agenda of adaptation to climate change forward in the state.

#### **Activity 4.10 Learning Workshops**

The project aims at organising two sharing and learning workshops: one, at the state level and the second, at he national level. The aim is to present the learning from the project experience and also to share the experiences of similar projects in the state/ country. These workshops will comprise of representatives from the academia, policy makers, researchers, practitioners and media that are working on the issues related to climate and change and adaptation.

#### **Activity 4.11 Knowledge Products**

The project will be developing two types of knowledge products: one set of knowledge products will be to develop the experience as training manuals and tool kits for practitioners. The second set of knowledge product will be based on documentation of good practice from the project. Both the documents will use the experience of the project to develop the content of the knowledge products. The training manual and products identified include (a) a toolkit for identifying adaptation strategies in natural resource management with specific reference to fisheries; and (b) toolkit for preparation of business plan for fisheries, hatchery and nursery that incorporates components of climate adaptation in its analysis. The training manual planned by the project is for fishers on climate adaptation fish rearing practices.

***B. Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project / programme will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund.***

The project is expected to deliver a set of targeted and interlinked economic, social and environmental benefits, as well as serve as a model for future replication throughout the country. The project will promote a set of innovations, together with partner institutions / organisation that will help create better living conditions for the marginalised fishermen community.

Vulnerable groups expected to be benefited from this project include:

**Tribal fishers:** Rural communities including tribal communities and fishers in particular whose livelihoods are highly dependent on climatic conditions and who are particularly vulnerable to extreme weather events, are dependent on fish farming. The proposed project districts are predominantly inhabited by scheduled tribes and the project will be implemented with these ethnic groups.

**Fisher Folk:** Fisher folk (traditional fisher communities) do not have access to the production side of the value chain but they have access to the processing trading of fish in the fish market. The fisher folk will be covered by the project to forge linkages with the tribal fishers so that both the social groups can develop economic linkages that will create opportunities where both the groups can optimise their respective incomes.

**Women:** Women are engaged in different aspects in the value chain for fisheries, e.g. making of fish net, harvesting of fish, post harvest processing and trade in fish. The project will ensure that the women are part of the project interventions, specifically during the capacity building exercises and as members of the fishers' livelihood groups or cooperative societies.

**Fish Businesses:** People associated with fish related business activities would benefit due to an increase in scale of harvest, regularity of fish catch supply and better scope of marketing the increased quantum of produce.

**General Local Consumers:** With stabilisation in fish production, local consumers can avail nutritional / protein rich food more regularly in a cheaper rate. Because of the local production and demand for farm gate selling, the price would be relatively low in comparison to market price in urban areas and big markets. So, with less purchasing power, poor people can access protein rich food more frequently. This includes people with poor income level. Dependency on preserved fish will reduce and fresh fish would be available to the local rural consumers.

Benefit Areas	Key benefits	Baseline scenario
<b>Social</b>	Small and marginal farmers face stagnant farm productivity and they regularly scope alternative sources of income and employment. Small pond fisheries are a viable and profitable source of alternative employment for this group	Small and marginal farmers are forced to migrate in search of employment that has a high social and economic cost for the family
	Fish farming is a feasible option for the households to fulfil their nutritional requirements as well as ensuring livelihoods	The project area has high incidence of malnutrition and livelihood insecurity
	Tribal fishers will be developed as productive fishers as well as climate resilient fishers	Tribal fishers learn fish practices from their peers and do not have access to credible sources of training and capacity building
	Fisher groups will emerge and be strengthened as credible institutions that will undertake regular fisheries in the region	Fisher groups among tribal communities are non functional and do not have credibility with financial institutions
<b>Economic</b>	With ensured catch / harvest, economic gain of the fish farmers will be enhanced from the present level of income from fisheries	Unsecured and poor income of the small fish farmers due to climate variability

Benefit Areas	Key benefits	Baseline scenario
	Changes in income/ earning of the small fish farmers from fisheries is being addressed by developing a package of financial instruments comprising of saving, credit and insurance that will enable the farmer to cope with financial losses arising out of vulnerability from climate change	Poor insurance coverage and credit access to meet the required capital and recurring expenses
	Fish farmers will be able to increase their income on a regular basis as they access and develop linkages in the fish market	Poor understanding of and access to fish market
	Improved capacity of the fisher as they learn to employ labour and resource to achieve optimum levels of production through responsible fishing practices	Fishing at low levels of productivity and
	Linkages with banks and financial institutions improved and fishers are able to access credit individually and as a group	Poor access to financial institutions and credit
<b>Environmental</b>	Making modifications in the design of the pond so that it creates a buffer against the variability in its water storage capacities based on the local rainfall	At present it is at the maximum of 4-5 months which would increase to 8-10 months
	Reviewing and taking measures in the catchment area of the pond to arrest the rate of siltation	Siltation in the tanks due to denuded catchment and no management of run-off. Treatment can minimise the soil erosion and improve soil profile.
	Introducing fish species that can adapt to climatic variability and yield optimally. This will reduce vulnerability and improve adaptive capacity of the farmer. Protection and recovery of biodiversity with the use of native and adapted species	Without the project, the survival rate of species in extreme weather conditions would reduce drastically
	Improved vegetative cover around the tank area and rehabilitation of pond catchment will improve the green cover status, stabilisation of pond banks, decrease run-off and restoration of top soil	Denudation in the catchment increase soil erosion through run-off due to rain variability

A number of environmental benefits are expected to accrue from the project, especially under component 1 and 2. Firstly, the project will utilise the available rain water to the best possible extent for fish rearing, conservation and optimisation of run-off water. Secondly, catchment treatment would be helpful to minimise soil erosion, better soil water holding, minimise top soil erosion and increasing fertility. Thirdly, temperature regulation mechanisms would help to grow micro-organisms, along with fish in an ambient temperature situation maintaining the diversity in the local ecosystem. Fourthly, increase in green cover around the fish tank. Other environmental

benefits to be accrued by this project include water quality maintenance, tank water protection for utilisation in dry condition and carbon sinks.

Activities	Key benefits (Direct)		
	Social	Economic	Environmental
<b>Component 1: Adaptive measures to address rainfall variability</b>			
Technical modification of pond design		Better harvest, improved economic return from the tanks	Water harvesting, improved water retention, Adaptability to climate variability, increased surface water utilisation
Geographical suitability assessed	Small / marginal farmers with required holding in different geographical set-ups will benefit		Assessment of existing resources, drought prone vulnerable areas having water bodies, retention of surface water and water availability for fish culture
Modification of insurance product		The insurance product would improve the economic risk management in case of failure of the production system	
Treatment / rehabilitation of catchment of tanks.	Small and marginal fish farmers get the benefit	Cost of de-siltation reduced, less cost for water quality treatment due to poor soil content	Minimise run-off, decreased soil erosion, in-situ moisture conservation and vegetative coverage
<b>Component 2: Adaptive measures to address warmer climatic regime</b>			
Pond temperature regulation		Reduced fish mortality and hence increased income	Less surface evaporation minimised surface water temperature and making the environment less prone to fish mortality
Promoting Poly-culture		Better survival of fish, better harvest and improved return on investment	Meeting fish survival conditions by maintaining water level for different fish species  Improved fish diversity in small ponds and in the region

Activities	Key benefits (Direct)		
	Social	Economic	Environmental
		Four harvests per year i.e. one harvest cycle per species	Optimal use of stored water and maintaining diversity based on the feeding habit and feeding zone
Oxygenation And Water Quality Management		Reduced mortality of fish and hence better income from harvest	Maintaining dissolved oxygen level suitable for fish survival
		Fish production reach optimal level	Ambient condition for fish habitation, survival and growth
Establishment of seed hatchery / nursery/ seed rearing unit		Economic way of supply of fingerlings , minimised transportation cost due to establishment of infrastructure near the tank cluster	Development of species under local conditions
<b>Component 3: Building resilience for climate adaptation</b>			
Capacity Building	Improved management skill and better understanding of adaptive measures in fishery	Higher productivity of fish leading to higher income	Better management of the local environment by the farmers as they practice responsible fisheries
	Women and tribal fishers learn skills for responsible fisheries and gain competency in adopting and adapting these practices	Increase in income of tribal community and women	
Market linkages	Increased skills to understand market institutions	Increased access to market and improved terms of engagement	
Financial and Governance Linkages	Increased skills to understand financial and governance institutions	Competitive credit availability for businesses	
Insurance Coverage	Small fish farmers recover part of their investment in worse cases through insurance	Shift of risks and cost recovery	Weather proofing measures
<b>Component 4: Knowledge Generation and Management</b>			
Multi-stakeholder participation in project processes	Adaptation policies and plans recognise the social imperatives of the small pond fishers	Identification of areas of investment that will enable expansion of productive practices to other areas	Green practices identified and case for replication developed

Activities	Key benefits (Direct)		
	Social	Economic	Environmental
Evidence based learning documents prepared	Adaptive practices verified and reinforced for small pond fishers	Programmes for economic development of small fishers gain from cost-benefit assessments from the project	Green practices identified and case for replication strengthened
Knowledge generation	Recognition as a key stakeholder in policy development for climate adaptation	Strategies for Livelihood security for small-scale fishers developed	Contribution in the development of green practices and policies
Knowledge dissemination	Civil society strengthened by training them in knowledge and skills learned from the project	Budgetary allocation under government programmes influenced to respond to needs of adaptation to climate change in natural resource management sector	Other projects for adaptation to climate change triggered by civil society

As may be seen from above, implementation of the project will not cause any negative social and environmental impacts. Local communities have been consulted in design of the project and components proposed are in line with the prevalent regulations, policies and standards of National and Sub-national Governments. Components proposed under the project have been designed with consideration towards the Social and Environmental Policy of Adaptation Fund.

**C. Describe or provide an analysis of the cost-effectiveness of the proposed project / programme.**

To improve cost effectiveness the project specifically addresses the issue of ad-hoc and small scale adaptation efforts (private ponds). The strategy recognises that though fragmented responses may address a local issue, however, without a combined community based and ecosystem based approach it is unlikely that context specific priorities of local populations will be implemented. The project will help address this concern by specifically aiming to reduce fragmentation by targeting water catchments and promoting an ecosystem approach.

Small activities often lead to externalities and are hard to bring to scale. The proposed project aims to achieve a large scale impact and avoid externalities as actions will be based on the priority of affected communities. However, this shall be determined only after a project cycle completion in a pilot area. The Government has already put in an enabling framework linking it to MGNREGS under a sub-scheme and replication will not be difficult.

The cost of fish farming in 0.5 ha of tank would normally cost around 65% to 70% of the proposed cost in a non-adaptive situation yielding less harvest, more mortality, fewer crops per cycle and high loss to natural eco-system services. With an escalation of 30% to 35% cost in capital cost, the project will provide gains in increased water retention capacity of the tanks by 50%, growth in

catch by 25-30% in a sustained manner, reduction in fish mortality by 20%, catchment restoration and arresting top soil erosion, saving standing crop at least in 0.2 ha of land from the available tank water during dry spell in monsoon. The additional cost to be incurred towards adaptation can attain breakeven at the end of the project cycle, in at least 40% of tanks. So, assuming the life of a tank at 25 years with full operation and required maintenance, a farmer can generate profit at least for a period of 20 years.

The emphasis on participatory decision making, catchment level interventions, and an integrated approach enhances the cost effectiveness of the project. The integrated approach of community based and ecosystem based approaches will promote an integrated package of measures that will build knowledge, awareness, tools and local capacities to address the threats of climate change. The project strategy emphasizes coordination between different organizations and full involvement of communities.

Inclusive development and enhancement in social capital by consciously ensuring gender equity in coverage of project activities and strategizing linkages with banks and insurance companies will enhance cost effectiveness of the proposed project.

**D. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.**

Key Policies of Central and State Government, on which this project is based, are as follows.

SN	Central/State Government Policy	Responsible Agency	Project Component Consistent with the Policy
1	12 <sup>th</sup> Five year plan	Planning Commission, Govt. of India	<ol style="list-style-type: none"> <li>1. Maintenance of surface water bodies</li> <li>2. Concrete effort to engage in the process of de-siltation and restitution of water bodies through treatment of their catchment areas making tanks suitable for storage of rain water and fishery promotion</li> </ol>
2	National Water Mission	Ministry of Water Resources, Govt. of India	<ol style="list-style-type: none"> <li>1. Designing incentive structures to promote water neutral or water positive technologies</li> <li>2. Integrated water resource management helping to conserve water</li> <li>3. Optimise water use by increasing water use efficiency by 20%</li> <li>4. Enhancing storage, both above and below ground, special effort to increase water storage capacity</li> </ol>
3	National Mission on Strategic Knowledge for Climate Change	Cross cuts all the Ministries & Department	<ol style="list-style-type: none"> <li>1. Identifying challenges of and response to climate change</li> <li>2. Research on socio-economic impacts of climate change, including impact on health and livelihoods</li> <li>3. Development of innovative technologies for adaptation and mitigation</li> <li>4. Research to support policy and implementation</li> </ol>
4	Madhya Pradesh State Action Plan on Climate Change	Housing and Environment Department, Govt. of Madhya Pradesh	<ol style="list-style-type: none"> <li>1. Conservation of fish bio-diversity</li> <li>2. Study of impacts of climate change on inland fisheries</li> <li>3. Develop agro-climatic zone wise plan for fisheries</li> <li>4. Strengthening the existing system of fish management in the State</li> <li>5. Capacity building to integrate climate change risk in planning</li> </ol>

SN	Central/State Government Policy	Responsible Agency	Project Component Consistent with the Policy
5	Madhya Pradesh State Fishery Policy, 2008	Department of Fisheries, Govt. of Madhya Pradesh	<ol style="list-style-type: none"> <li>Loans to fish farmers</li> <li>Janshree Bima Yojana for all fishermen ( Insurance)</li> <li>Use of the latest techniques in fishing to improve production</li> </ol>

**E. Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.**

The overall objective of the project is in line with the Fishery Policy of Government of Madhya Pradesh 2008 and adheres to the recommendations of the State Action Plan on Climate Change. Secondly, the project will be governed as per the policy and preference of Government of Madhya Pradesh in adherence to all the specific local criteria. Apart from that the project would also adhere to the national scientific criteria with regard to adaptation such as economic, social and environmental benefit etc. The project meets the sustainable fishing guidelines developed by the Inland Fishery Research Institute. The environmental norms (water quality) notified with regards to hatcheries will be in conformity with state pollution control board norms. The involvement of the key stakeholders in the Technical committee and the Project Steering committee will ensure compliance with the law. The monitoring of compliance to the technical standard would be done field level units and Steering Committee. Further NIE would monitoring the adherence to the technical standards during its periodic field visits.

SN	Activity	Applicable Standards	Application to Project by
<b>Component 1</b>			
1	Technical modification of pond design	With reference to the RES guideline and Guidelines of Fisheries Dept.	Implementing agency and Dept. of Fisheries
2	Geographical Suitability Assessment	Technical standards of Fisheries Department	Implementing agency along with Geo-hydrology expert
3	Construction of Tanks	With reference to the MGNREGA (Meenakshi) guideline and Guidelines of Fisheries Dept.	By implementing agency with technical expert
4	Catchment Treatment	Standards of watershed development programme and standards of forest department.	Implementing agency along with expert
<b>Component 2</b>			
5	Pond Temperature Regulation	Specification of Fisheries Dept.	Dept. of Fisheries, Govt. of MP along with Implementing Agency
6	Promotion of selected fish species	Specification of Fisheries Dept.	By implementing agency with technical expert

SN	Activity	Applicable Standards	Application to Project by
7	Oxygenation	Specification of Fisheries Dept.	Dept. of Fisheries, Govt. of MP along with Implementing Agency
8	Water quality management	Specification of Fisheries Dept.	Dept. of Fisheries, Govt. of MP along with Implementing Agency
9	Establishment of seed hatcheries / nurseries	Specification of Fisheries Dept.	Dept. of Fisheries, Govt. of MP
<b>Component 3</b>			
10	Training of fish farmer	Specification of Fisheries Dept.	Implementing Agency
11	Project linkage	Convergence Guidelines of Govt. Institutional framework for fisheries sector	Dept. of Fisheries, Govt. of MP along with Housing and Environment Department
12	Insurance Coverage	Specification of Fisheries Dept.	Dept. of Fisheries, Govt. of MP along with Implementing Agency
<b>Component 4</b>			
13	Key Stakeholder participation	Convergence Guidelines of Govt. Institutional framework	Department of Panchayat and Rural Development and Implementing Agency
14	Generation of evidence based learning	Approved national standard, Climate Change Action Plan suggested benefits	EPCO and Implementing Agency
15	Dissemination of learning	Government protocols for participation in learning sharing events	Department of Rural Development and Department of Fisheries and Implementing Agency
16	Development of knowledge products	Knowledge standards established by FAO and other agencies	Implementing Agency

The project is not expected to violate and social and environmental regulations as applicable at National and Sub-national level.

***F. Describe if there is duplication of project / programme with other funding sources, if any.***

Both central and state Government have a number of schemes that have similar components, except having an adaptation mechanism, integrated fishery development perspective and convergent implementation arrangements. Proposed project will take required measures to avoid potential fund duplication with other funding sources for similar activities. Some of the potential schemes/programmes of Government that have complimentary components are as follows:

S N	Project	Objectives	Complementarities	Geographical Coverage	Agency
1	MGNREGS	Wage employment (unskilled) and asset creation	Mainstreaming of adaptation strategy developed under the project	All Districts	Panchayat and Rural Development Department, Govt. of MP
2	National Rural Livelihoods Mission	Rural Livelihoods promotion through women collective	Fishery as one of the livelihoods components (financial support for fish farming & enterprise)	10 Districts	Panchayat and Rural Development Department, Govt. of MP
3	RKVY	Holistic development of agriculture and allied sector to achieve 4% annual growth	Enhancing fish production	All Districts	Ministry of Agriculture & Department of Fishery, Govt. of MP
4	Development of inland fisheries & aquaculture (Development of freshwater aquaculture)	Development of fisheries to strengthen food security, generate employment opportunities, improving the socio economic status of fishers and other people engaged in the sector.	Construction of new ponds Reclamation/renovation of ponds/tanks Cost of inputs Integrated fish farming Support for aerators / pumps Fresh water fish seed hatchery Fish feed unit Training of fish farmers Transportation of fish seed	All Districts	Dept. of Fisheries and Ministry of Agriculture
5	National Mission for Protein Supplements (NMPS)	Intensive aquaculture in ponds / tanks along with reservoir fishery development and aquaculture development through integrated approach for	Construction of Nurseries / hatcheries Capital cost for construction of battery of cages Input cost Establishment of infrastructure like cold storage, ice plant, insulated truck, marketing/retail outlets	All Districts, based on feasibility	Dept. of Fisheries and Ministry of Agriculture

S N	Project	Objectives	Complementarities	Geographical Coverage	Agency
		protein supplement			
6	National Fishermen's Welfare Fund	Welfare of the fishermen community	Personal accident insurance Savings cum relief plan	All Districts	Dept. of Fisheries and Ministry of Agriculture

**Climate Proofing of Fish Farming under Minakshi Sub Scheme of MGNREGS with the support of GIZ:**

A pilot project on climate proofing of fish farming under Minakshi sub scheme of MGNREGS was implemented by the Agency (TAAL) with the support of GIZ in Gandhawani block of Dhar District of Madhya Pradesh. The pilot project aimed at identifying impact of climate change on fisheries sector and to come out with suitable recommendation for enabling fisherman community to adapt to the climate change. The project was implemented during November 2011 to June 2013 by TAAL. A brief account of the Pilot Project and its outcome are given below.

Small farmers in Madhya Pradesh's Dhar district traditionally depend on rain-fed agriculture for their livelihood. Some areas are irrigated with ground water. However, groundwater extraction has reached a critical stage, since recharge rates are low. Lately, farmers have also been affected by changes in rainfall patterns, such as decreases in pre- and post-monsoon rainfall and a shift in the onset of the monsoon. Rising temperatures are another challenge. To increase livelihood options, the Government of Madhya Pradesh has initiated the Meenakshi sub scheme of the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). The goal of MGNREGS is to enhance livelihood security in rural areas by guaranteeing at least 100 days of wage employment a year. The Meenakshi sub scheme aims to provide alternative income sources to farmers by constructing small ponds or hatcheries for fish farming on sections of their land. The sustainability of these activities is threatened by changes in precipitation and temperature. Since high intensive rainfall events have become more frequent, causing surface runoff, the siltation rates of ponds are increasing. In addition, rising temperatures are likely to affect fisheries, e.g. changes in the breeding period, growth retardation and declining overall production.

The objectives of the project were to showcase climate-resilient pond designs, institutional arrangements between farmers and traditional fishermen, and insurance schemes which will provide farmers with options for coping more effectively with climatic variability. The major recommendations include increasing the depth of the pond upto 4 m from the present level of 1.2 to 2.0 m so as to have a minimum water column depth of 2.0 m; construction of smaller size of ponds (0.5 ha) as against 1.0 ha size pond, introduction of common carp fish species, water retention for a period of 10 months, and capacity building of small fisheries farmers on climate resilient fish production technology.

The proposed project is to field test the above recommendations made through the pilot project and to create models which could be replicated and upscale through mainstream programme like MGNREGS.

***G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.***

Component 4 of this project describes both the cross-cutting and specific knowledge management functions that will be undertaken in this project. These include constituting and activating institutional process that will provide opportunity to key stakeholders to participate in the implementation of the project as well as involve them in the identification of learning areas and

issues on which evidence needs to be generated. The Steering Committees at the State and District levels aim at providing inputs on the relevance of adaptation strategies and the documentation that will be required for their up-scaling and their contribution to policy development for small fishers in the state and for development of adaptation strategies for natural resource management with reference to fisheries.

The Technical Advisory Group and the Climate Change Observatory include stakeholders that comprise the community of practitioners and as experts in the field of fisheries and climate change. These Groups and functioning of the Observatory are critical in identifying impacts and in assessing the effectiveness of different project components and strategies. The members from these institutions have access to data and experiences of other projects hence they will be in a position to comment on the applicability of interventions in other areas and sectors. Regular meetings and field visits along with systematically designed action-reflection exercises and systematisation processes will capture the learning from a range of stakeholders during the implementation of the project.

In order to focus on concrete adaptation activities, however, this project focuses on the necessary elements of climate resilience and learning the successful activity implementation and policy linkages, and will work with other projects and initiatives to disseminate information as cost-effectively as possible. The project will generate / record and disseminate explicit as well as tacit knowledge. Explicit knowledge will be generated and shared with different stakeholders during meetings, workshops and and/or through publication. Tactical knowledge (learning generated through implementation experience) will be documented in shape of process learning document for sharing / publication.

The specific steps for replication of tested methodologies will be undertaken through:

1. Presentation of the tested methodologies in the meetings of the District and State Steering Committee, which has membership from key departments of Government (Fisheries and Rural Development)
2. Presentation of policy level issues through Policy Briefs to the State Steering | Committee and the members of the technical Advisory Group
3. Developing Good Practice documents as part of process documentation. The document will be shared with:
  - Members of Climate Change Observatory/ Committee
  - Community of practitioners through the existing e-groups
  - Other stakeholders- financial institutions, insurance companies
  - Civil Society networks involved in Natural Resource Management and/or Livelihood Enhancement
4. Development of civil society organisations interested to address issues related to climate change and/or fisheries will be trained in the knowledge and skills gained from the project through training programmes organised by the project.

Key areas of learning and knowledge generation, its documentation and sharing would be as follows.

1. Production comparison: Fingerling Vs Yearling (in a pre-post project situation)
2. Water quality maintenance and its relation to fish production / productivity
3. Success of temperature regulation through vegetative and shed means
4. Temperature variation and mortality of different fish species
5. Water level variation and tank productivity by fish species
6. Water oxygenation and dissolve oxygen level linked mortality of fish species
7. Benefit of catchment treatment & its linkage to water level and water quality
8. Livelihoods security, income and annual catch improvement (pre-post project)

The knowledge products that will be developed by the project include:

- (a) Toolkit for Developing Adaptation Strategies in Natural Resource Management with Specific Reference to Fisheries
- (b) Toolkit for Preparation of Business Plans for Small-Scale Fishery, Hatchery and Nursery
- (c) Training Manual for Fishers on Climate Resilient Fish Rearing Practices
- (d) Awareness material on climate change and fisheries
- (e) Good Practice Documentation to highlight effectiveness of strategies adopted by the project

The knowledge management system, to be adapted in the project is multi fold i.e. through (1) technology base i.e. web-site / library linkage and sharing through social media sites, (2) publication mode in shape of reports / research papers etc., and (3) interactive mode i.e. seminars and workshops.

**H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund.**

Stakeholder consultation was undertaken and a detailed stakeholder analysis and stakeholder management strategy developed.<sup>23</sup>The stakeholders identified and consulted include the following:

<b>Community Level</b>	<b>Government Departments</b>
<ul style="list-style-type: none"> <li>• Village Community</li> <li>• Fisher (Men and Women)</li> <li>• Traditional Fisher (Men and Women)</li> <li>• Labour (Men and Women)</li> <li>• Gram Sabha</li> <li>• Gram Panchayat</li> <li>• Self Help Group (Fishers)</li> <li>• Fisher Cooperative Society</li> </ul>	<ul style="list-style-type: none"> <li>• Department of Fisheries</li> <li>• Madhya Pradesh Fisheries Federation</li> <li>• Department of Farmer welfare and Agriculture Development</li> <li>• Department of Panchayat and Rural Development</li> <li>• Directorate of Panchayat</li> <li>• Department of Forest</li> <li>• Department of Revenue</li> <li>• Department of Mineral Resources</li> </ul>

<sup>23</sup> See **Annexure 4** Stakeholder Analysis and Management

	<ul style="list-style-type: none"> <li>• Department of Cooperation</li> <li>• Department of Water Resources</li> <li>• EPCO</li> <li>• CIFA</li> </ul>
<b>Commercial Enterprises</b> <ul style="list-style-type: none"> <li>• Commercial Banks</li> <li>• Seed Suppliers</li> <li>• Feed Suppliers</li> <li>• Suppliers of Fish Net</li> <li>• Fish Traders</li> </ul>	<b>Civil Society Organisations</b> <ul style="list-style-type: none"> <li>• Local NGOs</li> <li>• Media</li> <li>• Academic Institutions</li> </ul>

Details on stakeholders' consultations are indicated below, whereas the stakeholder analysis and management details are presented in the Annexure 4.

## Stakeholder Consultation for the Preparation of Proposal

Stakeholder consulted	Process of Consultation	Description	Key findings
<b>Traditional Fisher Community</b>			
(a) Fisher Community at Alirajpur (12 May 2014)	<ul style="list-style-type: none"> <li>- Observation in the local Fish Market on weekly market day</li> <li>- Focus Group Discussion with traditional fisher and sellers in the fish market</li> </ul>	<p>Traditional fisher households have their shops in the local fish market. The observation involved a study of the selling and buying behavior of the consumer on weekly market day for fresh and dry fish.</p> <p>Focus Group Discussion with traditional fisher that also included women from their households to assess findings from observations and trends of local fish demand and market in the area.</p>	<ul style="list-style-type: none"> <li>- Different fish species and their demand in the local market including trend of prices across season</li> <li>- Fish buying behavior of the local customers; different types of fish sellers and pricing strategies adopted by them in the market</li> <li>- Fish market infrastructure, support structures and services available to traditional fishers</li> <li>- Long term changes in the availability of fish in the local markets</li> <li>- Assessment of climatic change and its impact on fisheries</li> <li>- Role of women in fish trade and assessment of existing skill levels amongst women</li> <li>- Associated market for fisheries (e.g. fish net) and role of women in these products</li> <li>- Access to government schemes and programmes</li> <li>- Linkages between local fishers (tribal community) and fish sellers (traditional fishers)</li> <li>- Local demand for fish seed and opportunity for fish nursery and hatchery</li> <li>- Assessment of climatic change and its impact on fisheries</li> </ul>
(b) Fisher community at Jhabua (7, 9 and 13 May 2014)			
(c) Fisher Community at Petlawad (Jhabua) (14 May 2014)			
(d) Migrant fishers from Maharashtra at Kunda Dam in Dhar (10 and 11 May 2014)			
(e) Fishers in Dhar Market (12 May 2014)			
<b>Small Farmer Fishers</b>			
(a) Fisher Group at Alirajpur (6, 7 and 11 May 2014)	<ul style="list-style-type: none"> <li>- Focus Group Discussion with Fisher Group</li> <li>- Individual interaction with Gram Panchayat representatives</li> </ul>	<ul style="list-style-type: none"> <li>- Through consultation with representatives of Fisheries department and civil society organizations local scheduled tribe fishers were selected that were identified as undertaking regular</li> </ul>	<ul style="list-style-type: none"> <li>- Process of leasing pond for fishing rights (legal and administrative procedures)</li> <li>- Group formation and distribution of responsibilities among group members</li> <li>- Fish rearing practices and source of information and learning about fisheries</li> <li>- Access to government schemes and programmes</li> </ul>
(b) Fisher Group at Rama/Para (Jhabua) (8 and 13 May 2014)			

Stakeholder consulted	Process of Consultation	Description	Key findings
(c) Fisher Group Gulab Pura (8 May 2014), Jhabua (d) Fisher Group at Narvali, Jhabua (6 May 2014) (e) Fish Hatchery at Maud Sagar (6 May 2014)		commercial fisheries. The aim was to identify good practices in the region that can be incorporated in the project. - Gram Panchayat representatives including Panchayat representatives were identified and contacted to find out the process of leasing pond, availability and access to maintenance fund for ponds, appropriateness of design of pond for fisheries, understanding of factors for climate and their role in enabling users to develop adaptation strategies	- Access to financial support services including savings, credit and insurance - Perception and data related to climate change and impact on fish production - Strategies for enhancing fish production and constraints faced by fishers - access to information, training and knowledge related to climate change, adaptation strategies - skills and knowledge related to fish hatchery and nursery
<b>Private Entrepreneur</b>			
<b>Private Hatchery and Nursery</b> (a) Hoshangabad(11 April 2014) (b) Sundrel, Dhar (10 May 2014) (c) Ornamental Fish entrepreneur at Dharampuri (11 May 2014)	- Visit to Hatchery and nursery and discussion with private entrepreneur	- for assessment of market for fish seed - for assessment of resource and training requirement for fish hatchery	- type of infrastructure required - need and demand for fish seeds - terms of trade of fish seed market and supply mechanisms - knowledge and skills required for fish hatchery and nursery - Business plans for hatchery and ornamental fisheries
<b>Fish Traders</b> (a) Indore (11 May and 5 June 2014) (b) Khalghat (11 May 2014) (c) Dahod (2 June 2014) (d) Meghnagar (5 May 2014)	- Individual interactions with traders	- Traders who on a regular basis engage in trading in fish purchasing it locally or from outside the district	- Fish market and demand pattern of fish locally - Volumes of fish consumption locally and cyclical trends in fish - Terms of trade of fish market

Stakeholder consulted	Process of Consultation	Description	Key findings
(e) Alirajpur (3 June 2014) (f) Jhabua (3 June 2014) (g) Dhar (6 June 2014)			<ul style="list-style-type: none"> <li>- Different players in the fish market and their negotiating abilities</li> <li>- Extent of fish trade and its linkages with markets outside the district</li> <li>- Infrastructure for fish markets</li> <li>- Support services for fish trade in the local markets</li> </ul>
<b>Civil Society Organisation</b>			
(a) Gramin Vikas Trust, Jhabua (15 and 27 April 2014) (b) Khedut Kisan Majdoor Sangahtan, Alirajpur (11 May 2014)	- Peer Consultation through individual interaction	- Civil society experience for promoting fisheries in the region	<ul style="list-style-type: none"> <li>- Inter-community dynamics between traditional fisherpersons and small and marginal farmer fishers</li> <li>- Gram Sabha meetings and their role in fisheries development</li> <li>- Interest of small and marginal farmers towards fisheries</li> <li>- Role of women in different operations of fisheries</li> <li>- Civil Society understanding of factors of climate change, their impact on fisheries, and adaptation strategies</li> <li>- Opportunities for integrated agriculture and aquaculture practices</li> <li>- Support structures and services for fishers for marketing, financial services and infrastructure support</li> </ul>
<b>Panchayat Institutions</b>			
Zila Panchayat (a) Zila Panchayat, Alirajpur (12 May 2014) (b) Zila Panchayat, Jhabua (13 May 2014)	- Individual interaction	- Zila Panchayat is the nodal body that has the responsibility for planning for economic development and social justice in the district. The technical and administrative officials of the Zila Panchayat were contacted and information was generated through individual interaction	<ul style="list-style-type: none"> <li>- Guidelines for construction of ponds for fisheries</li> <li>- Parameters that are taken in to account while planning for fisheries in the district</li> <li>- Present plans for promotion of fisheries in the district</li> <li>- Present level of understanding about climate change and its impact, particularly on fisheries</li> <li>- Basic information on development parameters related to the district</li> <li>- Poverty and development planning in the district</li> </ul>

Stakeholder consulted	Process of Consultation	Description	Key findings
			- Role of women in fisheries and specific schemes targeting women involved in different operations of fisheries
<b>Government Departments- District Level</b>			
<b>Department of Fisheries</b> (a) Jhabua (5 and 13 May 2014) (b) Dhar (18- 21 May 2014) (c) Alirajpur (12 May 2014)	- Individual interaction and perusal of records -	- Fisheries officers and their field level functionaries were contacted and detailed discussions were undertaken with them	- Process of implementation of State Fisheries Policy - Challenges and constraints in promotion of fisheries in the district - Present list of small pond fishers - Inter community dynamics between traditional fishers and local (scheduled tribe) fishers - Data on fish production in the district - Adaptation strategies and planning to address climate change in the district - Resources available for training and other capacity building measures in the district for fishers and for the staff of department - Fish hatchery, nursery and departmental interventions for making fish seed available in the districts - Government programmes related to fisheries and their implementation in the district - Identification of priority areas for promotion of fisheries in the district and the parameters used for such identification - Linkages with banks and other financial institutions for promotion of fisheries in the district - Coordination mechanism with other departments and stakeholders - Role of women in fisheries and government programmes for enhancing their role and productivity
<b>Department of Water Resources</b> (a) Dhar (5 May 2014)	- Individual interaction	- Divisional Officers in the district were contacted and information related to water	- Development of water resources in the district

Stakeholder consulted	Process of Consultation	Description	Key findings
(b) Jhabua (6 to 7 May 2014) (c) Alirajpur (12 May 2014)		resources was collected from them	<ul style="list-style-type: none"> <li>- Design parameters and guidelines for design of reservoirs and ponds specific to fisheries</li> <li>- Identification of priority areas for fisheries in the district</li> <li>- Water statistics of the district</li> </ul>
<b>Department of Revenue</b> (a) Dhar (22-25 May 2014) (b) Jhabua (6-7 May 2014) (c) Alirajpur (12 May 2014)	- Individual interaction	- Revenue officers in charge of land records in the district	- Land use data and location of weather stations in the district
<b>Department of Farmers Welfare and Agriculture Development</b> (a) Dhar (22-25 May 2014) (b) Jhabua (6-7 May 2014)	- Individual interaction	- Deputy Director Agriculture and their junior officers were contacted to gain information of their preparedness for climate change and adaptation strategies in agriculture in the district	<ul style="list-style-type: none"> <li>- Plans for agriculture development of the district</li> <li>- Emergency plan for agriculture including plans for intervention for fisheries in cases of natural disasters</li> <li>- Training for small and marginal farmers and promotion of IAA in the district</li> <li>- Coordination mechanisms with Fisheries Department</li> </ul>
<b>Government Departments- State Level</b>			
<b>Directorate of Panchayat</b> (19 May 2014)	- Individual interaction	<ul style="list-style-type: none"> <li>- Information related to role of Panchayats and their powers in development of fisheries</li> <li>- Specific provisions related to Schedule V areas on fisheries in the state</li> </ul>	<ul style="list-style-type: none"> <li>- Legal provisions that enable Panchayats to intervene for development of fisheries in the state</li> <li>- Orders and circulars to implement the legal provisions</li> <li>- Orders for implementation of powers of Gram Sabha in scheduled areas in the state</li> <li>- Incorporation of specific legal provisions for the implementation of State Fisheries policy</li> </ul>
<b>Department of Fisheries</b> (3, 19 May 2014)	- Individual interaction	<ul style="list-style-type: none"> <li>- State Policy for Fisheries</li> <li>- Data and trend of fisheries in the state</li> <li>- Assessment of impact of climate change on fisheries and preparedness to address climate change factors</li> </ul>	<ul style="list-style-type: none"> <li>- State policy for fisheries and challenges and constraints in its implementation</li> <li>- Gaps in state policy</li> <li>- Structure of the department and distribution of roles and responsibilities within the department</li> <li>- State plan of action for climate change for fisheries in the state</li> </ul>

Stakeholder consulted	Process of Consultation	Description	Key findings
<b>Department of Rural Development</b> (24 May 2014)	- Individual interaction	- State imperatives for rural development and priority accorded to fisheries for rural development - Climate change as a factor for rural development in the state and state's preparedness for addressing issues in climate change	- State plans for use of MGNREGS for promotion of resources for fisheries in the state - Guidelines for designing and implementation of ponds to promote fisheries - Coordination mechanism of the department with other technical department
<b>Madhya Pradesh Fish Federation</b> (18 Feb and 18 June 2014)	- Individual interaction	- Programmes and support structure of the federation for small-scale fishers	- Federation programmes in the state - Role of federation in promotion of small-scale fishers - Role of Federation in promoting women in the fishery sector
<b>Environment Pollution Control Agency</b> (5 May 2014)	- Individual interaction	- Climate Change Knowledge Management centre was contacted as it is the nodal point for climate change issues in the state	- State Action Plan for Climate Change - Vth Environmental Status Report - Coordination mechanisms for climate change issues and for policy development in the state
<b>Central Institute for Freshwater Aquaculture</b> (25 April 2014)	- Individual interaction	- Senior scientist that have been allocated to tack the issue of climate change were contacted	- National priorities for promotion of small-scale fisheries - Initiatives for development of adaptive strategies for small-scale fisheries - Development new technology for fish seed production, fish rearing practices and best management practices for adaptive measures to address climate change - Coordination mechanism for bringing different stakeholders for development and up scaling of climate resilient strategies in freshwater aqua culture
<b>Indian Meteorological Department</b> (23 May 2014)	- Individual interaction	- Gain information on climatic parameters and assessment of climate change in the state	- Climate modeling for the state report on climate change - Coordination and collaboration mechanisms

Stakeholder consulted	Process of Consultation	Description	Key findings
<b>Institute of Soil Science</b> (21 May 2014)	- Individual interaction	- Gain information on national level initiatives on climate change	- National projects on climate change - Resource availability in the institute - Coordination among different research agencies in the state - Priority to climate change initiatives in the state
<b>Indian Council of Agriculture Research (CIAE)</b> (21 May 2014)	- Individual interaction	- Climate modeling for the state	- Climate modeling in the work of the institute in the state - Coordination mechanism among different research and academic institution in the state

#### Stakeholder Consultation during the Concept Formulation Stage

Stakeholder consulted	Process of Consultation	Description	Key findings
<b>Department of Fisheries</b> (23 and 24 July 2013)	- Individual interaction	- Senior State level officials in charge of implementation of State policy for Fisheries	- Project feasibility - Review of study reports - Sharing of experience of pilot project - Possible adaptive measures for climate change
<b>Traditional Fisher folk</b> (Regular interaction during the pilot phase during 2012 and 2013)	- Focus Group Discussion	- Traditional fishers and their leaders - Women from traditional fisher families engaged in fishing operations	- Challenges and constraints in accessing ponds for fishing rights - Changes in fish production over a period of time and its attributability to climatic factors - Possible areas for adaptation to make fishing resilient to climate change - Access to financial services including credit and insurance - Fish market, consumer behaviour and preference for fish species

***I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.***

**Component 1: Adaptive measures to address rainfall variability**

**Baseline Scenario**

In-land fish farming remains a possibility only during the monsoon (June to October) in a rain-fed situation. In a scarcity of precipitation and skewed distribution situation, this option also goes out of the hands of fish farmers. Availability of water in the tank, as per the present design can be for a maximum of 4-5 months and in many cases, getting a good harvest also becomes difficult for the fish farmers. Prior to this proposition, a detail participatory study was conducted in one of the proposed project district of Madhya Pradesh (Dhar) which reflects a number of factors that are not conducive for fish rearing such as poor depth of the tank, denuded catchment, poor tank maintenance etc.

Present construction of tanks, as per the technical specifications, does not address these issues. Further, the design also does not take in to account the temperature and wind related evaporation which is common to all water bodies. As a result, very little or no water remains available in the tanks for fish rearing after monsoon.

In the absence of adaptation fund support, the present system of fish farming is expected to continue as Government is having stipulated tied fund provision for different components. Provisioning of additional fund in to the existing plan/programme to meet the cost of adaptation is cumbersome unless its benefit dimensions are demonstrated successfully and fish farmers realise the benefit.

**Adaptation Alternative**

The proposed component includes a protocol for prioritising selection of site of pond for fisheries and modification in the design of the farm pond so that the water retention capacity is improved substantially. This is expected to provide a prolonged fish rearing period that will lead to a better fish harvest. Further, the catchment treatment would reduce the siltation of the ponds and maintain the water depth for fish rearing. The insurance product proposed to be developed would address climate risks associated with the fish production system on a sustainable basis.

**Component 2: Adaptive measures to address warmer climatic regime**

**Baseline Scenario**

Experience gained during one and half years of direct association with in-land fisheries shows that required adaptive measures to climate variability are deficient in many ways and in most parts of the State. Even in commercial farms in other districts, the adaptive measures are inadequate. The study conducted in one of the project districts further reveals that there is no initiative to maintain the quality of fish habitation, no measures for temperature regulation, maintaining dissolved oxygen level, water quality monitoring, etc. Supply of good quality fingerlings is also an important constraint due to non-availability of adequate hatcheries.

### **Adaptation Alternative**

Water temperature has a bearing of fish productivity. Different fish species are productive at different band width of temperature. Changes in water temperature will thus affect the overall productivity of fish under inland fresh water fish culture. The two adaptive measures that are possible under such conditions are: strategies that will regulate temperature of pond; and introduction of fish species that is suited to warmer climate regime and has local demand for consumption.

The proposed project will customize one or more of the following measures to regulate water temperature through (a) controlled and restricted use of water hyacinth on not more than 20% of the pond area to as a temperature regulating mechanism (b) greening of the immediate vicinity of the pond to regulate micro temperature especially during hot summer months; (b) providing shade over a portion of the pond so that part of the pond has lower temperature and the fishes can move to cooler areas. As a risk reduction measure the project will demonstrate use of oxygen tablets and solar powered aerators to decrease mortality of fish during hot summer months due to lack of oxygen in water.

Introduction of fish species that is suited to warmer climatic regime implies use of poly culture fish rearing practices. The project proposes use of four layered fish species based on their adaptive characteristics, feeding practices, and their being endemic and native to the region. To make poly culture adaptable to the fisher it will be customized to the need of the fisher so that the acceptance of adaptation practices will be ensured.

Strategies to regularly monitor water quality, training on best practices to control and manage water quality, introduction and training on fish hatchery and nursery will be undertaken to support the implementation of above adaptive strategies.

### **Component 3: Building resilience for climate adaptation**

#### **Baseline Scenario**

As most of the fishermen are small and marginal in their operation, it becomes difficult for them to make the required investment in this regard. Secondly, as fish farming is more seasonal in character, no farmer is willing to make additional investment as it will cost them more than what they get from the harvest. Thirdly, required additional investment support also does not come from other sources due to tied nature of the fund and missing an adaptation perspective in fish rearing. Further, marketing and other backward / forward linkages are either weak or non-existing due to poor institutional support.

#### **Adaptation Alternative**

The proposed component the capacity building needs of fisheries community is taken into consideration. The component includes training and capacity building in responsible fisheries and in climate resilience and climate change strategies, insurance coverage etc. The components also aim to link the entire value chain related to fish production, as proposed under the project.

Adaptation Fund support can help in bridging persisting gaps and fostering adaptive practices in fish rearing.

#### **Component 4: Knowledge Generation and Management**

##### **Baseline Scenario**

Government has a number of schemes / programmes that help in building the capacity of the fish farmers. But the imparted knowledge is quite traditional in nature and of less importance for climate responsive adaptive practices. As a result, the fish farming methods, adapted are also traditional in character. On the other hand, the existing formal mechanism is inadequate with regards to recording and sharing innovative practices and coping mechanisms.

##### **Adaptation Alternative**

The proposed components would include process documentation, documents indicating social, environmental and economic benefit of the proposed model, development of evidence based strategy for inland fish production.

Funding is requested to the Adaptation Fund Board in order to start up concrete adaptation activities in the fisheries sector to improve the resilience to climate variability and change. The project covers the full cost of adaptation in the western regions of Madhya Pradesh. Specific reasoning for adaptation funding is as follows.

1. Through the construction or rehabilitation of climate suitable tanks, there would be more availability of water, at least for a period of 10 months, which will help in fish farming in a more sustained and profitable manner (climatic adaptation for better survival and growth).
2. Water quality maintenance would keep the pond ecosystem clean and suitable for fish species to grow. By temperature and water quality regulation, farmer's adaptive capacity to the changing climatic conditions would improve to a great extent.
3. Catchment based planning and treatment of catchment would further help to adapt to increasing temperature, minimizing soil erosion and pond siltation and restoring soil moisture content.
4. The use of fingerlings, instead of spawn would be helpful to minimise the mortality of fish, ensuring appropriate growth and hence better economic return (economic adaptation).
5. Apart from natural aeration, artificial mechanised aeration would be further helpful to maintaining the dissolve oxygen level and there by improved fish survival.
6. New management practices and system will be adopted by fishery extension system in rain-fed area.
7. A convergence model for integrating programs of poverty alleviations/ rural development, fisheries development, and financial institutions.
8. A policy framework on 'Climate Change Resilient inland Fisheries in Rain-fed Areas' evolved through integrating scientific production technologies, appropriate community institutional systems and management practices.

**J. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project / programme.**

The project has inbuilt sustainability enhancing design parameters which would continue beyond the life of the project. The sustainability parameters of the project are many folds and interlinking i.e. (i) related to the physical / structural, (ii) economic and (iii) operational aspects. With increased economic return, tanks under fish farming would continue for a longer period. The tanks, with annual maintenance as suggested, would have a life span of minimum of 20 years where farmers would continue doing fishing. Secondly, the life of the hatcheries, with required production, supply and maintenance would be more than 25 years as it will be financially and technically linked with the Department of Fishery for the production of fingerlings and with nursing firms. The vegetative and mechanical measures taken in the catchment would also continue with a refilling and rehabilitation mode and with active participation of the fishing and general community. In the economic sphere, the tanks would be utilised for fish farming and economic return to fish farmers would continue in a longer run. The sustainability and economic return can be guaranteed due to direct and increased returns.

**Sustainability of Outcomes**

The project will take a livelihood-based approach to adaptation developing asset / capital base of individual / community in a participatory model. Four types of capital base will be created i.e. human capital, natural capital, physical capital and financial capital. The human capital will be formed through developing adaptive knowledge and skill base of fish farmers whereas physical capital will be in shape of tanks and hatcheries. The natural capital will be the catchment treatment measures, water quality management, temperature regulation and providing an ambient atmosphere for fish farming in the tanks. This will impact on building the financial capital of the small and marginal fish farmers, which will also be strengthened by linking the fishers directly to savings and credit and insurance products. All these will lead to improve the adaptive capacity, both at household and community level. Combined impact of these components will ensure the sustainability of the outcome in the long run.

**Environment Sustainability**

Prioritised selection of ponds for fisheries, modified pond design and catchment treatment of pond will enhance the water retention capacity of the pond that will be used to introduce technologies and practices that regulate the temperature of ponds especially during the summer months. The two factors together will ensure longer duration of water availability and a quality of water is most suitable for fish culture. Further, the capacity building of fishers on responsible fisheries will orient and train them to conduct fisheries on a scale that is environmentally sustainable and conserves and maintains the natural resource base at the same time.

**Economic Sustainability**

Developing customised business plans for fisheries for each of the selected ponds will enable the fishers to envision and work according to strategy. This will create economic security amongst the fishers with an in built growth of business that will enable them to optimise returns from fishing. Being able to ward off forces of distress migration and with better linkages to market the fishers

will be able to maintain a steady stream of income from fisheries that will complement their income from agriculture.

### **Social and Institutional Sustainability**

Strengthening of livelihood group of fishers as non-formal groups or as cooperative societies will enable the groups to form linkages with financial institutions and forge partnerships with other stakeholders in the input and product market. The membership comprising of similar social and economic groups will impart homogeneity to the membership and development of equal stakes in these groups. Further ensuring that the capacity building is inclusive for men and women equally will lead to equal distribution of benefits from the project. These factors will impart social and institutional sustainability to the target communities and groups.

### **Replication and Scaling up**

The institutional arrangement for implementation of the project is based on the institutional capacity and its operational mandate given by State and National Government. This will help to synergise the outcome in future plan and policy of Government. Based on the data and analysis that will be undertaken during implementation, the viability, sustainability and replicability of the model will be tested. The tank construction and maintenance unit cost per fish farmer is a significant investment for livelihood enhancement. Actual per fish farmer output, revenues, savings performance and savings mechanisms will be monitored. Also the potential for cost reduction, additional value added and future financing options, will be monitored and assessed for use in replication and expansion of the project.

The inputs provided to the State Steering Group and reflections of the Climate Change Observatory will create forums and opportunities for parking successful strategies for policy development and designing programmes. The process documentation and evidence-based studies will provide the necessary academic support to capitalising these opportunities and enable wider replication of project impacts and successes.

### ***K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.***

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
<b>Compliance with the Law</b>	<ul style="list-style-type: none"> <li>The project complies with Environment (Protection) Act, 1986 and Forest Conservation Act, 1980.</li> <li>Further the project complies with MP Land Revenue Code (for ownership of land); MP Panchayat Raj and Gram Swaraj Act (local governance); and other administrative orders of Subnational Government.</li> </ul>	None
<b>Access and Equity</b>	<ul style="list-style-type: none"> <li>The project provides fair and equitable access to the project beneficiaries and will not be impeding access to any of the other requirements like health clean water, sanitation, energy, education, housing, safe and decent working conditions and land rights.</li> </ul>	None

	<ul style="list-style-type: none"> <li>The project has the component of regular water monitoring. In case the quality of water will get affected mitigation measures will be undertaken.</li> <li>The project will design ponds for small and marginal landholders as much as it will for other landholders.</li> <li>The proportion of benefits that will flow to each category of landholder will be determined in consultation with the Project Steering Group.</li> </ul>	
<b>Marginalized and Vulnerable Groups</b>	<p>The beneficiaries of the project will be tribal communities residing in the proposed project area. The other community that will benefit will be the traditional fishers who are also categorised as scheduled caste. In both the cases the marginalised groups will benefit from the project.</p> <p>The Technical Assessment and Baseline and Project Benefit Assessment include identification of impact on marginalised groups.</p>	None
<b>Human Rights</b>	The project does not foresee any violation of human rights	None
<b>Gender Equity and Women's Empowerment</b>	<p>Project would ensure participation by women fully and equitably, receiving comparable socio-economic benefits and that they do not suffer adverse effects.</p> <p>The beneficiary related activities, e.g. training, exposure visits, will include women so as to enable them to develop their capacities and strengthen their skill base. In addition the Fish Farmers Associations (ref. Implementation Arrangement) that will be formed will have representation of women so that they also participate in the project related decision making process (ref point 2 of Part II)</p>	None
<b>Core Labour Rights</b>	Payments to labour under the project will be made as per Government approved norms duly following minimum wage rate and hence ensuring core labour rights.	None
<b>Indigenous Peoples</b>	Not applicable to this project	None
<b>Involuntary Resettlement</b>	The project does not displace any community and hence issue of resettlement does not arise	None
<b>Protection of Natural Habitats</b>	Project does not affect any of the natural habitats	None
<b>Conservation of Biological Diversity</b>	<p>The fish species proposed to be promoted under the project are native and endemic to the area.</p> <p>The project would not cause any impact on bio-diversity values.</p>	None
<b>Climate Change</b>	The project is basically for enhancing the adaptive capacity of the fisherman community against adverse impact of climate change and is not expected to contribute to GHG emissions	None
<b>Pollution Prevention and Resource Efficiency</b>	<p>Project is not expected to create any environmental pollution and aims for higher resources efficiency for better management of available natural resources like water, fish species, plantation species (locally available), etc.</p> <p>In order to further ensure the same, water quality monitoring will be regularly undertaken to assess whether the water bodies created under the project are not being subjected to in flow of pollutants from nearby fields. Mitigation measures will be implemented for water bodies where the pollution levels are found to exceed national and international standards.</p>	None
<b>Public Health</b>	No adverse impact on public health related issues is envisaged. However, considering that with creation of water bodies there is possibility of increase in vector borne diseases. The Gram Sabha (local governance structure) will be informed and made aware of the possible increase in incidences of diseases and the preventive measures for the same. The project will conduct health camps and will specifically focus on vector borne diseases.	None to low

<b>Physical and Cultural Heritage</b>	No adverse impact on cultural heritage related issues is identified.	None
<b>Lands and Soil Conservation</b>	Creation of farm pond and catchment area treatment is envisaged to help in land and soil conservation and will not create any damage to land & soil resources.	None

In view of the above the project is categorized as **“Category C”** with no adverse Environmental or Social Impacts.

As indicated earlier, the project districts are predominantly inhabited by Scheduled Tribes. The implementation of the project is expected to provide benefits to these communities. As such no adverse impact is envisaged to the people belonging to Scheduled Tribes or any other marginalized groups in the project area. However, the project will identify and ensure that the provisions of the UN Declaration of the Rights of Indigenous people are strictly adhered to.

The AFP’s Environmental and Social Policy (approved in November 2013) will be made available to project stakeholders and promoted through training and dialogue with implementing agencies to build a common understanding of the principles and practices that have been adopted to enhance development benefits and avoid unnecessary harm to the environment and affected communities. Any potential impacts on marginalized and vulnerable groups will be properly screened and considered by the implementing agencies. Further, grievance redressal mechanism would be created as part of implementation mechanism. Contact details of NIE Co-ordinator and Contact Person of NABARD would be made available to stakeholders and community at large through prominent display of these details in the project area. The information on the same would also be communicated to stakeholders during project inception workshop.

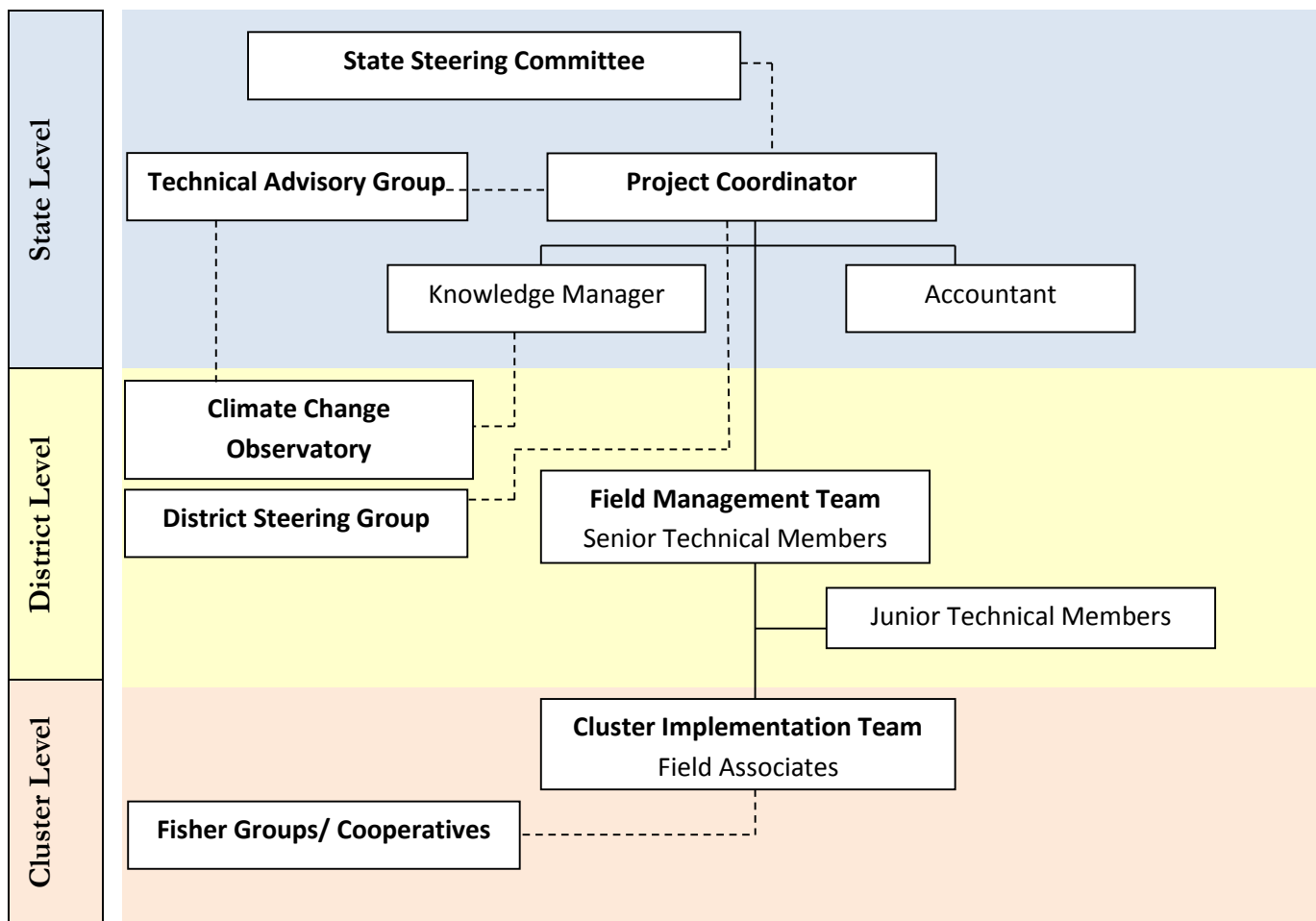
## PART III: IMPLEMENTATION ARRANGEMENTS

### A. Describe the arrangements for project / programme implementation.

Operationally, the project has two distinct objectives: **one**, to develop the fish farmer as an efficient fisher so that he is able to mobilize his resources and capacities to practice responsible fisheries in ponds; and **second**, to develop the fish farmer as a resilient fisher that enables him to assess and respond to climate variability such that his livelihood security is not adversely affected.

The institutional arrangement of the project will thus comprise of implementation and support structures that will be focused on the fishers so as to provide inputs to them to enable them to develop as efficient fishers **and** as climate resilient fishers in the project area. The human resource plan is guided by these twin requirements and aims at initiating processes related to execution, facilitation, handholding, and mentoring of fishers to develop them as trained and experienced climate champions.

**Institutional Arrangement of the Project**



Institutional arrangement for the implementation of the project and their role in the project is as follows:

Institutional Structure	Composition/Membership	Role and Responsibility
<b>State Steering Committee</b>	<p>Comprising of membership from the Senior Government officials from the Department of Rural Development; Fisheries; Panchayat; Farmer Welfare and Agriculture Development; Water Resources; Fish Federation; EPCO; NFDB and CIFA; NABARD and Project Coordinator of the Project Team.</p> <p>NABARD as NIE at the state level will be the Convener of the State Steering Committee.</p>	<ul style="list-style-type: none"> <li>● Facilitate involvement of government departments in the implementation process of the project at the state and district level</li> <li>● Provide guidance and direction to the project activities to enable it to achieve its objectives</li> <li>● Monitor the progress of the project against the agreed time lines</li> <li>● Assess the relevance and feasibility of the project activities and impacts and identify policy level issues that can be fed to relevant departments for policy development</li> </ul>
<b>Technical Advisory Group</b>	<p>Experts with qualification and Experience in:</p> <ul style="list-style-type: none"> <li>● Fisheries</li> <li>● Climate Change and development of Adaptation Strategies</li> <li>● Agriculture/Civil Engineering</li> <li>● Geo Hydrology</li> <li>● Rural Marketing</li> <li>● Institution Development</li> </ul> <p>The Technical Advisory Group will be constituted for the purpose of the project and will be convened by the Project Coordinator to draw upon the expertise of the Resource Persons from this group.</p>	<ul style="list-style-type: none"> <li>● Provide technical inputs to the team members and fishers in the field.</li> <li>● Assess relevance and impact of the climate adaptive strategies</li> <li>● Make recommendation to the Project Team on technical matters to incorporate the same in the implementation plan</li> </ul>
<b>Project Team<sup>24</sup></b>	<p>Project team will have three layers: (i) at the state level comprising of the Project Coordinator, Knowledge Manager and the Accountant; (ii) the Field Management Team comprising of Senior Technical Members who will be assisted by Junior Technical Members and placed at the district level; and (iii) the Cluster Implementation Team comprising of</p>	<ul style="list-style-type: none"> <li>● Overall responsibility of the implementation of the project</li> <li>● Engage with external stakeholders to achieve project objectives</li> <li>● Responsible to the NIE and for fulfilling monitoring and</li> </ul>

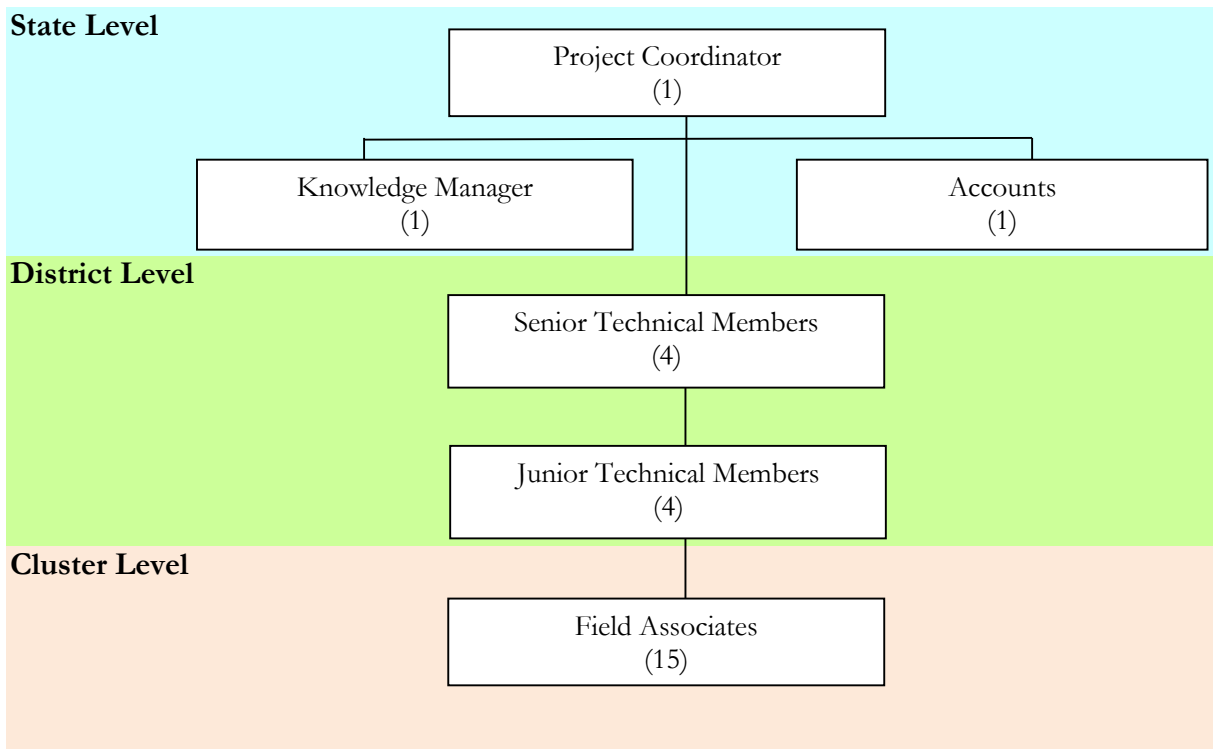
<sup>24</sup> For Terms of reference for the Project Team members see **Annexure 8** Human Resource Plan

	Field Associates located at the district level.	evaluation activities under the project
<b>District Steering Committee</b>	<p>District Steering Group will be comprise of the membership of District Collectors, and district level officials from the department of Fisheries; Cooperatives; Farmer Welfare and Agriculture Department; Zila Panchayat; and Mineral Resources. <b>The Lead Bank Manager of the district will also be the ex officio nominee to the DSC.</b></p> <p>The Project Coordinator will be the Convener of the District Steering Committee.</p>	<ul style="list-style-type: none"> <li>• Facilitate project implementation at the district level</li> <li>• Facilitate coordination between different departments for the smooth implementation of activities at the project level</li> <li>• Monitor the project activities and assess the benefit an impacts accruing to the project beneficiary</li> <li>• Provide guidance and direction to the project for the implementation of project</li> <li>• Assess the usefulness of climate adaptive strategies for the region</li> </ul>
<b>Climate Change Observatory</b>	Invited members from Community of Practitioners; Climate Change Cell of EPCO; Department of Fisheries; Panchayat representatives; Experts on Fisheries; representatives of Insurance Companies and Financial Institutions.	<ul style="list-style-type: none"> <li>• CCO will review data generated as part of the project's experiences, climate data from local and IMD sources, and data on adaptation practices in fisheries from other places.</li> <li>• Climate Change Observatory will become the prime mechanism whereby adaptation knowledge is transformed into policy-relevant tools to be used at the national and local level.</li> </ul>
<b>Fishers Group/Organisation</b>	Fisher group will comprise of the fishers who are directly involved in the fishing activity. The group can be informal livelihood groups; or Self Help Groups; or Fisher Cooperative Societies. These groups may already exist or may be formed under the project.	<ul style="list-style-type: none"> <li>• Participate in the project activities at the pond, cluster and district level</li> <li>• Work for the strengthening of activities related to fisheries and adoption of climate resilient strategies</li> <li>• Participate in capacity building events and</li> </ul>

		<p>exposure visits for the fishers</p> <ul style="list-style-type: none"> <li>• Adopt responsible fishing practices in the pond for which they have leasing rights</li> <li>• Strengthen the organisation base of the Fisher Group to provide institutional sustainability</li> </ul>
--	--	---

The organisation structure for the implementation of the project comprise of three levels: state level that will provide the overall leadership and coordination to the project and undertake monitoring and supervision of project activities; district level structure that comprise the field management team to spearhead implementation of project activities at the district and sub district level; and cluster level teams to ensure execution of project activities at the pond level and with targeted fisher community.

### Project Organisation Structure



The specific Job Descriptions of member of the project team is given in **Annexure 8** Human Resource Plan.

**B. Describe the measures for financial and project / programme risk management.**

Expected Risk	Rating of Risk	Risk Management Strategy
<b>Operational Risk</b>		
Water from pond drawn for irrigation that adversely affects the ability of the fisher to conduct fisheries in the pond	Moderate	Processes of community consultation before finalization of the site; involvement of Gram Sabha in selection of the pond for fisheries; consultations with farmers with fields near the pond; co-opting farmers as members of the Fisher Group
Elite Capture leasing rights of the pond and corner project benefits	Low	Criteria of small and marginal farmer as target group on community land will be non-negotiable; <i>benami</i> membership will be discouraged; fishers that actually carry out fishing will be made members of the Fisher Group
Greater emphasis on development of fisheries than on development of adaptive capacities/ strategies by the fishers	Moderate	Training on climate change and adaptation art of capacity building plan; capacity building of staff on impacts of climate change; design of the pond focused on increasing water retention of ponds; climate change adaptation as part of Job Description of the senior management team and will become part of their performance appraisal
Low adoption rate of adaptive strategies by target fishers	Low	Development of adaptive strategies as part of consultative process with the fishers; intensive handholding process; training and exposure to fishers; output-market linkages; opportunity identification and their assessment
Delays in approval and sanctioning of leasing rights	Moderate	Launch workshop with external stakeholders; District Steering Committee to facilitate quick decision making; intensive engagement with department officials
Poaching of fish from pond by other members of the community	Moderate	Extensive consultation process with the community before leasing the pond; resolution of the Gram Sabha for providing of leasing rights; making households residing around the pond as members of the Fishers Groups; community consultation processes
Non availability of fish seed on time by the fisher	Moderate	Project will establish one hatchery in each of the three districts that will have the capacity to supply fish seed to the fishers supported by the project; training of fishers on production and nurturing of fish seed
<b>Environmental</b>		
Extreme weather event-drought leading to lack of water for fisheries	Moderate	Existence of alternative source of water defined as one of the parameters for site selection; subscription to weather based insurance by the fishers; pond design to ensure sufficient water during summer season

Expected Risk	Rating of Risk	Risk Management Strategy
Extreme weather event-excessive rains leading to outflow of fish seed	Moderate	Net on the waste weir; weather based insurance product for the fishers
Conflict with farmers in the catchment area using chemical fertilizers that adversely affect the quality of water and hence productive capacity of the pond for fisheries	Low	Water quality monitoring; consultations with farmers in catchment area; development and implementation of catchment treatment plan;
<b>Political</b>		
Political interference in the selection of site and to provide political patronage to the selected fishers	Moderate	Pre implementation consultations with political representatives of Panchayat institutions were the sites have been finalized; Panchayat representatives oriented and sensitized on climate change and its impact on livelihoods in the region
<b>Financial</b>		
Damage or loss of equipment given to the fisher e.g. mechanical aerators	Moderate	Fishers will be asked to contribute towards the purchase of equipment under the project. The contribution will be kept in a separate account as maintenance fund that will be handed over to the fisher as part of with drawl strategy of the project
Duplication of booking expenses undertaken on ponds by the project also by the Gram Panchayat as their expenditure	Low	Six monthly report of the project will be shared at the block and district Panchayat; display of project name and expenses on board near the pond; MoUs will be drawn with fisher group prior to handing over of the assets
<b>Institutional</b>		
High attrition rate amongst the staff that will delay the implementation of the project	Moderate	Contracts will be for three years and notice for leaving will be for longer duration; recruitment of local persons at the Field Associate level so that they do not have motivation to leave; regular staff meetings and capacity building to ensure that all staff understand their role in the project
Fisher not able to leverage funds for maintenance of pond that adversely affects the water retention capacity of the pond	Moderate	Issue of pond maintenance on community land will be brought before they District Steering Committee and a broad policy frame will be developed within which the Gram Panchayats can access funds for pond maintenance

### **Operational Risks associated with conflicts**

The project had identified three potential areas of conflict:

#### **(a) Conflict over competitive use of water**

These conflicts arise on ponds made on common land. The competition is primarily between the demand for water for agriculture and the need to store water for fisheries. The project has proposed two strategies to decrease the risks of these conflicts: **one**, is to involve the Gram Sabha in finalisation of the site for fisheries. This will ensure that all immediate stakeholders will be involved in making the decision to give the pond for lease for fishing. **Second**, the project will not work on sites where there had been a history of disputes and conflict.

**(b) Conflict over rights over fishing**

The conflict takes the form of poaching fishes from the pond. This can happen in ponds that are on private lands as well as on common land. In both cases the fishers have struck agreements with households living near the pond to ensure security of the pond. The fishers have in fact formed common livelihood group of fishers where labour is provided by the members and in return they are entitled to wages. Periodically the profits are calculated and distributed among members. The households living near the pond get wages for providing security to the fish stock.

**(c) Conflict over use of chemical fertilisers and pesticides in the catchment area**

Farmers practicing agriculture in catchment area use chemical on their farm which flow in to the pond and affect the quality of water that creates adverse conditions for conduct of fisheries. One of the factors that will be taken in to account for finalisation of sites is the presence of farmers in the catchment and their prevailing agriculture practices. The project has proposed adoption of catchment treatment to decrease silt load and to improve the quality of water that flows in the pond. Regular monitoring of water quality will indicate whether the quality of water is getting adversely affected.

As a strategy the possibility of co-opting farmers in the catchment as part of the fisher's group to develop his stakes will be employed by the project. The co-option can compensate him for the loss of income on account of decreased use of chemicals on the farm.

The settlement pattern among the Bhils and Bhilalas is to construct their house on their agriculture land. The proximity to their field ensures security of their produce. The villages in the region do not have compact houses at one location. The village is spread out in small hamlets (called *phalia*). In cases where the small fishers have started practising regular pond fisheries they have constructed a house near the pond so as to provide regular security to the fish and water.

The community in the region is predominantly tribal belonging to the Bhil and Bhilala community. These communities have strong dispute resolution mechanisms. The community has been known to resolve conflicting claims over resources through negotiation and mediation. Any conflicts that will arise during the course of implementation of the project will use the traditional and indigenous dispute resolution mechanisms.

**C. Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund.**

The project is categorized as “**Category C**” with no adverse Environmental or Social Impacts and hence no additional measures for risk management are envisaged.

However, implementation mechanism is designed to take care of social and environmental risks as per the AFB’s Policy. The principles of the environmental and social policy of the adaptation fund have been included in each of the project activities. The Technical Assessment will have hydro geological zoning exercise which will make an assessment of individual ponds and will take an area approach and make assessment of:

- Existing and proposed water bodies in the block
- Possibility of water logging in selected sites
- Existing natural habitats in the region
- Potential natural habitats which need protection
- Sites with unique natural value
- Physical Cultural resources
- Relevant and Important aspects of the Biodiversity of the area
- Relevant and Important aspects of the Eco services of the area

The Pond design/construction, catchment treatment, introduction of fish species etc., will be based on the regional biodiversity and eco services requirements so as to ensure enhancement of natural resources. All measures will be taken to avoid degradation of natural resources, as well as physical and cultural heritage.

**Specific measures to address major ESP risks are detailed below:**

<b>ESP Principles</b>	<b>Addressed within the Project</b>
<p><b>Access and Equity</b></p>	<p>Transparency in selection of beneficiary and pro active dissemination of project activities will establish equal opportunity to all households to participate in the process of selection of beneficiaries for the project.</p> <p>Projects intervention in each pond and with each fisher household will be customized to their need and their ability to develop adaptive strategies. This process will be beneficiary centric and will ensure full participation of the beneficiary in the implementation of project’s intervention and ensure access to project’s activities and resources.</p> <p>Linkages to government schemes, financial institutions and insurance will be accessible to all households that will be directly covered by the project. Providing information about the possible benefits, process of accessing benefits and handholding to apply and access the benefits will be part of project’s intervention to support beneficiaries to increase their access to these benefits.</p> <p>The approach adopted by the project will be to train and empower the households and the beneficiaries to directly access benefits and services from the institutions. This will reduce their dependency on the project and they can sustain these linkages beyond the project period.</p>

	<p>The proposed collectives of fishers that will be formed as part of project's intervention will include consultations with the fishers on its organizational form (self help group; livelihood group; or cooperative). The advantages and constraints of each of these collectives will be informed and discussed with each member and through the process of consensus building the organizational form will be selected. The membership to these groups will be accessible and available to all the participant beneficiaries and the bye laws will not contain any provisions that exclude participation in decision making or in accessing benefits.</p>
<p><b>Marginalised and Vulnerable Groups</b></p>	<p>The project is located in the region where there is predominance of scheduled tribe households. The project will work with households belonging to scheduled tribes only.</p> <p>The target beneficiaries of the project's intervention will be small and marginal farmers.</p> <p>The selection and approval process for the finalization of beneficiaries is based on the approval of Gram Sabha. This will ensure that project will work with marginalized and vulnerable groups only.</p>
<p><b>Gender Equity and Women's Empowerment</b></p>	<p>Small and marginal households work as a family unit. The women from these households are involved in different operations related to fisheries. Selection of households belonging to small and marginal farming households will ensure involvement of women as part of beneficiary group.</p> <p>Targets have been set for coverage of women in all the project's interventions related to training and other capacity building activities. This will ensure that women will have equal access to information and acquisition of skills under the project.</p> <p>Fishers collective formed as part of project processes will have mandated representation of women. Women will be entitled to membership of the collectives that will be promoted under the project. In addition they will be trained to participate as active members in the decision making processes of the collective. Specific inputs and handholding to become office bearers of the collective will be provided to the women members.</p> <p>Equal wages for equal work principle will ensure women are paid the same wage as men to establish principle of gender equity.</p> <p>Lease of ponds on common land will be in the joint name of men and women.</p> <p>Linkages with government, financial institutions and services will ensure that women are also linked with these institutions. In case the women require specific handholding to ensure and sustain their access the same will be provided to them under the project.</p>
<p><b>Core Labour Rights</b></p>	<p>All labour payments will adhere to the principle of payment of minimum wages to skilled and unskilled work. The principle of equal wages for equal work for men and women will be strictly adhered to in the project.</p>

	<p>The assessment of wages for the preparation of business plan will be based on minimum wages or market wages whichever is higher. This is to ensure that fair wages are given to the worker for their labour in the project and project related activities.</p> <p>The project will not promote employment of child labour on pond sites. The adults will be sensitized to provide protective measure for small children in case the family has to spent time to carry out activities in and around the pond and bring their children along with them.</p> <p>Forced labour or any form of bonded labour will be prohibited on pond sites covered under the project.</p> <p>Specific provisions related to restriction of employment of child labour and forced labour on ponds will be placed before the Gram Sabha as conditions for leasing the ponds to selected beneficiary households. In case of private lands the same conditions will form part of the MoU that will be drawn up with the farmer-fisher household.</p> <p>The above mentioned conditions will be applicable in cases where the fishers and their collective work themselves or they employ labour at pond sites or other work associated with fisheries.</p> <p>The labour will have the freedom to form their own collective and negotiate their terms of employment as a collective. Formation of and seeking employment as a collective will not be the criteria for non employment at work sites.</p>
<p><b>Involuntary Settlement</b></p>	<p>Part II point K had assessed that there is no likelihood of involuntary settlement because of project activities.</p> <p>The project will primarily seek out and work with existing pond sites. The main intervention will be to modify the design of the pond to enhance its water retention capacity. At such sites there is no likelihood that the proposed modifications will lead to involuntary resettlement.</p> <p>The selection and finalization of site protocol includes the element of disputes and conflicts at proposed sites. The project will <b>not</b> select such sites that have history of disputes and conflicts. These disputes will also include disputes arising out of involuntary settlement when the pond was originally constructed if any.</p>
<p><b>Protection of Natural Habitats</b></p>	<p>Protocols that will be developed and employed for the finalization of the site for ponds will take the factor of existence of Natural Habitats in to account. Sites that will have a direct bearing on the protected sites will <b>not</b> be selected.</p> <p>The protocol will not only take in to account the existing natural habitats but also potential habitats that will need protection and will <b>not</b> select these sites for project's intervention.</p>

	<p>The list of protected areas and habitats will be procured from the Department of Forest, Department of Archeology, and Revenue Department.</p> <p>The project will inform itself of the management plans of protected areas and will adhere to these plans in the implementation of project activities.</p>
<p>Conservation of Biological Diversity</p>	<p>Fish species introduced under poly culture fish regime will be native and endemic to the area.</p> <p>The species used for greening of the pond and for catchment treatment will be based on selection of local species so that it is locally adapted and strengthens the local bio diversity of the area.</p> <p>In case an invasive species is to be introduced for a specific purpose (e.g. water hyacinth) it will be used under strict control conditions and with measures that ensures that the species will not be allowed to grow beyond a certain limit. The fishers will be informed and trained in the physical and biological processes to weed out the invasive species. The project will undertake regular monitoring of such species to ensure controlling its spread and impact.</p>
<p>Pollution Prevention and Resource Efficiency</p>	<p>The current practice of introducing high density seeds leads to higher mortality of fish seeds and is resource in efficient. The training on responsible fishing will ensure that the fishers are aware of appropriate seed density that has to be introduced in the ponds at the beginning of fishing season.</p> <p>Project will not use any method that pollutes existing natural resources. Use of chemicals will not be undertaken and as far as possible organic matter will be used that decomposes and does not cause pollution.</p> <p>Water quality monitoring of all the ponds under the project will be undertaken on pre defined 7 parameters. The monitoring will indicate whether there has been excessive flow of pollutants in the pond. Water management measures that can be implemented with the help of local resources will be undertaken so that the local persons are trained in the use of local resources.</p> <p>Training on best practices will lead to better use of resources for fresh water inland fisheries. Such best practices have the impact in improving the resource use efficiencies at different level in fisheries.</p>
<p>Public Health</p>	<p>Regular monitoring of water quality of ponds on seven parameters will be undertaken. Any deviation in these parameters will be reported to Public Health and Engineering department so that preventive measures could be undertaken.</p> <p>Gram Sabha will be informed of vector borne diseases consequent to storage of water. Organisation of health camps with the Department of Health will address the measures to prevent occurrence of these diseases in the village.</p>

**D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.**

**1. Monitoring**

The project aims at developing and implementing a robust monitoring system that is able to assess and report on performance, efficiency, processes and achievements. The monitoring system of the project will comprise of the following components.

**1.1 Inception Report**

Project Inception Workshop will be held within the two months of the start of the project. The workshop will be attended by the members of the institutions that have been identified as members of the Steering Committee and the Technical Advisory Group. Among other things the Inception Workshop will include:

- (i) assist stakeholders to understand the objectives of the project and visualize their respective roles and responsibility in the implementation and results of the project
- (ii) establish reporting and communication protocols and familiarise with project decision making structure and processes
- (iii) presentation of project activities and major milestones and the expected outcome of the project
- (iv) the annual work plan will be presented to the stakeholders along with the indicators, means of verification, and monitoring and reporting frameworks and schedules

The Inception report will report on the proceedings of the Inception Workshop and annex the documents that have been finalised during the workshop, namely, monitoring frameworks, indicators and their means of verification, responsibility for tracking specific risks and implementing risk management strategies, and annual work plan of the project. The Inception Report will be submitted within one month of holding the workshop.

**1.2 Performance Monitoring**

Performance monitoring will be carried throughout the project period. The monitoring cycle will be quarterly and the report will be shared with the members of the State and District Steering Committee. The Performance Monitoring Report will include the following components:

**(a) Progress Tracking**

Conduct of activities against their time line will be tracked every quarter. The process entails conduct of review meeting and each activity will be tracked in terms of its progress and state of implementation. The review will be followed up with finalizing the next quarter plan of activities that will incorporate spill over and inadvertent delays.

**(b) Risk Management**

Every quarter the risks will be monitored and the action taken for managing each risk will be reviewed. The exercise will also include identification of new risks and allocation of responsibility for managing it.

**(c) Output to Outcome Tracking**

Performance monitoring will undertake monitoring and review of output to outcome tracking. The first two quarterly reports will, however, not report on this aspect, as it will be too early to assess output-outcome relationships. This aspect will be covered from third quarter onwards in all the quarterly reports.

**(d) Financial Monitoring**

Quarterly financial monitoring will be undertaken in order to review the progress of financial utilization and for ensuring that the expenditure for each head is according to the financial norms specified in the budget and agreed procurement processes.

**1.3 Process Monitoring**

**(a) Process Documentation**

Process Guidelines will be developed for each output that will include milestones, specific tasks to achieve the milestone, and indicators to measure whether the task, the milestone and the output has been achieved. The Process Guidelines will constitute the framework for the Process Documentation that will document and report on the processes carried out every quarter. The Process Document report will also record the evidences of the process so that these can be verified during the course of implementation.

**(b) Efficiency Reporting**

Six monthly reporting on efficiency of the project will be prepared. The efficiency is with respect to the manner in which the project management has been able to manage its resources and accomplish project milestones. The components of efficiency reporting will include efficiency:

- Human resource deployment (recruitment, induction, procurement of external experts etc)
- Funds flow management (fund flow, financial utilization, observance of procurement processes and ethical standards)
- Implementation (completion of activities and achievement of milestones, observance of project processes)
- Monitoring and reporting (conduct of monitoring exercises and their reporting)

The Efficiency Report will be reflective of the capacity of the management team to implement project activities in time and within the resources that were allocated for them. Detailed format of Efficiency Assessment and reporting will be annexed in the Inception Report.

**1.4 Project Completion**

**(a) Project Completion Report**

At the end of the project a Project Completion Report will be prepared and submitted on an agreed format that will consolidate all the activities carried out during the project, its achievements, and results along with evidence of impact and benefit.

**(b) Audited Statement**

A detailed Audited Statement of accounts will be prepared and submitted in funds received and spent under the project.

## 2. Evaluation

Evaluation will be a major source of learning and consolidation of project activities and achievements. The framework for evaluation will be based on the existing guidelines of the AFB and will include the following components.

### 2.1 Base Line and End Line Survey

A base line and end line survey of all fishers selected for intervention by the project will be undertaken. The survey will also include survey of package of practices adopted by fishers and their levels of information and awareness regarding climate change and its impact of fisheries. A detailed format of base line will be developed before the Inception Workshop and will be annexed with the Inception Report.

### 2.2 End Term Evaluation

An End Term Evaluation by an external Resource Person(s) will be conducted for the project. The conduct of evaluation will follow the provisions of the Guidelines for Project/Programme Evaluation of the Adaptation Fund. The scope of the evaluation, inter alia, will include assessment of achievements, progress towards impacts; and evaluation of risks to sustainability, processes influencing achievements and M&E systems. The evaluation will specifically focus on achievement of adaptation measures and contribution of the project towards achievement of AFB targets, objectives, impacts and goal.

The budget for Monitoring and Evaluation is given below:

Activity	Responsible Parties	Budget US \$	Frequency
<b>MONITORING</b>			
Inception Workshop	<ul style="list-style-type: none"> <li>Project Coordinator</li> <li>Project Team</li> </ul>	1833	Within two months of the project start
Performance Monitoring	<ul style="list-style-type: none"> <li>Project Coordinator</li> <li>Technical Advisory Group</li> <li>State Steering Committee</li> </ul>	-	Quarterly
Efficiency Reporting	<ul style="list-style-type: none"> <li>Project Coordinator</li> </ul>	-	Six Monthly
Project Completion Report	<ul style="list-style-type: none"> <li>Project Coordinator</li> <li>Project Team</li> </ul>	-	End of Project
Audit	<ul style="list-style-type: none"> <li>External Auditor</li> </ul>	1000	Yearly
<b>EVALUATION</b>			
Project Benefit Assessment	<ul style="list-style-type: none"> <li>External Consultant</li> </ul>	2750	2 reports
End term Evaluation	<ul style="list-style-type: none"> <li>External Consultant</li> </ul>	7500	Completion of project
<b>Total</b>		<b>13,083</b>	

**E. Include a results framework for the project proposal, including milestones, targets and indicators.**

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
<p><b>Overall Objective</b> Climate Change Adaptation in fishery sector for secured livelihoods of small and marginal farmers</p>	<ul style="list-style-type: none"> <li>- % Fishers adapting climate resilient fish rearing practices developed by the project</li> <li>- % Fishers using subscribing to weather based insurance products</li> <li>- % of income of small and marginal farmers and fishers from fisheries</li> <li>- Selection protocol and design of ponds tested by the project adopted by Government for small pond fisheries</li> <li>- State Government resolves to formulate a separate policy for</li> </ul>	<ul style="list-style-type: none"> <li>- none at present</li> <li>- One weather based insurance product negligible subscription</li> <li>- 20% of income of small and marginal farmers from fisheries</li> <li>- Govt guidelines for pond design are not based on climate change parameters</li> <li>- State Policy for Fisheries have no separate provision</li> </ul>	<ul style="list-style-type: none"> <li>- all fishers covered by the project adopt climate resilient fish rearing practices</li> <li>- all Fishers targeted by the project subscribe to one of the insurance product</li> <li>- 40% of income of small and marginal farmers will be from fisheries</li> <li>- Govt guidelines include climate change parameter for designing ponds for fisheries</li> <li>- Recognition of and specific provisions for small-scale</li> </ul>	<ul style="list-style-type: none"> <li>- Benefit Assessment report</li> <li>- Correspondence with state government</li> <li>- Minutes of State Steering Committee</li> </ul>	

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
	small fishers that is based on climate adaptive strategies	for small-scale fisheries	fisheries in state policy		
<b>Outcome 1</b> Increasing water retention capacity of the tanks as an adaptive measure to address rainfall variability by modifying technical specification of the tanks	<ul style="list-style-type: none"> <li>- % ponds with water retention for more than 10 months</li> <li>- % ponds with depth of water at least 1.5 m during dry months</li> <li>- % ponds where silt load has been decreased</li> <li>- % ponds where there has been no loss of fish because of flooding throughout the year</li> <li>- % ponds where Private/ Panchayat investment on maintenance of ponds to increase water retention capacity</li> </ul>	<ul style="list-style-type: none"> <li>- to be determined during project implementation</li> <li>- to be determined during project implementation</li> <li>- to be determined during project implementation</li> <li>- to be determined during project implementation</li> <li>- No investment on ponds either on Panchayat/private land for maintenance</li> </ul>	<ul style="list-style-type: none"> <li>- 100% ponds with water retention for more than 10 months</li> <li>- 80% ponds with water depth up to 1.5 m during dry months</li> <li>- 80% ponds where silt load has been decreased</li> <li>- 100% ponds have protective features for flooding and insurance cover against loss of fish</li> <li>- 100% ponds have resources for ensuring investment for maintenance of ponds for fisheries</li> </ul>	<ul style="list-style-type: none"> <li>- End line survey</li> <li>- Systematisation report</li> <li>- Action-Reflection Report</li> <li>- Case studies of change</li> </ul>	<p><b>Assumption:</b>Gram Sabha allows the project to undertake modifications and implementation of catchment treatment plans.</p> <p><b>Assumption:</b>Fishers willing to make private investment on maintenance of ponds.</p> <p><b>Risk:</b> Increase pressure on alternative use of water once retention of water increases in ponds thereby decreasing the availability of water for fisheries.</p>

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
<p><b>Outputs 1.1</b> Ponds identified according to geo-hydrological protocol for fisheries and modified pond design implemented on selected ponds</p>	- % Ponds suitable for small-scale commercial fisheries	- to be determined during project implementation	- 100% ponds are being used for small-scale commercial fisheries	<ul style="list-style-type: none"> <li>- End line survey</li> <li>- Systematisation report</li> <li>- Process Document Report</li> <li>- Performance Report</li> </ul>	<p><b>Assumption:</b> Sufficient numbers of sites identified in clusters for fisheries based on geo hydrological protocol.</p> <p><b>Risk:</b>Conflict in Gram Sabha in allotment of pond</p> <p><b>Risk:</b>Dispute on ownership rights on land identified for fisheries</p>
<p><b>Activity 1.1</b> Protocol for prioritising rural ponds (less than 10 ha) for inland fisheries developed and implemented</p>	<ul style="list-style-type: none"> <li>- Protocol for prioritizing pond for fisheries developed and implemented</li> <li>- Protocol for prioritizing pond for fisheries will give higher priority to ponds here women have joint ownership of pond/ fishing rights</li> </ul>	- no protocol exists for prioritizing sites for small-scale fisheries	<ul style="list-style-type: none"> <li>- protocol developed for three districts and implemented by the project</li> <li>- 25 ponds in each districts selected based on priorities identified in the protocol</li> <li>- at least 25% ponds selected will have joint ownership of women</li> </ul>	<ul style="list-style-type: none"> <li>- Process Document Report</li> <li>- Performance report</li> <li>- Photo documentation of ponds</li> <li>- Copy of Gram Sabha approving the pond for taking up for fisheries by the project</li> <li>- Minutes of the District Steering Committee</li> </ul>	

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
	- Selection of ponds based on sites recommended by the protocol	- to be determined during project implementation			
<b>Activity 1.2</b> Modified Pond design specifically for fisheries developed and implemented on selected new and existing ponds	- % pond design prepared  - % ponds modified/constructed according to prepared design	- all ponds have common design  - ponds not modified for fishing purposes	- 75 ponds design specific to location prepared  - 75 ponds developed according to design prepared for each one of them	- Minutes of the District Steering Committee - Progress Tracking Report - Process Document Report - Photo Documentation of ponds	
<b>Output 1.2</b> Catchment treatment plan for each pond prepared and implemented	- % ponds catchment treatment plan prepared  - % ponds silt load decrease	- Not prepared  - to be determined during project implementation	- 75 catchment treatment plans prepared and implemented  - 80% ponds silt load decreases	- Progress Tracking Report - Process Document - End Line Survey - Systematisation Report - Photo documentation	<b>Assumption:</b> Catchment and the pond are within the same Gram Sabha enabling quick approval/implementation of treatment plans

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
					<b>Risk:</b> Catchment area under dispute leading to non implementation of plan
<b>Activity 1.3</b> Treatment of about 0.1 to 0.2 ha of catchment ponds/ tanks for each pond constructed modified	<ul style="list-style-type: none"> <li>- % ponds need for catchment treatment assessed</li> <li>- % ponds catchment treatment plans prepared</li> <li>- catchment area treated</li> </ul>	<ul style="list-style-type: none"> <li>- no written assessment of catchment treatment of ponds exists</li> <li>- catchment treatment not prepared</li> <li>- to be determined during project implementation</li> </ul>	<ul style="list-style-type: none"> <li>- 75 ponds catchment treatment needs assessed</li> <li>- 75 ponds have their respective catchment treatment plans</li> <li>- 37.5 ha catchment treated</li> </ul>	<ul style="list-style-type: none"> <li>- Performance Report</li> <li>- Progress Tracking Report</li> <li>- Process Document report</li> <li>- Photo Documentation of catchment treatment</li> </ul>	
<b>Output 1.3</b> Small-scale fishers linked to financial support systems to access resources for pond maintenance	<ul style="list-style-type: none"> <li>- % small-scale fishers have access to resources for pond maintenance</li> </ul>	<ul style="list-style-type: none"> <li>- to be determined during project implementation</li> </ul>	<ul style="list-style-type: none"> <li>- 100% small-scale fishers have access to resources for pond maintenance</li> </ul>	<ul style="list-style-type: none"> <li>- Action-Reflection Report</li> <li>- Systematisation Report</li> <li>- Performance Report</li> </ul>	<b>Assumption:</b> Private insurance companies pro actively develop insurance products for small-scale fishers <b>Risk:</b> Maintenance fund is diverted for other purposes

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
<p><b>Activity 1.4</b> Insurance product developed that provides resources for making modifications to the technical design of the pond after the projected climatic changes take place</p>	<ul style="list-style-type: none"> <li>- % ponds have availability of maintenance fund for their ponds</li> <li>- % Small-scale fishers are members of cooperatives</li> <li>- % women involved in fishing members of cooperatives</li> <li>- % small-scale fishers linked to financial support systems</li> </ul>	<ul style="list-style-type: none"> <li>- no resources are available exclusively for maintenance of ponds for fisheries</li> <li>- to be determined during project implementation</li> <li>- to be determined during project implementation</li> </ul>	<ul style="list-style-type: none"> <li>- 100% ponds have maintenance funds for the ponds</li> <li>- Small-scale fishers linked to cooperatives to enable them to leverage resources for making pond maintenance</li> <li>- in at least 50% of ponds women involved in fishing activity are members of cooperative</li> <li>- 100% small-scale fishers linked to financial support systems</li> </ul>	<ul style="list-style-type: none"> <li>- Process Documentation Report</li> <li>- Action-Reflection Report</li> <li>- Systematisation Report</li> <li>- Performance Report</li> </ul>	
<p><b>Outcome 2</b> Diversification of fish species and temperature regulation</p>	<ul style="list-style-type: none"> <li>- % ponds where water temperature is regulated and</li> </ul>	<ul style="list-style-type: none"> <li>- None by design</li> </ul>	<ul style="list-style-type: none"> <li>- 100% ponds where water temperature is regulated</li> </ul>	<ul style="list-style-type: none"> <li>- End line survey</li> <li>- Systematisation Report</li> </ul>	<p><b>Assumption:</b>Fishers are willing to enhance the commercial viability</p>

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
of ponds as adaptive measures to warmer climatic regime	<ul style="list-style-type: none"> <li>controlled during summer</li> <li>- % fishers adopting poly culture fish farming</li> <li>- % farmers adopting recommended fish stocking rate</li> <li>- % hatcheries running successfully</li> <li>- % ponds with decrease in fish mortality due to decrease in BOD</li> </ul>	<ul style="list-style-type: none"> <li>- small-scale fishers practice 2 layered fisheries only</li> <li>- all small-scale fishers resort to high density stocking</li> <li>- no fish hatcheries among small-scale fishers</li> <li>- to be determined during project implementation</li> </ul>	<ul style="list-style-type: none"> <li>- 100% small-scale fishers adopt at least 3 layered fish culture</li> <li>- 100% small-scale fishers adopt recommended fish stocking</li> <li>- 1 hatchery in each district running successfully</li> <li>- 100% ponds report decrease in fish mortality due to decrease in BOD</li> </ul>	<ul style="list-style-type: none"> <li>- Action-Reflection Report</li> <li>- Case Studies</li> <li>- Record of water temperature of pond from water quality surveillance</li> <li>- Case study of hatcheries</li> <li>- Record of BOD from water quality surveillance</li> </ul>	<p>of the pond for fisheries.</p> <p><b>Assumption:</b> Fishers are willing to undertake fish seed production through hatchery, fish rearing and nursery</p> <p><b>Risk:</b> Excessive use of chemical fertiliser in nearby agriculture fields pollute the pond water adversely affecting the productive capacity of the pond to undertake poly culture</p>
<b>Output 2.1</b> Pond temperature regulating best management practices and technology	<ul style="list-style-type: none"> <li>- % Fishers adopt best management practices for regulating pond temperature</li> </ul>	<ul style="list-style-type: none"> <li>- Fishers do not use any practice to control temperature of the pond</li> </ul>	<ul style="list-style-type: none"> <li>- 100% fishers adopt best management practice for regulating pond temperature</li> </ul>	<ul style="list-style-type: none"> <li>- Performance Report</li> <li>- Process Document Report</li> <li>- Systematisation Report</li> </ul>	<p><b>Assumption:</b> Sufficient space available near pond to implement best management practice for regulating the temperature of pond</p>

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
adopted by small-scale fishers	- % Fishers adopting technology to decrease likelihood of oxygen deficiency	- Fishers are not using any technological input to decrease likelihood of oxygen deficiency	- two-third fishers adopt technology to decrease likelihood of oxygen deficiency	- Action-Reflection Report - Photo documentation	
<b>Activity 2.1</b> Pond temperature regulating best management practices and greening the pond surrounds	- % Fishers trained in adopting best management practices - % women involved in fishing trained in best management practices	- None of the Fishers trained in best management practices for regulating the temperature of the pond	- 100% Fishers trained in best management practice for regulating the temperature of the pond - in at least 50% of ponds women involved in fishing trained in best management practices	- Performance report - Process Document Report - Systematisation report - Action reflection report - Photo documentation	

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
<b>Activity 2.2</b> Best management practices to decrease likelihood of oxygen deficiency along with use of oxygen tablets and solar powered aerators	<ul style="list-style-type: none"> <li>- % farmers using oxygen tablets and solar powered aerators</li> <li>- % farmers instituting measures to decrease organic load in pond</li> </ul>	<ul style="list-style-type: none"> <li>- No Fisher use oxygen tablet or aerators</li> <li>- to be determined during project implementation</li> </ul>	<ul style="list-style-type: none"> <li>- 50% Fishers use oxygen tablet and/or solar powered aerators as per site requirement</li> <li>- 100% farmers instituting measure to decrease organic silt load</li> </ul>	<ul style="list-style-type: none"> <li>- Performance report</li> <li>- Progress Tracking</li> <li>- Action-Reflection report</li> <li>- Photo Documentation</li> </ul>	
<b>Output 2.2</b> Fishers trained in poly-culture fish culture and making fish seed for composite fish culture available to small-scale fishers	<ul style="list-style-type: none"> <li>- % Fishers trained in ploy culture fish rearing practices</li> <li>- % Fishers have access to different species of fish seed for their recommended fish culture</li> </ul>	<ul style="list-style-type: none"> <li>- No small-scale fisher trained in poly culture fish culture</li> <li>- to be determined during project implementation</li> </ul>	<ul style="list-style-type: none"> <li>- 100% Fishers trained in ploy culture fish rearing practice</li> <li>- 100% Fishers have access to composite fish seeds</li> </ul>	<ul style="list-style-type: none"> <li>- Performance Report</li> <li>- Process Document Report</li> <li>- Photo Documentation</li> <li>- Action-reflection Report</li> <li>- Systematisation Report</li> </ul>	<p><b>Assumption:</b> Fishers have regular access to local fish market to harvest different species of fish and sell them in the local markets</p> <p><b>Risk:</b> Delay in availability of fish seed of different species to the fisher</p>
<b>Activity 2.3</b> Composite fish culture practices with combination of intensive, semi intensive and extensive	<ul style="list-style-type: none"> <li>- % Fishers trained in different fish culture practices</li> <li>- % women trained in poly culture fish rearing practices</li> </ul>	<ul style="list-style-type: none"> <li>- to be determined during project implementation</li> </ul>	<ul style="list-style-type: none"> <li>- 100% farmers trained in composite fish culture practices</li> <li>- in at least 50% of ponds women</li> </ul>	<ul style="list-style-type: none"> <li>- Performance Report</li> <li>- Process Document Report</li> <li>- Photo Documentation</li> </ul>	

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
culture practices based on fishers capacity	<ul style="list-style-type: none"> <li>- % Fishers adopting IAA</li> <li>- % farmers buying fish seed of three and four species of fish</li> </ul>	<ul style="list-style-type: none"> <li>- to be determined during project implementation</li> <li>- to be determined during project implementation</li> </ul>	<p>involved in fishing trained in poly culture fish rearing practices</p> <ul style="list-style-type: none"> <li>- 50% Fishers adopt IAA</li> <li>- 100% Fishers buying fish seed of at least three species</li> </ul>	<ul style="list-style-type: none"> <li>- Action-reflection Report</li> <li>- Systematisation Report</li> </ul>	
<b>Activity 2.4</b> Seed hatcheries (3 numbers) 2 nurseries (0.1 ha) and 1 seed rearing unit (0.1 ha) per district established.	<ul style="list-style-type: none"> <li>- No of seed hatcheries constructed</li> <li>- No of nurseries developed</li> <li>- No of rearing units developed</li> </ul>	<ul style="list-style-type: none"> <li>- No hatchery by small-scale fishers</li> <li>- No fish nursery small-scale fisher in project district</li> <li>- No fish rearing unit by small-scale fishers developed</li> </ul>	<ul style="list-style-type: none"> <li>- 1 hatchery per district established</li> <li>- 1 fish nursery per district</li> <li>- 1 fish seed rearing unit in each district established</li> </ul>	<ul style="list-style-type: none"> <li>- Performance Report</li> <li>- Photo Documentation</li> <li>- Case Study</li> </ul>	
<b>Outcome 3</b> Making small pond fisheries climate	<ul style="list-style-type: none"> <li>- % Fishers adopting responsible fisheries practices</li> </ul>	<ul style="list-style-type: none"> <li>- to be determined during project implementation</li> </ul>	<ul style="list-style-type: none"> <li>- 100% Fishers adopt responsible fisheries practices</li> </ul>	<ul style="list-style-type: none"> <li>- Base Line and End Line Survey</li> <li>- Training Reports</li> </ul>	<b>Assumption:</b> There is no change in the ownership of the pond

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
adaptation resilient through productivity enhancement by capacity building and institutional linkages	<ul style="list-style-type: none"> <li>- % Increase in productivity</li> <li>- % Fishers participated in the development of fisheries business plan</li> <li>- % Fishers develop partnerships and linkages with other players in the market</li> <li>- % Fishers members of formal groups formed</li> <li>- % Fishers pay for premium for insurance</li> <li>- % Panchayats formed plans to</li> </ul>	<ul style="list-style-type: none"> <li>- to be determined during project implementation</li> <li>- Fishers do not develop business plans</li> <li>- Fishers do not have formal linkages</li> <li>- to be determined during project implementation</li> <li>- Fishers do not have access to weather based insurance product</li> <li>- No Gram Panchayat have prepared plans that reflect climate change factors</li> </ul>	<ul style="list-style-type: none"> <li>- At least 25% increase in productivity</li> <li>- 100% Fishers have developed business plans</li> <li>- 100% Fishers develop formal linkages with other players</li> <li>- 100% Fishers members of formal groups</li> <li>- 100% Fishers pay premium for weather based insurance product</li> <li>- At least 50% of the Gram Panchayats attending training incorporate climate change</li> </ul>	<ul style="list-style-type: none"> <li>- Systematisation Reports</li> <li>- Action-reflection Reports</li> <li>- Case Studies</li> <li>- Group formation documents</li> <li>- Minutes of group meetings</li> <li>- Receipt of premium paid to insurance companies</li> <li>-</li> </ul>	<p>or transfer of leasing rights to another group during the course of project implementation</p> <p><b>Risk:</b> There are extreme weather events that leads to loss of significant fish stock with the fishers that acts as negative factor for adoption of adaptive strategies by fishers</p> <p><b>Risk:</b> Change in ownership of pond that leads to dropping out of trained fisher without completion of their training</p>

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
	reflect climate change factors		factors in their plans		
<b>Output 3.1</b> Capacity building of Fishers on climate resilient fishing	- % Fishers trained in climate resilient training	- No Fisher trained in climate resilient fishing	- 100% Fishers complete all modules of Climate Resilient Fishing	- Performance report - Training report - Photo Documentation	<b>Assumption:</b> The ownership and leasing rights of the pond continue with the same Fisher during the course of the project  <b>Risk:</b> Households not giving enough space and opportunity to women to participate in training programme  <b>Risk:</b> Household migrate as better income earning opportunity is made available to them
<b>Activity 3.1</b> Productivity of 75 fish farmers enhanced towards optimal level of production through training and capacity building on climate resilient fish farming	- % Fishers attending training programmes - % Women attending training programmes - - - -	- to be determined during project implementation	- 100% Fishers attend training programmes - in at least 50% ponds women attend training programme -	- Performance report - Training report - Photo Documentation	

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
	<ul style="list-style-type: none"> <li>- % Fishers take training to become Climate Champions</li> <li>- % Fishers participating in exposure visits</li> </ul>	<ul style="list-style-type: none"> <li>- no Fisher trained as climate champion at present</li> <li>- to be determined during project implementation</li> </ul>	<ul style="list-style-type: none"> <li>- 100% Fishers trained as Climate Champions</li> <li>- 25% of Climate Champions are women</li> <li>- 100% Fishers participating in exposure visits</li> <li>- 25% fishers going for exposure visit are women</li> </ul>		
<b>Output 3.2</b> Fishers trained on market analysis of fish and prepare their business plans	<ul style="list-style-type: none"> <li>- % Fishers complete their training on market analysis and business plan</li> </ul>	<ul style="list-style-type: none"> <li>- to be determined during project implementation</li> </ul>	<ul style="list-style-type: none"> <li>- 100% Fishers complete their training on market analysis and business plan</li> </ul>	<ul style="list-style-type: none"> <li>- Training Report</li> <li>- Performance Report</li> <li>- Copy of bye laws of the group</li> <li>- Process Document Report</li> </ul>	<b>Assumption:</b> Fishers retain their ownership and leasing rights over pond during the course of project implementation  <b>Risk:</b> Increase in rate of inflation leading to spike in prices of inputs and transportation costs making business plans redundant
<b>Activity 3.2</b> Fish farmers supported through market	<ul style="list-style-type: none"> <li>- % Fishers attending training on value</li> </ul>	<ul style="list-style-type: none"> <li>- No training to Fishers on market analysis</li> </ul>	<ul style="list-style-type: none"> <li>- 100% Fishers trained in market analysis</li> </ul>	<ul style="list-style-type: none"> <li>- Training Report</li> <li>- Performance Report</li> </ul>	

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
infrastructure and value chain assessment done.	<ul style="list-style-type: none"> <li>- chain and market analysis of fish</li> <li>- % women involved in fishing activity attend training programme</li> <li>- % Fishers attending institutional strengthening training</li> <li>- % women involved in fishing activity attend training programme</li> <li>- % Fishers members of non formal and formal groups</li> <li>- % women members of non formal and formal groups</li> <li>- % groups forge partnerships with</li> </ul>	<ul style="list-style-type: none"> <li>- to be determined during project implementation</li> <li>- to be determined during project implementation</li> <li>- to be determined during project implementation</li> </ul>	<ul style="list-style-type: none"> <li>- in at least 50% of ponds women involved in fishing attend training</li> <li>- 100% Fishers attend institutional strengthening training</li> <li>- in at least 50% of ponds women involved in fishing attend training</li> <li>- 100% Fishers members of group</li> <li>- in at least 50% of ponds women involved in fishing are members of non formal and formal groups</li> <li>- 100% groups forge</li> </ul>	<ul style="list-style-type: none"> <li>- Copy of bye laws of the group</li> <li>- Group Meeting register</li> <li>- Process Document report</li> </ul>	

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
	other players in the value chain		partnerships with other players in the value chain		
<b>Activity 3.3</b> 75 fish farmers prepare business plan based on local market and existing value chain	- % Fishers develop Business Plan	- No Fisher prepares business plan for their fish culture	- 100% Fishers have participated and developed their business plans	- Copy of Business Plan - Process Document Report - Performance Report	
<b>Output 3.3</b> Panchayat representatives trained in climate change factors	- % Gram Panchayat representatives trained in climate change factors	- No training to Gram Panchayat representatives on Climate Change	- 50% of GP representatives trained in Climate Change	- Training Report - Performance report - Process Document Report - Photo documentation	<b>Assumption:</b> Local Government supports training of Panchayat representatives on Climate Change
<b>Activity 3.4</b> Institutional support interventions so as to enable Local Governance Institutions and fishers to play the role envisaged in the legal framework of the State.	- % Panchayat representatives trained on factors and impacts of climate change - % women Panchayat representatives trained on factors and impacts of climate change	- No training to Panchayat representatives Climate Change	- At least 50% of the representatives of Gram Panchayat where ponds are located trained - 100% of women representatives of Gram Panchayat where Ponds are located trained on factors and	- Training Report - Performance report - Process Document Report - Photo documentation	

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
			impacts of climate change		
<b>Output 3.4</b> Fishers made aware on the weather based insurance product for fish culture	- % Fishers understanding the terms and conditions of insurance product	- No Fisher has been trained in the terms and conditions of insurance product	- 100% Fishers attend awareness and training on weather based insurance products	- Performance Report	<b>Assumption:</b> Insurance Companies participate in the training and orientation programmes for Fishers  <b>Assumption:</b> Fishers generate enough surplus income from fisheries that they pay insurance premium regularly to protect their source of income
<b>Activity 3.5</b> Insurance coverage provided for risk minimisation of 75 fish farmers of the project.	- % Fishers paying premium for insurance product  - % Fishers filing for claim under the insurance product	- No Fisher is paying premium on weather based insurance  - No Fisher has filed for claim under the insurance product	- 100% Fishers pay premium for weather based insurance  - 100% Fishers affected file for claim under the weather based insurance	- Performance Report	
<b>Outcome 4</b> Preparing and disseminating evidence	- Institutional processes for stakeholder	- No processes exist at present	- Steering Committees and Technical	- Meeting Reports - Report of Process Documentation	<b>Assumption:</b> Fisheries are given more importance in

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
based resilient climate change adaptation strategies for inland fisheries for small pond fishers	<p>involvement identifying areas for learning and policy development</p> <ul style="list-style-type: none"> <li>- % stakeholders covered through training and dissemination events on adaptation strategies for climate change</li> <li>- Adaptive strategies for fisheries articulated and developed</li> </ul>	<ul style="list-style-type: none"> <li>- None at present</li> <li>- Adaptive strategies does not exist</li> </ul>	<p>Advisory Group active and recommend areas for generating evidence</p> <ul style="list-style-type: none"> <li>- 2 training and 2 workshops conducted</li> <li>- Adaptive strategy for small-scale fisheries articulated and presented to different stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>- Learning Documents</li> <li>- Policy briefs written and submitted to Government and other stakeholders</li> <li>- Training material developed by the project</li> </ul>	<p>enhancing income, livelihood security and nutritional security of tribal communities.</p> <p><b>Assumption:</b> State is willing to implement State Action Plan for Climate Change.</p> <p><b>Risk:</b> Senior government officials do not participate in sharing and learning initiatives</p>
<b>Output 4.1</b> Institutional Processes for multi-stakeholder learning are established and activated	<ul style="list-style-type: none"> <li>- Membership of Institutions</li> <li>- No of meetings</li> </ul>	<ul style="list-style-type: none"> <li>- No institution</li> <li>- No meetings</li> <li>- No meeting</li> </ul>	<ul style="list-style-type: none"> <li>- Key stakeholders represented in institutions</li> <li>- Meetings held as per schedule</li> <li>- Two thirds of stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>- Minutes of the meetings</li> <li>- Process Report</li> </ul>	<p><b>Assumption:</b> Stakeholders are willing to give time for the meetings and priority to meeting of the committee/group</p> <p><b>Risk:</b> Organisational representative changed</p>

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
	- Presence of stakeholders at meetings		present at all meetings		due to transfer leading to decrease in emphasis to the institutional process of the project
<b>Activity 4.1</b> Constitution of District Steering Committee and holding its meetings regularly	- Multi-stakeholder review of project impacts and activities  - Meetings of DSC	- Does not exist  - Do not take place	- DSC with multi-stakeholder membership constituted in each district  - 6 meetings per year in each district	- Meeting reports - Process Document Reports	
<b>Activity 4.2</b> Technical Advisory Group constituted and holding its meeting regularly	- Constitution of Technical Advisory Group  - Field visits and meetings	- Does not exist  - No visits	- Technical Advisory Group constituted  - 2 Field visits and Meetings held every year	- Documentation of Technical Advisory Group - Process Document Reports	
<b>Activity 4.3</b> Constitution of State Steering Committee and holding its meetings regularly	- Senior decision makers involvement in the project  - Meetings of SSC	- Does not exist  - Do not take place	- SSC with senior decision makers membership constituted at the state level  - 2 meetings per year of the SSC	- Meeting reports - Process Document Reports	

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
<b>Activity 4.4</b> Constitution of Climate Change Observatory and holding its meetings regularly	<ul style="list-style-type: none"> <li>- Multi-stakeholder review relevance of adaptation strategies</li> <li>- Meetings of CCO</li> </ul>	<ul style="list-style-type: none"> <li>- Does not exist</li> <li>- Do not take place</li> </ul>	<ul style="list-style-type: none"> <li>- CCO with multi-stakeholder membership constituted in each district</li> <li>- 2 meetings per year in each district</li> </ul>	<ul style="list-style-type: none"> <li>- Meeting reports</li> <li>- Process Document Reports</li> </ul>	
<b>Output 4.2</b> Evidence based learning documents prepared for dissemination	<ul style="list-style-type: none"> <li>- No of learning documents prepared</li> </ul>	<ul style="list-style-type: none"> <li>- No learning document exist</li> </ul>	<ul style="list-style-type: none"> <li>- 3 Process Reports; 6 AR reports; 3 Systematisation reports and 3 Policy Briefs prepared</li> </ul>	<ul style="list-style-type: none"> <li>- Reports and Briefs</li> <li>- Process Document Report</li> <li>- Evaluation Report</li> </ul>	<p><b>Assumption:</b> Fishers able to retain their focus on climate adaptability than on development of fisheries per se</p> <p><b>Risk:</b> Key stakeholders not giving priority in participating for learning exercises</p>
<b>Activity 4.5</b> Conduct of Participatory Action-Reflection exercises	<ul style="list-style-type: none"> <li>- Formation of AR group</li> <li>- No of women members of AR group</li> <li>- No of AR exercises</li> </ul>	<ul style="list-style-type: none"> <li>- No AR group formed</li> <li>- No women representation</li> </ul>	<ul style="list-style-type: none"> <li>- 3 AR groups formed in each district each year</li> <li>- 33% members of the AR group are women</li> <li>- 3 AR exercises conducted in each</li> </ul>	<ul style="list-style-type: none"> <li>- Minutes of AR exercises</li> <li>- Process Documentation report</li> </ul>	

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
		No AR exercises	year in each district		
<b>Activity 4.6</b> Systematisation Exercise carried out	- Conduct of Systematisation exercises	- Systematization not done -	- 3 Systematisation exercises conducted - All three systematization exercise to have role of women and impact on women as one of the key themes	- Systematisation Report - Process Document Report - Evaluation Report	
<b>Activity 4.7</b> Process Document prepared	- Process Guidelines developed  - Process Documents protocol developed and implemented  - Processes documented	- Process guidelines do not exist  - No protocol exist  - No processes have been documented	- Process Guidelines for the project developed  - PD Protocol developed  - 3 Process Document Report prepared	- Process Document Reports - Process Document report reviewed and cited in Evaluation	
<b>Activity 4.8</b> Policy Briefs prepared	- No of Policy Briefs	- No Policy Briefs prepared	- At least 3 Policy Briefs prepared - At least one policy brief covers women issues	- Policy Brief documents	

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
			-		
<b>Output 4.3</b> Learning from Project Disseminated	<ul style="list-style-type: none"> <li>- No of stakeholders covered for dissemination of project learning</li> <li>- No of dissemination events organised</li> </ul>	<ul style="list-style-type: none"> <li>- No coverage</li> <li>- No events</li> </ul>	<ul style="list-style-type: none"> <li>- At least 20 different types of key stakeholders covered</li> <li>- 2 training of CSOs and 2 workshops conducted</li> </ul>	<ul style="list-style-type: none"> <li>- Training Reports</li> <li>- Workshop Reports</li> <li>- Process Document Report</li> <li>- Evaluation Report</li> </ul>	<p><b>Assumption:</b> CSOs are interested in intervening in small scale fisheries sector</p> <p><b>Assumption:</b> Climate adaptation is a priority agenda for state and national government</p> <p><b>Risk:</b> Non institutional stakeholders (fishers, women, small traders in fish) are marginalised and are not adequately represented in the events</p>
<b>Activity 4.9</b> Training of Civil Society Organisations conducted	<ul style="list-style-type: none"> <li>- No of training</li> <li>- No of participants</li> <li>- No of women participants</li> <li>- Type of participation</li> </ul>	<ul style="list-style-type: none"> <li>- No training on CC for CSOs</li> <li>- No training for CSOs on fisheries and CC</li> <li>- No training for CSOs on fisheries and CC</li> <li>- No training for CSOs on fisheries and CC</li> </ul>	<ul style="list-style-type: none"> <li>- 2 training for CSOs</li> <li>- 20 participants per training</li> <li>- At least 25% participants will be women</li> <li>- Senior, middle level and grass root workers as participants</li> </ul>	<ul style="list-style-type: none"> <li>- Training Report</li> <li>- Process Document</li> <li>- End Term Evaluation Report</li> </ul>	
<b>Activity 4.10</b>	<ul style="list-style-type: none"> <li>- No of workshops</li> </ul>	<ul style="list-style-type: none"> <li>- No workshop</li> </ul>	<ul style="list-style-type: none"> <li>- 1 state level workshop</li> </ul>	<ul style="list-style-type: none"> <li>- Workshop reports</li> </ul>	

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
State and National Workshops conducted	<ul style="list-style-type: none"> <li>- No of participants</li> <li>- Representation of women issues</li> </ul>	<ul style="list-style-type: none"> <li>- No workshop</li> <li>- No representation fo women issues</li> </ul>	<ul style="list-style-type: none"> <li>- 1 national level workshop</li> <li>- 30 participants in each workshop</li> <li>- Gender concern represented at the workshops</li> </ul>	<ul style="list-style-type: none"> <li>- Process Document Report</li> </ul>	
<b>Output 4.4</b> Knowledge Products developed printed	<ul style="list-style-type: none"> <li>- No of document to facilitate training</li> <li>- No of document to showcase good practices</li> <li>- No of documents available in Hindi</li> </ul>	<ul style="list-style-type: none"> <li>- No document exist</li> </ul>	<ul style="list-style-type: none"> <li>- 1 Manual and 2 toolkits</li> <li>- 1 Good Practice document</li> <li>- All knowledge products in Hindi</li> </ul>	<ul style="list-style-type: none"> <li>- Document reports</li> <li>- Training Manual and toolkits</li> </ul>	<b>Assumption:</b> External stakeholders will share their experiences related to the project
<b>Activity 4.11</b> Awareness material, Training Manual, Toolkit and Good Practice document prepared and printed	<ul style="list-style-type: none"> <li>- No of documents and training-cum-learning material</li> </ul>	<ul style="list-style-type: none"> <li>- Document does not exist</li> </ul>	<ul style="list-style-type: none"> <li>- 4 Awareness material by way of leaflets and booklets developed and disseminated</li> <li>- Training Manual for Fishers for climate adaptive fish rearing practice developed</li> </ul>	<ul style="list-style-type: none"> <li>- Document reports</li> <li>- Training Manual and Toolkit</li> </ul>	

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
			<ul style="list-style-type: none"> <li>- 2 toolkits for practitioners developed</li> <li>- Good Practise document developed</li> </ul>		

### ***Technical Note***

- (a) The project will target 75 ponds for initiating project activities. The number of fishers covered will be 300 and the percentage mentioned in the indicators will be in reference to 300.
- (b) The project will develop the seed rearing, hatcheries and nurseries respectively. The total number of fishers covered by the project will be 40. The percentage with respect to these three units will be in reference to 40.
- (c) The above figures are the minimum numbers that will be covered under different activities. The actual number will be arrived at once the sites are finalized. Hence the indicators are written in percentage and not in absolute numbers.

Output Wise Direct Beneficiaries of the project will be as follows:

Outputs	No of direct beneficiaries
<b>Output 1.1</b> Ponds identified according to geo-hydrological protocol for fisheries and modified pond design implemented on selected ponds	<ul style="list-style-type: none"> <li>• 75 ponds</li> <li>• At least 75 households</li> </ul>
<b>Output 1.2</b> Catchment treatment plan for each pond prepared and implemented	<ul style="list-style-type: none"> <li>• 75 ponds</li> <li>• 75 households</li> </ul>
<b>Output 1.3</b> Small-scale fishers linked to financial support systems to access resources for pond maintenance	<ul style="list-style-type: none"> <li>• 75 households</li> </ul>
<b>Output 2.1</b> Pond temperature regulating best management practices and technology adopted by small-scale fishers	<ul style="list-style-type: none"> <li>• 75 ponds</li> <li>• 340 fishers</li> </ul>
<b>Output 2.2</b> Fishers trained in poly-culture fish culture and making fish seed for composite fish culture available to small-scale fishers	<ul style="list-style-type: none"> <li>• 340 fishers</li> <li>• 9 households for nursery, hatchery and seed rearing unit</li> </ul>
<b>Output 3.1</b> Capacity building of Fishers on climate resilient fishing	<ul style="list-style-type: none"> <li>• 150 fishers</li> </ul>
<b>Output 3.2</b> Fishers trained on market analysis of fish and prepare their business plans	<ul style="list-style-type: none"> <li>• 150 fishers</li> </ul>
<b>Output 3.3</b> Panchayat representatives trained in climate change factors	<ul style="list-style-type: none"> <li>• 300 Panchayat representatives</li> </ul>
<b>Output 3.4</b> Fishers made aware on the weather based insurance product for fish culture	<ul style="list-style-type: none"> <li>• 150 fishers</li> </ul>
<b>Output 4.1</b> Institutional Processes for multi-stakeholder learning are established and activated	<ul style="list-style-type: none"> <li>• No direct beneficiary</li> </ul>
<b>Output 4.2</b> Evidence based learning documents prepared for dissemination	<ul style="list-style-type: none"> <li>• 90 fishers undergo the process of systematisation</li> <li>• 340 fishers participate at least once during the life of the project in Action Reflection exercise</li> </ul>
<b>Output 4.3</b> Learning from Project Disseminated	<ul style="list-style-type: none"> <li>• 40 civil society members trained</li> </ul>
<b>Output 4.4</b> Knowledge Products developed printed	<ul style="list-style-type: none"> <li>• No direct beneficiary</li> </ul>

**F. Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund**

**Table 4: Program alignment with AF Result Framework**

Project Objective	Project Objective Indicator	Fund Outcome	Fund Outcome Indicator
Climate Change Adaptation in fishery sector for secured livelihoods of small and marginal farmers	% Fishers adapting climate resilient fish rearing practices developed by the project	<b>Outcome 3:</b> Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.2. Modification in behavior of targeted population
	% Fishers using subscribing to weather based insurance products	<b>Outcome 3:</b> Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses
	% small and marginal farmers increase proportion of their income from fisheries from 20 to 40%	<b>Outcome 6:</b> Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	6.1 Percentage of households and communities having more secure (increased) access to livelihood assets
	Selection protocol and design of ponds tested by the project adopted by Government for small pond fisheries	<b>Output 7:</b> Improved integration of climate resilience strategies into country development plans	7.2. No. or targeted development strategies with incorporated climate change priorities enforced
	State Government resolves to formulate a separate policy for small fishers that is based on climate adaptive strategies	<b>Output 7:</b> Improved integration of climate resilience strategies into country development plans	7. Climate change priorities are integrated into national development strategy

Project Outcomes	Project Outcome Indicators	Fund Output	Fund Output Indicators
<b>Outcome 1</b> Increasing water retention capacity of the tanks as an adaptive measure to address rainfall variability by modifying technical specification of the tanks	- % ponds with water retention for more than 10 months	<b>Output 4:</b> Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)
	- % ponds with depth of water at least 1.5 m during dry months	<b>Output 4:</b> Vulnerable physical, natural, and social assets strengthened in	4.1.2. No. of physical assets strengthened or constructed to withstand conditions

Project Outcomes	Project Outcome Indicators	Fund Output	Fund Output Indicators
		response to climate change impacts, including variability	resulting from climate variability and change (by asset types)
	- % ponds where silt load has been decreased	<b>Output 4:</b> Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)
	- % ponds where there has been no loss of fish because of flooding throughout the year	<b>Output 5:</b> Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	5.1. No. and type of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type of assets)
	- % ponds where Private/ Panchayat investment on maintenance of ponds to increase water retention capacity	<b>Outcome 2:</b> Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2.1. No. and type of targeted institutions with increased capacity to minimize exposure to climate variability risks
<b>Outcome 2</b> Diversification of fish species and temperature regulation of ponds as adaptive measures to warmer climatic regime	- % ponds where water temperature is regulated and controlled during summer	<b>Output 4:</b> Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)
	- % fishers adopting poly culture fish farming	<b>Output 4:</b> Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1. Development sectors' services responsive to evolving needs from changing and variable climate
	- % farmers adopting recommended fish stocking rate	<b>Output 4:</b> Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1. Development sectors' services responsive to evolving needs from changing and variable climate
	- % hatcheries running successfully	<b>Output 4:</b> Vulnerable physical, natural, and social assets	4.1.2. No. of physical assets strengthened or constructed to

Project Outcomes	Project Outcome Indicators	Fund Output	Fund Output Indicators
		strengthened in response to climate change impacts, including variability	withstand conditions resulting from climate variability and change (by asset types)
	- % ponds with decrease in fish mortality due to decrease in BOD	<b>Output 4:</b> Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)
<b>Outcome 3</b> Making small pond fisheries climate adaptation resilient through productivity enhancement by capacity building and institutional linkages	- % Fishers adopting responsible fisheries practices	<b>Output 4:</b> Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1. Development sectors' services responsive to evolving needs from changing and variable climate
	- % Increase in productivity of fish	<b>Outcome 6:</b> Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	6.1.1.No. and type of adaptation assets (physical as well as knowledge) created in support of individual or community-livelihood strategies
	- % Fishers participated in the development of fisheries business plan	<b>Outcome 3:</b> Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1.1 No. and type of risk reduction actions or strategies introduced at local level
	- % Fishers develop partnerships and linkages with other players in the market	<b>Outcome 3:</b> Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1.1 No. and type of risk reduction actions or strategies introduced at local level
	- % Fishers members of formal groups formed	<b>Outcome 3:</b> Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1.1 No. and type of risk reduction actions or strategies introduced at local level
	- % Fishers pay for premium insurance	<b>Outcome 3:</b> Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1.1 No. and type of risk reduction actions or strategies introduced at local level

Project Outcomes	Project Outcome Indicators	Fund Output	Fund Output Indicators
	- % Panchayats formed plans to reflect climate change factors	<b>Output 2.1:</b> Strengthened capacity of national and regional centers and networks to respond rapidly to extreme weather events	2.1.1. No. of staff trained to respond to, and mitigate impacts of, climate-related events
<b>Outcome 4</b> Preparing and disseminating evidence based resilient climate change adaptation strategies for inland fisheries for small pond fishers	- Institutional processes for stakeholder involvement identifying areas for learning and policy development	<b>Outcome 3:</b> Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1.1 No. and type of risk reduction actions or strategies introduced at local level
	- % stakeholders covered through training and dissemination events on adaptation strategies for climate change	<b>Output 2.1:</b> Strengthened capacity of national and regional centers and networks to respond rapidly to extreme weather events	2.1.2. Capacity of staff to respond to, and mitigate impacts of, climate related events from targeted institutions increased
	- Adaptive strategies for fisheries articulated and developed	<b>Output 7:</b> Improved integration of climate resilience strategies into country development plans	7.2. No. or targeted development strategies with incorporated climate change priorities enforced

### Adaptation Fund Core Indicators

Adaptation Fund Core Impact Indicator “Number of Beneficiaries”			
Date of Report: 29 August 2014			
Project Title : BUILDING ADAPTIVE CAPACITIES OF SMALL INLAND FISHERS FOR CLIMATE RESILIENCE AND LIVELIHOOD SECURITY, MADHYA PRADESH, INDIA			
Country : INDIA			
Implementing Agency: NABARD			
Project Duration : 3 years			
Baseline (absolute number)	Target at project approval (absolute number)	Adjusted target first year of implementation (absolute number)	Actual at completion <sup>7</sup> (absolute number)
Direct beneficiaries supported by the project	640		
Female direct beneficiaries	250		
Youth direct beneficiaries	This cannot be committed as the project interventions require land ownership and elected representatives.		

<b>Indirect beneficiaries supported by the project</b>	2115		
<i>Female indirect beneficiaries</i>	The nature of benefit is in terms of water availability for irrigation which will be benefit for household		
<i>Youth indirect beneficiaries</i>			

<b>Adaptation Fund Core Impact Indicator “Assets Produced, Developed, Improved, or Strengthened”</b>			
<b>Date of Report :29 August 2014</b>			
<b>Project Title : BUILDING ADAPTIVE CAPACITIES OF SMALL INLAND FISHERS FOR CLIMATE RESILIENCE AND LIVELIHOOD SECURITY, MADHYA PRADESH, INDIA</b>			
<b>Country : INDIA</b>			
<b>Implementing Agency :NABARD</b>			
<b>Project Duration : 3 years</b>			
<b>Baseline</b>	<b>Target at project approval</b>	<b>Adjusted target first year of implementation</b>	<b>Actual at completion</b>
<b>Sector (identify)</b>	<b>RURAL DEVELOPMENT ( FISHERIES)</b>		
<b>Targeted Asset</b> 1) Health and Social Infrastructure <i>(developed/ improved)</i> 2) Physical asset <i>(produced/ improved/ strengthened)</i>	1) Climate index based Insurance product for fisheries  2) Produced: Nurseries : 3 Hatcheries:4  Improved:75*ponds		
<b>Changes in Asset</b> <i>(Quantitative or qualitative depending on the asset)</i>	Quantitative: 1. Climate index based Insurance product developed by the insurance company for fisheries 2. Water retention for more than 10 months in 75 ponds 3. 60 ponds with water depth up to 1.5 m during dry months		



**G. Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.**

(Amount: US \$)

SN	BUDGET HEADS	Unit	QT.	Unit	QT.	Unit Cost	Total Amount
<b>1</b>	<b>COMPONENT 1</b>						
1.1	Hydro-geological assessment and Modification of Design	Blocks	2	Dist.	3	3333	10000
1.2	Modification of Insurance product	Product	2	Dist.	3	1000	3000
1.3	Construction of Tanks	Tanks/dist.	25	Dist.	3	375000	1125000
1.4	Catchment Treatment	hectare/dist	12.5	Dist.	3	2500	7500
	<b>Sub-Total</b>						<b>1145500</b>
<b>2</b>	<b>COMPONENT 2</b>						
2.1	Temperature Regulation of Ponds (Plantation of Surrounding Pond Area)	hectare/dist	5	Dist.	3	583	1750
2.2	Poly culture Fingerling Support (Part support)	Ponds/dist. for 3 years	25	Dist.	3	15625	46875
2.3	Oxygenation (solar aerators and oxygen tablets- all ponds)	Units	3	Dist.	3	7500	22500
2.4	Water Quality Measurement & Maintenance	Units	25	Dist.	3	4167	12500
2.5	Feeding -Micro-nutrient etc. (Part support)	Units/dist.	25	Dist.	3	6250	18750
2.6	Construction of Hatchery units-CIFA technology	Units	1	Dist.	3	8333	25000
2.6.1	Nursery Unit(0.1 ha)	Units	1	Dist.	3	5883	17650
2.6.2	Seed Rearing Unit (0.1 ha)	Units	1	Dist.	3	3800	11400
2.6.3	Transportation of Fingerlings	Units/dist.	25	Dist.	3	417	1250
	<b>Sub-Total</b>						<b>157675</b>
<b>3</b>	<b>COMPONENT 3</b>						
3.1	Training and Capacity Building including exposure visits	Units	5	Dist.	3	5000	15000
3.2	Institutional Strengthening of Fishers	Continuous	1	Dist	3	5000	15000
3.3	Marketing and Infrastructure Support	Units		Dist.	3	14167	42500
3.5	Business Plan Prepared	Units/dist.	25	Dist.	3	3000	9000

SN	BUDGET HEADS	Unit	QT.	Unit	QT.	Unit Cost	Total Amount
3.6	Linkages with Financial Services ( banking/federation/financial institutions)	Units	25	Dist.	3	1000	3000
3.7	Insurance Coverage ( premium part)	Units/dist.	25	Dist.	3	271	813
	<b>Sub-Total</b>						<b>85313</b>
<b>4</b>	<b>Component 4</b>						
4.1	Meetings of District Steering Committee	no of meeting in district	18	District	3	1890	5670
4.2	Meeting of Technical Advisory Group	no of meeting	6	State	1	14330	14330
4.3	Meeting of State Steering Committee	no of meeting	9	State	1	14333	14333
4.4	Meeting of Climate Change Observatory	no of meeting	6	District	3	4765	14295
4.5	Action-Reflection Meetings	no of meeting	9	District	3	1223	3668
4.6	Systematisation	no of document per year	1	Year	3	3108	9325
4.7	Process Documentation	no of document per year	1	Year	3	2917	8750
4.8	Development of Policy Briefs	no of Policy Briefs per year	1	Year	3	2000	6000
4.9	Training of Civil Society Organisation	no of training	2	State	1	3867	3867
4.10(a)	State Level Workshop	no of workshop	1	State	1	3933	3933
4.10(b)	National Level Workshop	no of workshop	1	State	1	7683	7683
4.11(a)	Awareness (Leaflets/pamphlets)	document	4	Year	3	1667	5000
4.11(b)	Toolkit for Practitioners: Developing Adaptation Strategies in Natural Resource Management with Specific Reference to Fisheries	document	1	State	1	5333	5333
4.11(c)	Training Manual for Fishers on Climate Resilient Fish Rearing Practices	document	1	State	1	5333	5333
4.11(d)	Toolkit for Preparation of Business Plans for Small-Scale Fishery, Hatchery and Nursery	document	1	State	1	5333	5333

SN	BUDGET HEADS	Unit	QT.	Unit	QT.	Unit Cost	Total Amount
4.11(e)	Good Management Practices for Climate Resilient Small-Scale Fisheries	document	1	State	1	6167	6167
	<b>Sub Total</b>						<b>119,020</b>
	<b>TOTAL</b>						<b>15,07,508</b>
<b>E</b>	Project / Programme Execution Cost	9.50%					1,43,192
<b>F</b>	<b>Total Project / Programme Cost</b>						<b>16,50,700</b>
<b>G</b>	Project/Programme Cycle Management	8.50%					1,39,800
	<b>Amount of Financing Requested</b>						<b>17,90,500</b>

**BUDGET NOTES: COST BREAKUPS**

1.1 Hydro-geological assessment and Modification of Design	Two blocks in each of the three districts will be covered during the Hydro geological assessment. The cost is calculated on per block basis as follows. The cost has been rounded off to Rs 1,00,000 per block. For 2 blocks per district it comes to Rs 2,00,000 or US \$ 3333. For three district the cost will be US \$ 10000																								
1.2 Modification of Insurance product	Short term Financial Consultant will be associated with the project to interact closely with banks and insurance companies at the district and regional level. The time requirements will be for about 4 months over the life of the project. The cost component are given below. The engagement may be per diem or monthly depending on profile and work understanding of the person. <table border="1"> <thead> <tr> <th>Details</th> <th>honorarium</th> <th>months</th> <th>Total Amount US\$</th> </tr> </thead> <tbody> <tr> <td>1. Time budget of Financial Consultant</td> <td>500</td> <td>4</td> <td>2000</td> </tr> <tr> <td>2. Travel cost (Travel, Boarding and Lodging, DSA)</td> <td>208.33</td> <td>4</td> <td>833.33</td> </tr> <tr> <td>3. Stationary and communication</td> <td>41.67</td> <td>4</td> <td>166.67</td> </tr> <tr> <td></td> <td></td> <td>Total</td> <td>3000</td> </tr> <tr> <td>Unit Rate per district</td> <td></td> <td></td> <td>1000</td> </tr> </tbody> </table>	Details	honorarium	months	Total Amount US\$	1. Time budget of Financial Consultant	500	4	2000	2. Travel cost (Travel, Boarding and Lodging, DSA)	208.33	4	833.33	3. Stationary and communication	41.67	4	166.67			Total	3000	Unit Rate per district			1000
Details	honorarium	months	Total Amount US\$																						
1. Time budget of Financial Consultant	500	4	2000																						
2. Travel cost (Travel, Boarding and Lodging, DSA)	208.33	4	833.33																						
3. Stationary and communication	41.67	4	166.67																						
		Total	3000																						
Unit Rate per district			1000																						
1.3 Construction of Tank	The pond construction cost is estimated at US\$ 15000 per pond the details are given below separately																								
1.4 Catchment Treatment	Per pond catchment area treatment 0.5 ha per district 12.5 ha (for 25 ponds). Total Area to be treated 37.5 ha. Unit cost US\$ 200 / ha. Total cost of the catchment treatment US\$ 7500/-																								
2.1 Temperature Regulation of Ponds (Plantation in surrounding areas)	0.2 hectare per pond, $0.2*25=5$ hectare / per district. Unit cost per ha US\$116. Total cost US\$ 7500/-																								
2.2 Poly Culture Fingerling Support (part support)	Water spread area of 0.5 ha for 25 ponds per districts for three district. i.e. total water spread area = $0.5*25*3 = 37.5$ ha. Stocking density @ 5000 fingerlings for 3 years. i.e. total fingerlings no. = $37.5 \times 5000 \times 3 = 562500$ nos. Cost per fingerling @ 0.0833 US\$. Total fingerling cost = $562500 \times 0.0833 = \text{US\$ } 46875$ (Approximately)																								
2.3 Oxygenation (solar aerators and oxygen tablets – all ponds)	3 Solar aerators per district and oxygen tablets for all ponds. @ US\$ 2500 per unit i.e. total cost = $2500*3*3 = \text{US\$ } 22500$																								
2.4 Water Quality Measurement & Maintenance	One testing unit for one pond for four tests in a year. Per unit cost US\$ 166.66. Total cost for 25 units per district. Total cost for 3 districts = $25*3*166.66 = \text{US\$ } 12500$																								
2.5 Feeding -Micro-nutrient etc. (Part support)	Support for one year. Feed support required 3 times per year @ US\$166.67 per pond. Total cost = $166.67*25*3= \text{US\$ } 18750$																								
2.6 Construction of Hatchery units-CIFA technology	Per district one hatchery @ US\$ 8333.34. three such hatcheries. Based on technology provided by Central Institute for Freshwater Aquaculture (CIFA), Bhubaneswar, Odisha, India.																								
2.7 Nursery Unit(0.1 ha)	USD 2941.67per nursery @ 2 nursery per hatchery : 500 sq m water spread area. Total 6 nurseries.																								
2.9 Seed Rearing Unit (0.1 ha)	One seed rearing unit per district. @ US\$ 3800 per unit. Total 3 such units.																								

2.10 Transportation of Fingerlings	US\$ 417 per district for one year																								
3.1 Training and Capacity Building including exposure visits	Five trainings per district @ US\$ 1000																								
3.2 Institutional Strengthening of Fishers	As mentioned in the capacity Building strategy Annexure 7, there are institutional barriers, barriers of information and market. This amount has been kept not for formal training, but for providing Institutional Input to fishing societies like maintaining records, holding timely meetings, giving them simplified rules and regulations, facilitate audit, ensure banking transactions. Provision of US\$ 5000 per district.																								
3.3 Marketing and Infrastructure Support	Small support in terms of making the infrastructure more suitable for fisheries is required like water facility, solar powered storage units, waste disposal system, making the environment more hygienic. Particulars of activities proposed under marketing and infra support are given below: <table border="1"> <thead> <tr> <th>Particulars</th> <th>Number</th> <th>Rate US\$</th> <th>Total US\$</th> </tr> </thead> <tbody> <tr> <td>Solar powered Storage units</td> <td>3</td> <td>2500</td> <td>7500</td> </tr> <tr> <td>Waste disposal Unit</td> <td>1</td> <td>4167</td> <td>4167</td> </tr> <tr> <td>Water Facility ( with contribution)</td> <td>1</td> <td>833</td> <td>833</td> </tr> <tr> <td>Hygienic environment</td> <td>1</td> <td>1667</td> <td>1667</td> </tr> <tr> <td><b>Total</b></td> <td></td> <td></td> <td>14167</td> </tr> </tbody> </table>	Particulars	Number	Rate US\$	Total US\$	Solar powered Storage units	3	2500	7500	Waste disposal Unit	1	4167	4167	Water Facility ( with contribution)	1	833	833	Hygienic environment	1	1667	1667	<b>Total</b>			14167
Particulars	Number	Rate US\$	Total US\$																						
Solar powered Storage units	3	2500	7500																						
Waste disposal Unit	1	4167	4167																						
Water Facility ( with contribution)	1	833	833																						
Hygienic environment	1	1667	1667																						
<b>Total</b>			14167																						
3.4 Business Plan Prepared	The assessments provide inputs to the fishers in enabling them to develop their respective business plans and make the best possible use of the market opportunities. All the 75 fishers will be trained to develop their respective business plans based in their own situation. @ 3000 US\$ per district.																								
3.5 Linkages with Financial Services ( banking/federation/financial institutions)	It was found that the fishermen fall short on cash to buy the seeds and end up compromising on the quality of the seed. Also all do not get the benefit of appropriate equipment, hence this fund is proposed in the project to work as revolving fund if needed. There is a component of fingerling support, but this fund will be merit based with defined terms to be used as revolving fund for short term needs. It would also be used for preparation of banking plan and credit linkages with financial institutions. @ US\$ 1000 per district																								
3.6 Insurance Coverage ( premium part)	Premium for one year @ US\$ 21.67 per ha for pond (of 0.5 ha) for 25 ponds per district. i.e. US\$ 271 per district.																								
4.1 Meetings of District Steering Committee	There will be 6 meetings of DSC per district per year. For three districts it implies 36 meetings during the period of project implementation. Cost of one meeting is \$ and for 54 meeting it will be \$5670.																								
4.2 Meeting of Technical Advisory Group	TAG will meet once in six months. The members will undertake field visit to project site and hold discussions among themselves. Cost of one meeting will be \$2388 and for six meetings it will be \$14330.																								
4.3 Action-Reflection Meetings	Each AR meeting will have 25 persons. These meetings will be held at the village level. There will be 3 meeting in each district every year. Cost of one meeting will be \$136 and there will be such 27 meetings leading to a total budgeted expenditure of \$3668.																								
4.4 Process Documentation	One Process Document per year which implies three reports during the project period. The cost of the PD includes consultancy charges of external resource																								

	person, his/her travel and cost of printing the report. The cost of one PD report is \$2917 and total expenses on PD will be \$8750.																																																
4.5 Meeting of State Steering Committee	SSC will meet twice a year. The constitution of SSC also includes members from the district and hence their travel has been built in to cost of organizing the meeting. The cost of organizing one meeting of SSC will be \$1593 and total cost will be \$14333.																																																
4.6 Meeting of Climate Change Observatory	CCO in each district will comprise of 10 persons. The CCO will meet once in six months in each district. That is, there will be 6 meetings of the CCO in each district during the project period. Cost of one meeting will be \$794 and for all the CCO meetings it will be \$14295.																																																
4.7 Systematisation	<p>Three systematization exercises will be conducted. The exercise will be facilitated by an external facilitator. The cost for one systematization exercise will be as follows</p> <table border="1"> <thead> <tr> <th></th> <th>Expenditure items</th> <th>Unit</th> <th>Rate US\$</th> <th>No</th> <th>Total US\$</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Consultancy for External Facilitator</td> <td>per day</td> <td>83</td> <td>15</td> <td>1250</td> </tr> <tr> <td>2</td> <td>Travel of External Facilitator incl Boarding/Lodging and Food</td> <td>per day</td> <td>83</td> <td>15</td> <td>1250</td> </tr> <tr> <td>3</td> <td>District Stakeholder Meetings</td> <td>per meeting</td> <td>50</td> <td>3</td> <td>150</td> </tr> <tr> <td>4</td> <td>Cost of Evidence Collection (travel etc)</td> <td>per visit to the site</td> <td>42</td> <td>5</td> <td>208</td> </tr> <tr> <td>5</td> <td>Audio visual and written documentation</td> <td>per report</td> <td>250</td> <td>1</td> <td>250</td> </tr> <tr> <td>6</td> <td>Total for one Systematisation</td> <td></td> <td></td> <td></td> <td>3108</td> </tr> <tr> <td>7</td> <td>Total for 3 Systematisation</td> <td></td> <td></td> <td></td> <td>9325</td> </tr> </tbody> </table>		Expenditure items	Unit	Rate US\$	No	Total US\$	1	Consultancy for External Facilitator	per day	83	15	1250	2	Travel of External Facilitator incl Boarding/Lodging and Food	per day	83	15	1250	3	District Stakeholder Meetings	per meeting	50	3	150	4	Cost of Evidence Collection (travel etc)	per visit to the site	42	5	208	5	Audio visual and written documentation	per report	250	1	250	6	Total for one Systematisation				3108	7	Total for 3 Systematisation				9325
	Expenditure items	Unit	Rate US\$	No	Total US\$																																												
1	Consultancy for External Facilitator	per day	83	15	1250																																												
2	Travel of External Facilitator incl Boarding/Lodging and Food	per day	83	15	1250																																												
3	District Stakeholder Meetings	per meeting	50	3	150																																												
4	Cost of Evidence Collection (travel etc)	per visit to the site	42	5	208																																												
5	Audio visual and written documentation	per report	250	1	250																																												
6	Total for one Systematisation				3108																																												
7	Total for 3 Systematisation				9325																																												
4.8 Development of Policy Briefs	Three policy briefs will be developed during the course of the project implementation. Cost one Policy brief will be \$2000 that will include honorarium for the external resource person, travel to project site and printing of the finalized briefing paper.																																																
4.9 Training of Civil Society Organisation	2 training for members of the civil society will be organized. There will be 20 participants for each training. The cost of training per participant will be US\$ 97 for training for 3 days.																																																
4.10(a) State Level Workshop	30 participants will be invited for the workshop that will include persons other than the project districts as well. The workshop will be for two days and will include travel of participants in addition to the Boarding and Lodging and workshop expenses.																																																
4.10 (b) National Level Workshop	30 participants will be invited for the workshop that will include persons from different parts of the country. The workshop will be for two days and will include travel of participants in addition to the Boarding and Lodging and workshop expenses.																																																
4.11 (a) Awareness (Leaflets/pamphlets)	4 awareness leaflets per year will be developed on issues on which the project has planned to intervene. The cost includes printing and distribution of the material to local stakeholders.																																																
4.11 (b) Toolkit for Practitioners: Developing Adaptation Strategies in Natural Resource Management	Toolkit based on project experience and learning will be developed. The cost includes honorarium of the external resource persons, cost for designing the toolkit, translation cost and cost of printing. The aim is to print 500 copies of the toolkit for wider circulation.																																																

with Specific Reference to Fisheries	
4.11 (c) Training Manual for Fishers on Climate Resilient Fish Rearing Practices	The development of training manual includes include honorarium of the external resource persons, cost for designing the toolkit, translation cost and cost of printing. The aim is to print 500 copies of the toolkit for wider circulation.
4.11 (d) Toolkit for Preparation of Business Plans for Small-Scale Fishery, Hatchery and Nursery	Toolkit based on project experience and learning will be developed. The cost includes honorarium of the external resource persons, cost for designing the toolkit, translation cost and cost of printing. The aim is to print 500 copies of the toolkit for wider circulation.
4.11 (e) Good Management Practices for Climate Resilient Small-Scale Fisheries	Good Management practice document will be written by an external resource person who will also travel to the field site for evidence gathering in addition to undertaking review of project documents and reports. The cost includes consultancy charges, travel, boarding and lodging, translation cost and cost of printing the document.

### 1.3 Detailed calculation: Pond Construction (Model Design – Actual field level costs may vary depending on the site conditions)

Item No.	Description	Unit	No	Length	Breadth	Height /Depth	Content, CuM	Total Quantity	Rate / Unit (USD)	Amount USD
1	<b>Excavation</b> in all types of soils for all types and sizes of tanks including disposal of excavated stuff upto 50m .lead and a lift upto 1.50M.including dressing and levelling of pits and disposed stuff									
	Upper level	Cum	1	100.00	100.00	1.00	10000.00			
	Middle level	Cum	1	90.00	90.00	1.00	8100.00			
	Lower level	Cum	1	80.00	80.00	1.00	6400.00			
	Out let wall	Cum	2	15.00	1.00	0.60	18.00			
		Cum	1	7.50	1.00	0.60	4.50			
							24500.00			
	Hard Soil							<b>24500.00</b>	<b>0.566667</b>	<b>13883.33</b>
2	Earthern walls	Cum	2	15.00	1.00+0.40/2	1.50	31.50	<b>31.50</b>		
		Cum	1	7.50	1.00	1.00	5.25	<b>5.25</b>		
								<b>36.75</b>	<b>13.33333</b>	<b>490.00</b>
3	<b>Inlet</b>									
	22cm thick dry stone pitching with individual stone of 22cm depth and minimum size 0.014.	Sqm	1	20.00	2.00		40.00	<b>40.00</b>	<b>3.73</b>	<b>149.33</b>
4	<b>Out let</b>									
	22cm thick dry stone pitching with individual stone of 22cm depth and	Sqm	1	20.00	2.00		40.00	<b>40.00</b>	<b>3.73</b>	<b>149.33</b>

minimum size 0.014.										
									<b>Total US\$</b>	<b>14522.67</b>
									<b>rounded</b>	<b>15000</b>

**Table :Project Execution Cost:**

Expenditure	Staff	Unit	No	Rate US\$	No of months	Years	Total US\$
<b>Honorarium</b>	Project Coordinator	per month per person	1	425	12	3	15300
	Knowledge Manager	per month per person	1	250	12	3	9000
	Accounts	per month per person	1	150	12	3	5400
	Senior Technical Member	per month per person	3	360	12	3	38880
	Junior Technical Member	per month per person	3	200	12	3	21600
	Cluster Implementation Team	per month per person	6	65	12	3	14040
						<b>subtotal</b>	<b>104220</b>
<b>Travel</b>	Project Coordinator	per month per person	1	78	12	3	2807
	Knowledge Manager	per month per person	1	70	12	3	2520
	Senior Technical Member	per month per person	3	30	12	3	3240
	Junior Technical Member	per month per person	3	30	12	3	3240
	Cluster Implementation Team	per month per person	6	15	12	3	3240
						<b>subtotal</b>	<b>15047</b>
<b>Administration</b>	Rent Field Offices	per month	3	30	12	3	3240
	FO Expenses	per month	3	20	12	3	2160
	HO	per month	1	150	12	3	5400
						<b>subtotal</b>	<b>10800</b>
<b>M&amp;E</b>	Benefit assessment	per village	75	37	1	1	2775
	End Line	per document	1	7500	1	1	7500
	Inception	per participant	50	37	1	1	1850
	Audit	per audit	3	333	1	1	1000
						<b>subtotal</b>	<b>13125</b>
<b>Total</b>							<b>143192</b>

## Project management fee

The project management fee (8.5% of the total budget) will be utilized by NABARD, the National Implementing Entity, to cover the costs associated with the provision of general management support. Table 22 below provides a breakdown of the estimated costs of providing these services.

**Table: Breakdown of costs for the project management fee**

Particulars	Amount (US\$)
Financial Management	41,300
Information, Reporting, Knowledge Management	43,500
Performance Management - Progress Monitoring- Field Monitoring	30,000
Programme Support - Technical and Other to EE	25,000
<b>Total</b>	<b>1,39,800</b>

### NIE Fee Budget Notes:

#### 1. Finance, Budget and Treasury.

This covers general financial oversight, management and quality control to:

- Manage, monitor and track AF funding including allocating and monitoring expenditure based on agreed work plans, financial reporting to the AFB and the return of unspent funds to AF;
- Ensuring that financial management practices comply with AF requirements and support audits as required; E
- Ensuring financial reporting complies with AF standards; and
- Ensure cost efficient procurement processes and compliance with Government procurement rules and provide support to EE in this direction.

#### 2. Information, Reporting, Knowledge Management:

- This includes maintaining information management systems and specific project management databases to track and monitor project implementation
- Periodic Reporting to the AFB on the physical progress and AF result framework
- Creating platform for knowledge dissemination for the learnings out of project

#### 3. Performance Management - Progress Monitoring- Field Monitoring:

- Providing oversight of the monitoring and evaluation function of the Executing Entity.
- Field monitoring at six monthly interval and progress reporting
- Providing guidance on AF reporting requirements; managing the relationship with the AF and ensuring outputs and outcomes match with AF expectations;

- responding to information requests and arranging revisions;
4. **Programme Support - Technical and Other Support to EE**
- Providing technical support in the areas of risk management
  - Policy, programming, and implementation support services;
  - Providing guidance in establishing performance measurement processes; and
  - Technical support on methodologies, TOR validation, identification of experts, results validation, and quality assurance.
  - Technical support, troubleshooting, and support evaluation missions as necessary;
  - Support on technical issues in programme implementation

#### Output wise Budget

Outputs	Budget
<b>COMPONENT 1</b>	
<b>Outputs 1.1</b> Ponds identified according to geo-hydrological protocol for fisheries and modified pond design implemented on selected ponds	1135000
<b>Output 1.2</b> Catchment treatment plan for each pond prepared and implemented	7500
<b>Output 1.3</b> Small-scale fishers linked to financial support systems to access resources for pond maintenance	3000
<b>Total</b>	<b>1145500</b>
<b>COMPONENT 2</b>	
<b>Output 2.1</b> Pond temperature regulating best management practices and technology adopted by small-scale fishers	24250
<b>Output 2.2</b> Fishers trained in poly-culture fish culture and making fish seed for composite fish culture available to small-scale fishers	133425
<b>Total</b>	<b>157675</b>
<b>COMPONENT 3</b>	
<b>Output 3.1</b> Capacity building of Fishers on climate resilient fishing	15000
<b>Output 3.2</b> Fishers trained on market analysis of fish and prepare their business plans	51500
<b>Output 3.3</b> Panchayat representatives trained in climate change factors	15000
<b>Output 3.4</b> Fishers made aware on the weather based insurance product for fish culture	3813
<b>Total</b>	<b>85313</b>
<b>COMPONENT 4</b>	
<b>Output 4.1</b> Institutional Processes for multi-stakeholder learning are established and activated	48628
<b>Output 4.2</b> Evidence based learning documents prepared for dissemination	27743
<b>Output 4.3</b> Learning from Project Disseminated	15483
<b>Output 4.4</b> Knowledge Products developed printed	27166
<b>Total</b>	<b>119020</b>
<b>Grand Total</b>	<b>1507508</b>

**Budget Notes:**

Output 1.1	The cost include the cost of conducting the hydrogeological surveys and the construction cost for modification of ponds. The costs are US\$ 3333 per district for the survey and US\$15000 for modification per pond.
Output 1.2	Estimated area to be treated will be 37.5 ha @ US\$ 20 per ha, the total cost will be US\$7500
Output 1.3	Short term financial consultant will be employed for which US\$ 1000 per district has been budgeted
Output 2.1	Measures for temperature regulation including greening of pond surrounds and installing of solar aerators and use of oxygen tablets. The greening of pond will be @ US\$ 116 per ha for 5 ha per district
Output 2.2	Cost is inclusive of fingerling support to the fishers including cost of transportation of fingerlings; construction cost of hatchery, nursery and seed rearing units, feed support and cost for water quality testing unit.
Output 3.1	Five training @ US\$ 1000 per training per district
Output 3.2	The cost is inclusive of the marketing and infrastructure support that will be provided to fishers and in provision of training to each of the fishers in training and development of their respective business plans
Output 3.3	Training of Panchayat representatives @ US\$ 5000 per district
Output 3.4	Provisioning of revolving fund and support to pay premium for the first year. The former is US\$ 1000 per district and the latter us US\$ 271 per district
Output 4.1	The cost is inclusive of meetings of the District Steering Committee, the State Steering Committee, the Technical Advisory Group and Climate Change Observatory
Output 4.2	Cost is inclusive of organizing Action-Reflection meetings, conducting the process of systematization, developing Process Documentation reports and developing Policy Briefs
Output 4.3	The cost includes conduct of training workshop for Civil Society members, organizing state and national level workshops under the project
Output 4.4	The cost includes development and printing of awareness leaflets and pamphlets; development of training manual for Fishers on Climate Resilient practices; toolkit for practitioners on Adaptation Strategies in NRM with specific reference to Fisheries; and Development of Business Plan for Hatchery, Small Scale Fisheries and Nursery; and a Good practice document on Climate Resilient Fisheries for small fishers.

**H. Include a disbursement schedule with time-bound milestones.**

Instalment No.	Percentage	Amount (\$)	Year	Milestone
First Instalment	25%	447,625	October 2014	<ol style="list-style-type: none"> <li>1. Completion of inception workshop</li> <li>2. Geo-hydrological assessment</li> <li>3. Site finalisation</li> <li>4. Farmer mobilisation</li> <li>5. Completion of baseline</li> <li>6. Monitoring, Evaluation &amp; Learning framework</li> </ol>

Instalment No.	Percentage	Amount (\$)	Year	Milestone
				7. Finalisation of site specific maps 8. Start of tank construction in 15% sites
Second Instalment	25%	447,625	April 2015	1. Annual review and planning 2. Completion of 25% tanks 3. Start of work of hatchery units 4. Four monitoring (quarterly) 5. New tank construction – 25% started
Third Instalment	25%	447,625	April 2016	1. Start of operation in 25% tanks 2. Functioning of hatchery unit 3. Start of work in remaining 50% tanks 4. Adaptation benefit assessment in tanks
Fourth Instalment	25%	447,625	April 2017	1. Start of operation in 100% tanks 2. Adaptation benefit assessment-all tanks 3. Completion of mid-term review 4. Modified action plan based on review


Details	Upon Agreement signature - 1st instalment	Second Installment	Third Installment	Fourth Installment	Total
<b>Scheduled Date</b>	Oct- Nov. 2014	April 1, 2015	April 1, 2016	April 1, 2017	
<b>Project Funds</b>	412,675	412,675	412,675	412,675	1,650,700
<b>Implementing Entity Fee</b>	34,950	34,950	34,950	34,950	139,800
<b>Total</b>	<b>447,625</b>	<b>447,625</b>	<b>447,625</b>	<b>447,625</b>	<b>1,790,500</b>

## PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

- A. **Record of endorsement on behalf of the government** *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

<i>Ravi Shankar Prasad, IAS, Joint Secretary, Ministry of Environment and Forest (MoEF), Government of India</i>	Date:14 August 2014
--	---------------------

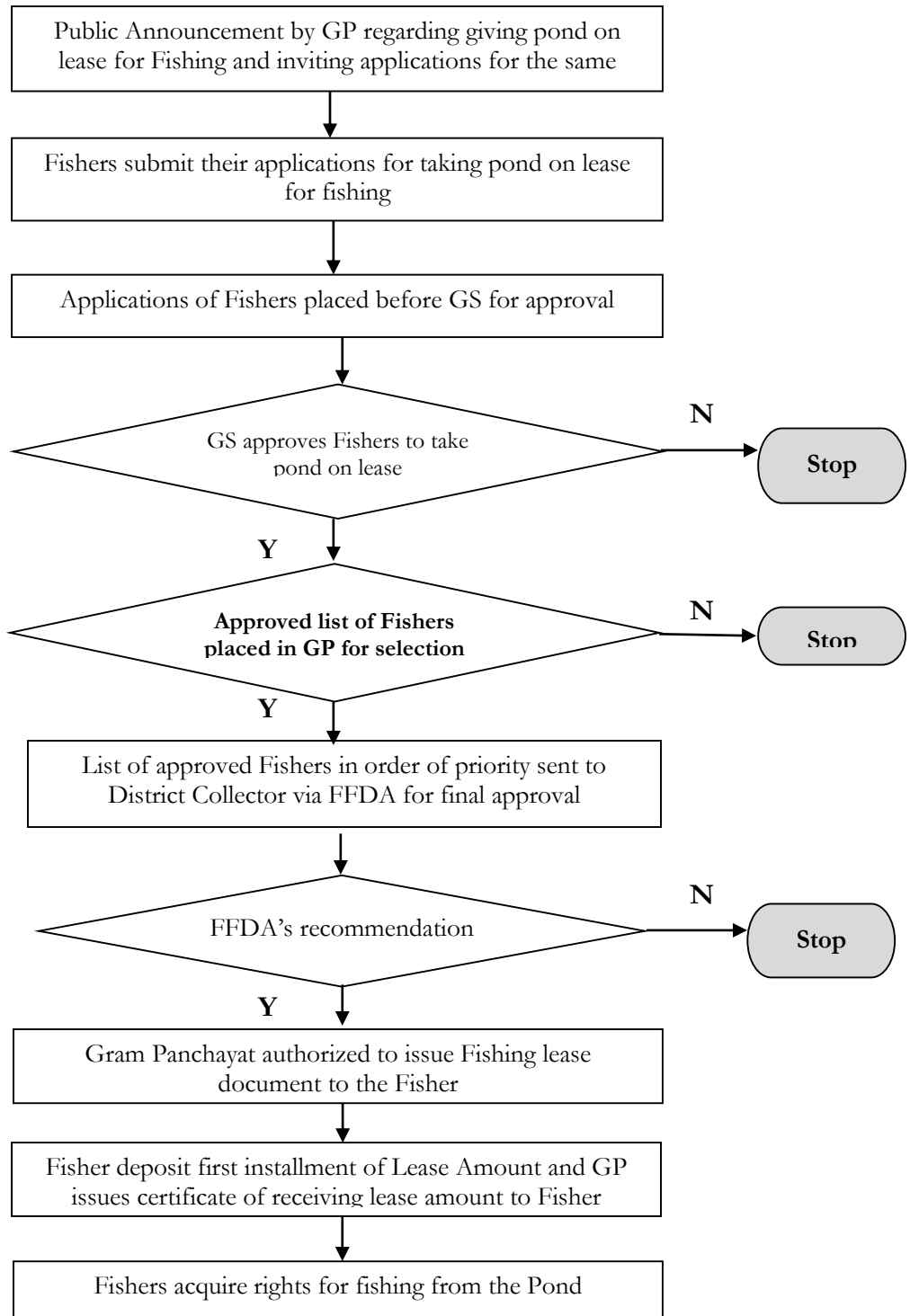
- B. **Implementing Entity certification** *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (National Action Plan on Climate Change) and subject to the approval by the Adaptation Fund Board, <u>commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund</u> and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
 (Dr. R. M. Kummur) Chief General Manager NABARD, Head Office, Mumbai (Implementing Entity Co-ordinator)	
Date: September,01, 2014	Tel. and email: +91 22 2653 0083, +91 7738175446 <a href="mailto:rm.kummur@nabard.org">rm.kummur@nabard.org</a>
Project Contact Person: Dr. P. Radhakrishnan, General Manager, NABARD, Head Office, Mumbai	
Tel. and Email: +91 22 2653 9384, +91 9167499397 <a href="mailto:p.radhakrishnan@nabard.org">p.radhakrishnan@nabard.org</a> , <a href="mailto:climate.change@nabard.org">climate.change@nabard.org</a>	

## ANNEXURES

<b>Annexure Details</b>		<b>Page No.</b>
<b>Annexure 1</b>	<b>Process Leasing of Pond by Fisher from Gram Panchayat</b>	<b>124</b>
<b>Annexure 2</b>	<b>Policy Guidelines and Subsequent Orders of the Government of Madhya Pradesh applicable for Fish Culture on Ponds less than 10 hectares</b>	<b>125-126</b>
<b>Annexure 3</b>	<b>Mapping Legal Provisions that are applicable for Fish Culture in Madhya Pradesh</b>	<b>127-129</b>
<b>Annexure 4</b>	<b>Stakeholder Analysis</b>	<b>130-148</b>
<b>Annexure 5</b>	<b>Technical Plan</b>	<b>149-158</b>
<b>Annexure 6</b>	<b>Business Development and Market Analysis</b>	<b>159-193</b>
<b>Annexure 7</b>	<b>Capacity Building Strategy</b>	<b>194-198</b>
<b>Annexure 8</b>	<b>Human Resource Plan</b>	<b>199-205</b>
<b>Annexure 9</b>	<b>Financial Service Plan</b>	<b>206-210</b>
<b>Annexure 10</b>	<b>Pond Design</b>	<b>211-212</b>
<b>Annexure 11</b>	<b>Representative Case Studies from Project Area</b>	<b>213-224</b>

**Annexure 1: Process Leasing of Pond by Fisher from Gram Panchayat**



GS= Gram Sabha; GP= Gram Panchayat; FFDA= Fish Farmers' Development Agency

## Annexure 2 Policy Guidelines and Subsequent Orders of the Government of Madhya Pradesh applicable for Fish Culture on Ponds less than 10 hectares

### 1. Management of Water Bodies

- 1.1 The right for management of water bodies in the state for the purpose of giving rights for fisheries has been determined on the basis of average water area of the water body as follows:

Average Water Area (ha)	Institution Responsible to give Fishing rights
less than 10	Gram Panchayat
between 10 to 100	Janpad Panchayat
between 100 to 1000	Zila Panchayat
between 1000 to 2000	Department of Fisheries/ Madhya Pradesh Fisheries Federation
more than 2000	Madhya Pradesh Fisheries Federation

- 1.2 Panchayats will have the right to allocate ponds and water bodies that fall within its purview for the purpose of Fishing, though the Department of Fisheries, Government of Madhya Pradesh, has the right to over the process of allocating leasing rights and in other technical processes.

### 2. Lease for Fisheries

#### 2.1 Priority in Giving Lease

The order of priority for giving lease by Gram Panchayat will be as follows:

Size of Pond	Order of Priority
Up to 1 ha	<b>Individual Beneficiary</b> Traditional Fisher/ Scheduled Tribe/ Scheduled Caste/ Other Backward Classes/ Below Poverty Line
1 to 5 ha	<i>First Preference:</i> <b>Registered Fisher Cooperative/Self Help Group/ Group constituted for the purpose of Fisheries</b> (recognized as such by District Officer of the Department of Fisheries). The order of priority within this will be as follows: Cooperatives or Groups belong to Traditional Fisher/ Scheduled Tribe/ Scheduled Caste/ Other Backward Classes/ Self Help Group (non reserved category)  <i>Second Preference:</i>

	<p><b>Individual Beneficiary</b> The order of priority in case if individual beneficiary will be as follows: Traditional Fisher/ Scheduled Tribe/ Scheduled Caste/ Other Backward Classes/ Below Poverty Line</p>
5 to 10 ha	<p><b>Registered Fishers Cooperative</b> The order of priority for the Fishers cooperative will be as follows: Traditional Fisher/ Scheduled Tribe/ Scheduled Caste/ Other Backward Classes/ Below Poverty Line</p>

## 2.2 Period of Lease

Gram Panchayat will give pond/ water body on lease for a period not less than 10 years for the purpose of fish culture.

## 2.3 Lease Amount

The Lease document will be exempted from Stamp Duty. The lease amount will be decided as follows:

Size of Pond	Type of Pond	Lease Amount
0 to 10 ha	Seasonal	Rs 300 per ha
0 to 10 ha	Perennial	Rs 500 per ha
<b>Note:</b> Seasonal Ponds have been defined as ponds that have water till February only.		

## 2.4 Conditions under which Lease will be suspended

The Policy and the model Lease Document issued by the Department of Fisheries stipulate that if the leaseholder sub lets the pond for fishing to another person or group the lease given to the original allottee can be suspended and cancelled.

## 2.4 Responsibility of Gram Panchayat after Lease

Gram Panchayat has the following responsibilities:

- Leaseholders will be informed beforehand if the water needs to be drawn from the pond
- Leaseholder will be exempted to pay the lease amount if they incur any loss on account of withdrawal of water from the pond
- Take measure to prevent illegal withdrawal of water from the pond

Ref:

1. Policy for Fisheries in Madhya Pradesh, October 2008
2. Order of the Department of Fisheries dated 8 October 2008 number 1548/2008/36

### Annexure 3 Mapping Legal Provisions that are applicable for Fish Culture in Madhya Pradesh

Name of the Act	Purpose of the Act	Provisions of the Act that affect Fishers/ Fisheries		
		Regulatory Provisions	Prohibitive Provisions	Enabling Provisions
<b>Madhya Pradesh Fisheries Act, 1948</b> including the Madhya Pradesh Fisheries (Amendment) Act, 1981	for the protection, conservation and development of Fisheries in MP	<ul style="list-style-type: none"> <li>erection and use of fixed engine</li> <li>construction of weirs, dams and bunds</li> <li>dimension, size of mesh, kind of nets, and mode of using them</li> <li>method of catching fish</li> <li>grant of license for fishing</li> <li>season during which killing, catching and sale of fishing</li> <li>size/ weight below which no fish will be sold</li> </ul>	<ul style="list-style-type: none"> <li>use of explosives, gun, bow, arrow, chemical or any other substance to cause water pollution or harmful for fish for catching/ destroying fish</li> </ul>	
Madhya Pradesh Riverine Fisheries Rules 1972	rules to regulate fishing in rivers and rivulets under the MP Fisheries Act 1948	<ul style="list-style-type: none"> <li>fishing in specified waters</li> <li>periods during which fishing will be suspended</li> <li>creation and use of fixed engines</li> <li>construction of weirs, dams and bunds on specified waters</li> </ul>	<ul style="list-style-type: none"> <li>licensee cannot employ another person unless he is using the drag net</li> <li>catch of fish species below 30 cms prohibited</li> </ul>	<ul style="list-style-type: none"> <li>priority in giving license to societies and federations</li> <li>types of nets and hooks/ lines that can be used by fish hunters</li> </ul>
Madhya Pradesh Fishermen Cooperative Societies (Loans and Subsidies) Rules, 1972	Act to organize, develop and enable cooperative societies for ensuring socio economic development with particular emphasis on			<ul style="list-style-type: none"> <li>Fishermen's Cooperative societies can raise loans and receive subsidies for purchase of fishing apparatus, preparing boat and conveyance for</li> </ul>

Name of the Act	Purpose of the Act	Provisions of the Act that affect Fishers/ Fisheries		
		Regulatory Provisions	Prohibitive Provisions	Enabling Provisions
	members of weaker sections of the society.			transportation of fish, purchase and stocking of fish seed, repairs of ponds and tanks, payment of lease money of ponds and tanks, expenditure on management
<b>Madhya Pradesh Panchayat Raj and Gram Swaraj Act, 1993</b> and Madhya Pradesh Panchayat (Transfer of Immovable Property) Rules 1994	act to effectively involve Panchayats in local administration and development activities			<ul style="list-style-type: none"> <li>• Fisheries has been listed as one of the subjects where Panchayat institutions can prepare plans, implement schemes for economic development and social justice in Schedule XI of the Constitution of India and in Schedule IV of the MP act for Panchayats</li> <li>• Panchayats empowered to lease immovable property that falls within its jurisdiction for a period of 3 years</li> <li>• Ponds and water bodies less than 10 hac transferred in to the jurisdiction of GPs</li> <li>• Rules lay down the process of leasing out immovable property of GPs</li> <li>• Gram Sabhas have the powers and function to lease out minor water bodies situated within its territorial jurisdiction</li> </ul>

Name of the Act	Purpose of the Act	Provisions of the Act that affect Fishers/ Fisheries		
		Regulatory Provisions	Prohibitive Provisions	Enabling Provisions
<b>Panchayat Extension Schedule Area Act, 1996</b> (Jhabua and Alirajpur are wholly and Dhar is partially schedule V district)	act to extend constitutional provisions related to Panchayats to scheduled areas in the country			<ul style="list-style-type: none"> <li>• Planning and management of minor water bodies entrusted to Panchayats in schedule areas</li> <li>• Gram Sabhas empowered to identify beneficiaries of any schemes and approve all plans for social and economic development before they are taken up for implementation by Gram Panchayat</li> </ul>
<b>The Biological Diversity Act, 2002</b> and Madhya Pradesh Biodiversity Rules 2004	act to conserve biological diversity and sustainable use of its components			<ul style="list-style-type: none"> <li>• Commercial utilization of biological resource exempts conventional breeding and traditional practices</li> <li>• Biological diversity dependent livelihoods can be integrated in to all sectors of planning and management and at levels of planning from local to state to enable all levels to contribute effectively for conservation and sustainable use</li> </ul>

## Annexure 4 Stakeholder Analysis

### 1. Community, Target Group and Institutions of Local Governance

Profile of the stakeholder	Stage of value chain where the stakeholder will be affected	Description on how are the stakeholder affected by the project	Possible actions to address stakeholder's interests
<b>Village Community</b> Village Community includes households of the village that have equal right over use of pond.	(a) Lease and access to Pond on community land	If the village pond is given on lease to the fishers without the consent of the village community it gives rise to serious disputes that does not allow the fisher to extract fish from the pond. Village residents use the pond for various purposes- drinking water for the animals, irrigation of agriculture fields, bathing, cleaning vehicles and bathing of animals, catching fish etc  The village community is <b>neutral</b> towards the project unless they are fully informed of the process that has to be transparent and one that provides opportunity to all the interested persons of the village.	<b>Action:</b> <i>Extensive Community consultation before finalizing the site and the fisher for the project.</i>
	(b) Production	The fishers face issue of poaching of the fishes from the pond. The poaching is often done by members of the village community living in and around the pond. These households may be <b>positive</b> towards the fact that the fishers are undertaking fish culture which implies increase in availability of fish but may be <b>negative</b> towards the fisher if there access to the pond is restricted.	<b>Action:</b> <i>Fishers adopt the strategy of co-opting the households living around the pond as members of the fisher group. This leads to building their direct stakes in to the pond and reduces the incidence of poaching.</i>
<b>Fisher</b> Fisher(s) who are residents of the village and are themselves	(a) Lease and access to Pond on community land	This group of fishers will be the direct beneficiaries of the project and the project will target its intervention to this group of fishers. The fishers will <b>support</b> the project activities as they tend to directly gain from the project.	<b>Action:</b> <i>Project will identify fisher(s) who are working/ interested to work themselves to undertake fish culture.</i>

Profile of the stakeholder	Stage of value chain where the stakeholder will be affected	Description on how are the stakeholder affected by the project	Possible actions to address stakeholder's interests
engaged as individual or as group, in undertaking the process of fish culture themselves.	(b) Pond Maintenance	Fishers with leasing rights undertake minor cleaning of the pond that does not entail any cash expenditure. The Fishers will <b>support</b> maintenance of the pond.	<b>Action:</b> <i>Inform and train the fishers in the processes related to pond maintenance and how they can apply to Gram Panchayat for maintenance of the pond.</i>
	(c) Fish Feed	Fisher collects feed from within the household waste and from the households with cattle. Fishers will <b>support</b> this activity as it will led to gaining of weight by the fish and it getting ready for the market at an early date.	<b>Action:</b> <i>train fishers on preparing fish feed from household and animal waste.</i>
	(d) Production	Fishers have to develop the mechanism for the protection of the pond from poaching and other interference (e.g. drawing of water for irrigation). The protection can be undertaken by employing labour or by strategically forming the fishers group in such a way that the members of the group take it upon themselves to protect the pond from poaching.	<b>Action:</b> <i>Fisher to form their group strategically so that they are able share the task of protecting the pond without un due loss of fish on account of poaching.</i>
	(e) Harvesting	Fishers or their group is involved in harvesting of fish. This is done by employing labour as well that is paid a negotiated wage rate.  The alternative method is to strike deal with other fishers and the fishers with leasing rights are paid on the quantity of catch for each harvest.	<b>Action:</b> <i>Fishers will be encouraged to use their managerial skills and employ labour to harvest the fish themselves as a group. Training and handholding support will be provided to them to be able to sharpen their skills and enhance their managerial capacity further.</i>

Profile of the stakeholder	Stage of value chain where the stakeholder will be affected	Description on how are the stakeholder affected by the project	Possible actions to address stakeholder's interests
	(f) Marketing and Sale	<p>Fishers sell their catch in the local market on fixed days and to the fish stalls that operate on all days of the week. Fishers do not have storage facility hence their quantity harvested is dependent on their estimate of the catch that they can sell on the market day.</p> <p>Fishers tend to sell the whole fish, instead of cutting it and selling it by weight. This tends to reduce their negotiating space for getting a better price of their catch. On the other hand this is compensated by the fact that they sell their fish as 'fresh' that gets them a higher price.</p>	<b>Action:</b> <i>Increased access to storage facility and training the fishers to enter in to trade agreement with regular fish sellers so that they are able to optimize their price throughout the year.</i>
<p><b>Absentee Fishers</b> Fisher(s) who have the lease in their name but actual fish culture is undertaken by contractor who in most cases is a non-tribal private businessman, who pays money to the tribal lease holder in return of using his name to secure the lease. The private operator employs his own labour for</p>	(a) Lease and access to Pond on community land	The Fisher and the contractor will <b>oppose</b> the project or try to subvert the project processes to corner benefit for themselves.	<b>Action:</b> <i>Project will <b>not</b> work with such absentee fisher(s) and contractors.</i>

Profile of the stakeholder	Stage of value chain where the stakeholder will be affected	Description on how are the stakeholder affected by the project	Possible actions to address stakeholder's interests
harvesting fish and is the sole beneficiary of the profit.			
<p><b>Traditional Fisher</b></p> <p>Traditional fishers are located in market places and in townships. They engage in fishing trade for which they buy fish from whole sellers and other small fishers. The traditional fishers often have a greater variety of fish species and than the fisher who sells limited variety of fish species.</p>	(a) Marketing and Sale	<p>Traditional fishers sell their fish by weight. They have storage facility that allows them to keep their fish chilled and protects them from undertaking distress sale. Traditional fisher is the first person to put up his shop in the market and last person to wind up his shop. Some of the traditional fishers move from <i>baat</i> to <i>haat</i> (local markets) and sell their fish.</p> <p>Traditional fishers keep a keen eye on the fishers from the village and offer to buy the stock of the latter's fish so that they are able to retain their competitive edge in the market.</p>	<p><b>Action:</b> <i>Explore the possibility of developing trade linkages between fishers from the villages and the traditional fishers in the market so that both are able to optimize the price of fish and do not compete with each other in the market.</i></p>
<b>Labour</b>	(a) Production	<p>Labour is required to protect the pond especially in the pre harvest period as the danger of poaching is high. The pond needs to be protected 24x7. Mostly the group members take turns for protection but depending in the location and size of the pond the need to employ labour is also felt. The labour is employed as</p>	<p><b>Action:</b> <i>the composition of the fisher group be such that persons residing near the pond are made members of the group so that the need to employ labour is minimized along with the cost incurred for protection.</i></p>

Profile of the stakeholder	Stage of value chain where the stakeholder will be affected	Description on how are the stakeholder affected by the project	Possible actions to address stakeholder's interests
		casual labour and is paid on a daily basis on a negotiated rate between the fisher and the labour.	
	(b) Harvesting	There is two type of labour available for harvesting of fish: <b>one</b> is the labour available from the village that works as casual labour, and the <b>second</b> , is labour provided by traditional fishers that are nomadic in nature and work in a group. The former works on a daily basis and the latter mostly work on the quantity of catch.	<b>Action:</b> <i>the fishers will be trained in responsible fishing and based on their assessment they will be handheld to employ labour for harvesting.</i>
<b>Gram Sabha</b> Gram Sabha is the formal body that approves the proposal of fishers to take pond on lease for fishing.	Lease and access to Pond on community land	The proposal is placed before the Gram Sabha and they accord their approval after which it is sent to Gram Panchayat for further action. Unless the access to pond is disputed the Gram Sabha will <b>support</b> the process of selection of the fisher for leasing rights.	<b>Action:</b> <i>Proposal for taking pond on lease is placed before the Gram Sabha for approval. In case Gram Sabha disapproves the village will not be selected.</i>
<b>Gram Panchayat</b> Gram Panchayat is a body of elected representatives that operate within the framework of	Lease and access to Pond on community land	The proposal for leasing the pond once approved by the Gram Sabha is placed before the Gram Panchayat for endorsement and sending it to the Fisheries department for finalization and sanctioning of the lease. Gram Panchayat will <b>support</b> leasing of the pond as it increases the income of the Panchayat and helping one of the residents of the village makes sound political sense for the selected representative.	<b>Action:</b> <i>Approved list of fishers from the Gram Sabha will be placed before the Gram Panchayat for finalization and onward transmission to the district.</i>

Profile of the stakeholder	Stage of value chain where the stakeholder will be affected	Description on how are the stakeholder affected by the project	Possible actions to address stakeholder's interests
state act on Panchayati Raj	(a) Pond Maintenance	Gram Panchayat has the mandate to undertake maintenance of the pond so that there are no losses to the fishers that have been granted leasing rights over the pond. The Gram Panchayat will be <b>neutral</b> towards pond maintenance as it does not gain any benefit from it.	<b>Action:</b> <i>Training of Panchayat representatives and supporting them in development of maintenance plan and preparation of estimate for the pond maintenance and handholding them to access resources for the maintenance.</i>
<b>Self Help Group(Fishers)</b> Self Help Group of fishers can provide credit for purchase of fish seed, fish feed and/or for fishing tools and equipment.	Credit during input stage	SHG will <b>support</b> the project as it will enable them to employ their savings and enhance their return from such investments. Moreover the investment also allows them to access credit facility from banks and other sources of finance.	<b>Action:</b> <i>the fishers group will be trained to function as saving and credit group so as to increase their bankability and also to develop and strengthen their financial sustainability plan.</i>
<b>Fisher Cooperative Society</b> Fisher cooperative societies are promoted by government and are a legal necessity if the fisher group aims at leasing larger ponds. Also the benefit of government programme to such societies is preferred option	Credit at input stage	Fisher Cooperative Society can access credit from government and banks. The Society can also link its members to subsidies other than that related to fisheries, e.g. housing, education scholarships for their children etc	<b>Action:</b> <i>Fisher group will be informed about the advantages and constraints of working as a cooperative society. The groups opting for the cooperative will be trained in the provisions of the act and handheld to enhance their managerial capacity of managing the cooperative.</i>

Profile of the stakeholder	Stage of value chain where the stakeholder will be affected	Description on how are the stakeholder affected by the project	Possible actions to address stakeholder's interests
for the department.			

**2. Institutional Stakeholders**

Aim and Objectives of the Institution	Programmes and Schemes for Fishers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
<b>Department of Fisheries</b>			
<p><b>Aim:</b> Fisheries development and conservation in the state</p> <p><b>Allocated Work:</b></p> <ul style="list-style-type: none"> <li>• development of water bodies and rivers for fisheries</li> <li>• establishment and of regional centers for production and distribution of fish seeds</li> <li>• protection, promotion and development of fish culture and methods of fish harvesting methods</li> <li>• development and strengthening of Fish Cooperatives</li> <li>• implementation of welfare schemes for fishers</li> <li>• development of fish market and legislation relate o fisheries</li> <li>• conservation and protection of other water creature</li> </ul>	<ul style="list-style-type: none"> <li>• Promotion of Fisheries through under Tribal sub plan and Special component plan for scheduled caste</li> <li>• Production of fish seeds on water bodies allocated to the department</li> <li>• Promotion of Fisheries on Irrigation ponds/ reservoirs av size 200 hac</li> <li>• Training of Fishers including study tours</li> <li>• Subsidy to Fishers Cooperative</li> <li>• Establishment of Aquarium and conducting research of fisheries</li> <li>• Implementation of Fishers Credit Card Scheme</li> <li>• Fishermen welfare scheme (personal accident insurance; model village development plan; and savings cum relief plan)</li> </ul>	<p><b>State:</b></p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">Principal Secretary</div> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; text-align: center; width: 45%;">Director</div> <div style="border: 1px solid black; padding: 5px; text-align: center; width: 45%;">Managing Director</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <div style="border: 1px solid black; padding: 5px; text-align: center; width: 45%;"> <ul style="list-style-type: none"> <li>• Training</li> <li>• Planning &amp; Budgeting</li> <li>• Fisheries</li> <li>• Co-operatives</li> <li>• FFDA</li> </ul> </div> <div style="border: 1px solid black; padding: 5px; text-align: center; width: 45%;"> <ul style="list-style-type: none"> <li>• Regional Manager</li> <li>• Engineer</li> </ul> </div> </div> <p><b>Division (6)</b>      <b>Regional (7)</b></p> <div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 5px; text-align: center; width: 45%;">Joint/Deputy Director</div> <div style="border: 1px solid black; padding: 5px; text-align: center; width: 45%;">Regional Manager</div> </div> <p><b>District (48)</b></p> <div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 5px;">Deputy/Assistant Director</div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <ul style="list-style-type: none"> <li>• Astt Fisheries Officer</li> <li>• Fisheries Inspector</li> </ul> </div>	<p>DoF has high degree of power to influence the implementation of the project. The department has the mandate to contribute in making of policy of Fisheries in the state as well as it has its own implementation mechanism that has been entrusted with regulatory powers under the MP Fisheries Act 1948.</p> <p>DoF is interested in defining a mechanism for promoting small pond fisheries as it has been identified as a potential to generate high level of income and provide alternative employment opportunities in rural areas, especially in the context of MGNREGS defining small pond fisheries as one of its key areas of intervention. The issue of climate change and fisheries has been identified by the department and has been included in the SPACC. With mutuality of objectives DoF will have a positive attitude</p>

Aim and Objectives of the Institution	Programmes and Schemes for Fishers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
			and support the implementation of the project.
<p><b>Recommended strategy</b></p> <p>The project should engage with the department both at the state level and the district level. At the state level the department can provide technical inputs to provide direction to the project and the project can contribute in identifying and sharing experiences related to policy imperatives for the department. The Director Fisheries should be made member of the project Steering Group.</p> <p>At the district level the involvement of the department will enable the project to smoothen operational issues related to getting of lease for the fisher(s), technical inputs related to fish seeds, equipment and in formation of fisher groups or cooperatives. The Deputy/Assistant Fisheries Officer of the districts where the project is located should be made members of the District Support Group of the project.</p>			
<p><b>Madhya Pradesh Fish Federation</b></p>			
<p><b>Aim:</b> Function as an apex body of Fish Cooperatives in the state</p> <p><b>Objectives</b></p>	<ul style="list-style-type: none"> <li>• Linking primary fish cooperatives with the federation</li> <li>• Fisheries, production of fish seed, marketing and sale of fish, distribution of wages to labour, linking fishers to welfare schemes,</li> <li>• Regulates use of nets so that fish that are in small in size are not caught and productivity of the reservoir is maintained</li> </ul>	<p><b>State</b> The Federation is headed by Managing Director at the state level. The office is supported by Executive Engineer and Regional Manager to carry out the activities of the Federation in the state.</p> <p><b>Regional</b> The Federation has divided the state in to six regions. Each of the regions is headed by a Regional Manager who are placed at reservoirs of large dams respectively.</p>	<p>MP Fish Federation focuses only on large reservoirs. It is not interested in fisheries in small ponds. The Federation will have a neutral to positive attitude towards the project.</p>
<p><b>Recommended Strategy</b></p> <p>Project should engage with the Federation at the state level only. The strategic advantage of engaging with the Federation is that they are the potential customer for fish seeds for their reservoirs and are also present in the value chain for sale of fish from the reservoirs. As member of the Steering Group at the state level the project will have the opportunity to assess the potential of engaging with the Federation activities. Secondly, Federation is an important player in contributing for the development of policy on Fisheries in the state. Influencing the Federation based on the experience of the project will enable the project to gather support of critical stakeholder for policy development in the state.</p>			
<p><b>Department of Farmer Welfare and Agriculture Development</b></p>			
<p><b>Aim:</b></p>	<ul style="list-style-type: none"> <li>• National Watershed Area Development scheme for treating</li> </ul>	<p><b>State</b></p>	<p>The Department of FWAD does not have stakes in the</p>

Aim and Objectives of the Institution	Programmes and Schemes for Fishers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
<p>Increase in agriculture production and productivity, land and water management, promotion of small irrigation schemes, promotion of innovative agriculture technology</p>	<p>of watershed area for soil erosion and for soil and water conservation</p> <ul style="list-style-type: none"> <li>• RADP Land conservation programme for construction of small ponds, contour trenching, and revival of old ponds</li> <li>• Construction of minor irrigation ponds and percolation ponds up to 40 hac</li> <li>• Climate based insurance scheme</li> </ul>	<p>Directorate of FWAD headed by Director with support of Subject Matter Specialists</p> <p><b>Division</b> Headed by Joint Director</p> <p><b>District</b> Headed by Deputy Director and support of subject matter specialist</p> <p><b>Block</b> Senior Agriculture Development Extension Officer support from ADO</p>	<p>proposed project. It does not have control over the ponds constructed under schemes of the department as they are handed over to the concerned Panchayat. There are two areas where the department and proposed project's interest overlap:: one, is the watershed treatment in the catchment area of the proposed pond and second, in the manner in which the climate based insurance schemes perform for the farmers.</p>
<p><b>Recommended Strategy</b></p> <p>At the state level the project can share its experience related to climate based insurance scheme with the department. The possibility of learning from each other's experience will benefit the project in making recommendations to the insurance agencies for their product development. The Director Agriculture should be an Special Invitee member to the project's Steering Committee for meetings that have the agenda related to climate based insurance.</p> <p>At the district and block level the project should engage with the Deputy Director and SADO before finalization of sites for ponds to find out the exiting programmes for watershed development so that their catchment treatment plans can be dovetailed with the proposed project's activities.</p>			
<p><b>Department of Panchayat and Rural Development</b></p>			
<p><b>Aim</b> Implementation of schemes and programmes for rural development through active involvement of Panchayat institutions</p> <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>• implementation of programmes and</li> </ul>	<ul style="list-style-type: none"> <li>• area and infrastructure development schemes and programmes including watershed development, housing and rural roads</li> <li>• Self employment programmes and schemes livelihood development programmes</li> <li>• wage employment programmes and schemes including MGNREGS</li> </ul>	<p><b>State</b> Development Commissioner heads the department</p> <p><b>Division</b> Deputy Commissioner Development</p> <p><b>District</b> Zila Panchayat Chief Executive Officer heads the district unit o the department</p> <p><b>Block</b></p>	<p>Department of Rural Development is directly interested in the project o three counts: one, small pond fisheries is one of the potential activities that it seeks to promote in the state; second, under MGNREGS small pond fisheries has been identified as one of the sub schemes that can</p>

Aim and Objectives of the Institution	Programmes and Schemes for Fishers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
schemes for rural development <ul style="list-style-type: none"> <li>• identification of BPL families</li> </ul>	<ul style="list-style-type: none"> <li>• environmental sanitation and mid day meals programmes</li> </ul>	Janpad Chief Executive Officer heads the block unit of the department <b>Gram Panchayat</b> Panchayat Secretary is the nodal person for the implementation of schemes of the department of rural development	be promoted as sustainable livelihood activity; and third, the adaptation strategy for fisheries will enable it to make changes in the operational guidelines off the sub scheme and explore similar processes for other climate dependent livelihoods.
<p><b>Recommended Strategy</b></p> <p>The project should actively engage with Department of Rural Development as it will find support from the department in its implementation. The technical changes that are undertaken by the project can be used to make recommendations for similar changes in the guidelines for the implementation of the schemes of the department. The department should be represented as a permanent member in the Steering Committee at the state level.</p> <p>At the district level the CEO of the district and the block where the project is being implemented should be members of the District Support Group as it will ensure that there is no duplication in implementation in the villages where the project is being implemented.</p>			
<p><b>Directorate of Panchayat</b></p>			
<p><b>Aim</b> implementation of Panchayat Act in the state</p> <p><b>Objective</b></p> <ul style="list-style-type: none"> <li>• elections of Panchayat representatives</li> <li>• training of Panchayat representatives</li> <li>• development of rules and recommendation for Finance Commission for devolution of funds to Panchayats</li> </ul>	<ul style="list-style-type: none"> <li>• implementation of rules that enable the fisher to get lease from Gram Panchayat</li> </ul>	<p><b>State</b> Secretary Panchayat Commissioner Panchayat</p> <p><b>District</b> Zila Panchayat Chief Executive Officer</p> <p><b>Block</b> Janpad Panchayat Chief Executive Officer</p> <p><b>Panchayat</b> Gram Panchayat Secretary</p>	Directorate of Panchayat does not have direct stakes in the implementation of the project. It however plays a critical role in ensuring that the fishers are able to secure their lease over the pond within the jurisdiction of the Gram Panchayat.

Aim and Objectives of the Institution	Programmes and Schemes for Fishers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
<p><b>Recommended Strategy</b> The project needs to engage with the DoP officials at the district and block level. The CEOs of the district and the block should be made the members of the District Support Group to facilitate project related processes within the block and the district.</p>			
<p><b>Department of Forest</b></p>			
<p><b>Aim</b> Protect and conserve forest resource through sustainable forest management</p> <p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li>• maintain and enhance forest productivity and biodiversity for ecosystem health</li> <li>• conserve soil and water resources for ecological and environmental stability</li> <li>• meet the requirements of forest produce particularly those dependent on forest</li> <li>• socio economic development of villages in and around forest areas</li> </ul>	<ul style="list-style-type: none"> <li>• small ponds less than 1 hac can be constructed on forest land on the recommendation of the Gram Sabha</li> <li>• department is implementing CDM and REDD+ projects in selected areas of the state for carbon sequestration</li> </ul>	<p><b>State</b> Headed by Principal Secretary and Principal Chief Conservator of Forest</p> <p><b>Circle (16)</b> Chief Conservator Forest</p> <p><b>Division (62)</b> Divisional Forest Officer heads the division in forest area.</p> <p><b>Range (473)</b> Ranger is in charge of a range.</p> <p><b>Beat (8286)</b> Each beat is headed by a Beat Guard</p>	<p>In case the pond for Fisheries is located or is proposed to be located on forest land it requires permission of the Forest Department for access and use.</p> <p>The use of pond on forest land will be guided by Forest Conservation Act and will have to be necessarily involve the Joint Forest Management Committee of the concerned village(s).</p> <p>Proposed project aims at construction of or working with ponds more than 1 hac in size that is not likely to gain support from the Department. The department draws its power from the Forest Conservation Act that empowers it to prohibit construction and use pond for fishing purposes. The department has used the provisions of the act for controlling or restricting access to pond for fishing purposes.</p>
<p><b>Recommended Strategy</b></p>			

Aim and Objectives of the Institution	Programmes and Schemes for Fishers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
Project should not work in Forest area. At the time of finalizing the site for the pond the project should find out whether the proposed site is in forest area. In case it is found to be in area belonging to the Forest department the site should be dropped and alternative site be identified.			
<b>Department of Revenue</b>			
<p><b>Aim</b> Implementation of land revenue code, maintenance of land records and collection of land revenue</p> <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>• land records and transfer of land use</li> <li>• record of rain and temperature</li> <li>• provision of disaster relief</li> <li>• land reforms</li> <li>• administration of nistar in villages</li> </ul>	<ul style="list-style-type: none"> <li>• No programmes for fisheries or fishers</li> </ul>	<p><b>State</b> Principal Secretary <b>Division (10)</b> Commissioner <b>District (51)</b> District Collector <b>Tehsil (272)</b> Tehsildar <b>Village (11622)</b> Patwari</p>	<p>The department does not have direct stakes in fisheries or fishers. Indirectly it is involved as it has endorse that the proposed site falls within the jurisdiction and control of Gram Panchayat.</p> <p>The administration of nistar is the responsibility of the department where the pond site will be or is proposed to be located.</p>
<p><b>Recommended Strategy</b> The department should be actively involved at the district level. The District Collector be made member of the District Support Group. As the administrative head of the district he should be made the Chairperson of the District Support Group as it will allow the project to seek cooperation and collaboration from other departments and gain easy access to other department officials.</p>			
<b>Department of Mineral Resources</b>			
<p><b>Aim:</b> survey, exploration and exploitation of all minerals and administration of Mines and Minerals</p>	<ul style="list-style-type: none"> <li>• No programmes for fishers or fisheries</li> </ul>	<p><b>State</b> Principal Secretary and Director, Directorate of Geology and Mining <b>Region (4)</b> Regional Officers for the region <b>District (48)</b></p>	<p>Mining department does not have direct stakes in fisheries. The department may get involved if the site of the pond is located in and around the mining area or belongs to an</p>

Aim and Objectives of the Institution	Programmes and Schemes for Fishers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
(Development and Regulation) Act <b>Objectives:</b> <ul style="list-style-type: none"> <li>• search and explorations of minerals in the state</li> <li>• increase revenue through production of minerals and scientific development</li> <li>• promotion of mineral based industries</li> </ul>		District Officers	area that is being explored for mining purposes.
<b>Recommended Strategy</b> The project should consult the District Officer of the department before finalizing the site to ensure that there are no possibilities of conflict with the department's activities.			
<b>Department of Cooperation</b>			
<b>Aim</b> Using cooperation as the mechanism for organizing the weaker sections to ensure their social and economic development <b>Objectives</b> <ul style="list-style-type: none"> <li>• provide guidance and technical support</li> <li>• assist backward sections and women to gain economic enhancement and social equality</li> </ul>	<ul style="list-style-type: none"> <li>• Registration of cooperative societies</li> <li>• Audit and inspection of the cooperative societies</li> <li>• Elections to cooperative societies</li> <li>• Enabling provisions for the fishers cooperatives to receive loans and subsidy</li> <li>• 3125 fisher cooperatives registered in the state with the department</li> </ul>	<b>State</b> Principal Secretary Commissioner Cooperative and Registrar Cooperative Societies <b>Division</b> Joint Commissioner and Registrar <b>District</b> Deputy/Assistant Commissioner	The department does not have direct stakes in the project. As such it is neutral to the project activities and benefits. The department however has the role in the formation of cooperative societies, if the project beneficiaries intend to do so.
<b>Recommended Strategy</b> The project needs to engage with the department at the district level in case any of the beneficiary (or beneficiary group) intends to form Fisher's Cooperative Society. A process of consultation with the department can take on a need basis.			
<b>Department of Water Resources</b>			

Aim and Objectives of the Institution	Programmes and Schemes for Fishers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
<p><b>Aim</b> Creation and maintenance of irrigation potential through construction of water resources projects</p> <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>• protect the rights of the state in sharing of water for inter state river basins</li> <li>• calamity management in the form of construction and maintenance of flood control works</li> <li>• maintenance and regulation of major, medium and minor irrigation projects</li> </ul>	<ul style="list-style-type: none"> <li>• Responsible for framing of State Water Policy</li> <li>• Catchment treatment plans of irrigation projects</li> </ul>	<p><b>State</b> Principal Secretary and Engineer-in-Chief</p> <p><b>Circle</b> Superintended Engineer</p> <p><b>Division (137)</b> Executive Engineer</p> <p><b>Sub Division (587)</b> Assistant Engineers</p>	<p>The involvement of the department is in terms of formulation of water policy for the state. As such the department does not have stakes in the process of implementation, benefits or the target beneficiary of the project.</p>
<p><b>Recommended Strategy</b> The project can engage with the department at the state level during its advocacy initiatives. The department can be an Special Invitee member to the Steering Group for meetings with specific agenda that have implications for state Water Policy.</p>			
<p><b>Environmental and Pollution Control Agency</b></p>			
<p>Established by Department of Housing and Environment as an autonomous unit</p> <p><b>Aim</b> Assist and advice the state government on environment related matters</p> <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>• situation analysis report on the state of</li> </ul>	<ul style="list-style-type: none"> <li>• State Knowledge Management Centre on Climate Change as EPCO has been designated as the state nodal agency for addressing climate change issues</li> <li>• Prepared State Action Plan on Climate Change</li> </ul>	<p><b>State Governing Council</b> Under the Ministry of Housing and Environment</p> <p><b>Director General</b> as the head of EPCO with <b>Executive Director</b> as full time executive head</p>	<p>EPCO is a primary stakeholder in the processes and outcomes of the project. The SKM on Climate Change is interested to know about the adaptation strategies and how it can be integrated in the implementation of SAPCC in the state.</p> <p>EPCO is an ardent supporter of the project and will support the project in identifying policy</p>

Aim and Objectives of the Institution	Programmes and Schemes for Fishers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
<p>environment along with relevant data base</p> <ul style="list-style-type: none"> <li>• study of specific environmental problems and exploring feasible solutions</li> <li>• environment research and coordination of environment related activities</li> </ul>			<p>level issues and also in creating opportunities of taking them forward in the state.</p>
<p><b>Recommended Strategy</b> Project should have regular and active engagement with EPCO. The agency should be made a permanent member of the Steering Group.</p>			
<p><b>Central Institute of Freshwater Aquaculture</b></p>			
<p><b>Aim</b> Development of sustainable and diversified freshwater aquaculture practices for enhanced productivity, quality, water use efficiency and farm income</p> <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>• conduct basic, strategic and applied research in freshwater aquaculture</li> <li>• enhance production efficiencies through biotechnological tools</li> <li>• study diversification of aquaculture practices</li> <li>• Training and consultancy services</li> </ul>	<ul style="list-style-type: none"> <li>• training of fishers</li> <li>• technology development and technological products for fishers</li> <li>• handholding and mentoring support to fishers</li> </ul>	<p><b>Bhubaneswar</b> Director</p>	<p>CIFA has direct stakes in the implementation of the project. So far they have not undertaken any study on the impact of climate change on fisheries and possible adaptation strategies. CIFA is an ardent supporter of the project and has the technical where withal to add value to project inputs and processes.</p> <p>CIFA can be a strategic partner in supporting the project in policy analysis and development and in bringing the experiences and learning from the project to an operational level in the government.</p>

Aim and Objectives of the Institution	Programmes and Schemes for Fishers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
<b>Recommended Strategies</b> Project should have active engagement with CIFA. The Institute should be made a permanent member of the Steering Committee at the state level.			
<b>National Fisheries Development Board</b>			
<b>Aim</b> Realize the untapped potential of fisheries sector in inland and marine capture, culture, processing and marketing of fish <b>Objectives</b> <ul style="list-style-type: none"> <li>• increasing fish production in the country</li> <li>• provide employment by extending assistance for implementation of activities under the fisheries sector</li> <li>• platform for public private partnership in fisheries</li> </ul>	<ul style="list-style-type: none"> <li>• Reservoirs for fisheries development</li> <li>• Intensive aquaculture in ponds and tanks</li> <li>• Hygienic development of wholesale and retail markets</li> <li>• Training of fishermen and fish farmers</li> </ul>	<b>Hyderabad</b> Chief Executive	NFDB has direct interest in the proposed project's processes and outcomes. There is a mutuality of objectives between the NFDBs objectives and the project. Impact of climate change on fisheries and development of adaptation strategies for freshwater aquaculture is an area of interest to the Board. The Board can contribute in providing technical inputs, capacity building measures, and linking target beneficiary with their schemes.
<b>Recommended Strategies</b> Project should actively engage with the Board. The NFDB should be made a permanent member of the Steering Committee at the state level.			

### 3. Commercial Enterprises

Profile of the stakeholder	Stage of value chain where the stakeholder will be affected	Description on how are the stakeholder affected by the project	Possible actions to address stakeholder's interests
<b>Commercial Banks</b> The commercial banks that also include the	Credit	Commercial banks are by and large <b>neutral</b> towards the project as they do not have the experience of providing funding for fishing on a small scale. Most funding from banks fall within the	<b>Action:</b> <i>engaging with commercial banks at the local level through the Lead Bank Manager of the district to make them</i>

Profile of the stakeholder	Stage of value chain where the stakeholder will be affected	Description on how are the stakeholder affected by the project	Possible actions to address stakeholder's interests
cooperative and regional rural banks.		subsidy for fishers and hence the bankers do not view fisheries as a profitable venture for their purpose.	<i>informed and aware of the bankability of small pond fisheries.</i>
<b>Government Fish Seed supplier</b> Government has its own hatchery and fish farm from which it supplies fish seed to the fishers and their groups	Fish seed	Fish seed supplier will <b>support</b> the project as it implies increased market for its fish seed.  The government hatchery declares the rate at which the seed will be supplied before the beginning of the season. The seed supplied includes for the fish species that has been approved for the district.	<b>Action:</b> <i>engage with the seed supplier on ensuring timely supply of the preferred species by the fishers.</i> <i>In case the project develops a new protocol for introduction of fish seed in terms of new species or difference in timing and quantity of fish as part of adaptation strategy the suppliers will have to be informed and even trained in the new protocol.</i>
<b>Private Fish Seed Supplier</b> Private fish seed suppliers exist in Dhar district.	Fish Seed	Fish seed supplier will <b>support</b> the project as it implies increased market for its fish seed.  Fishers have to negotiate the price of fish seed with the suppliers and have to place an advance order so as to receive the seeds on time.	<b>Action:</b> <i>engage with seed supplier to gain timely and quality seed of the preferred species by the fisher.</i> <i>In case the project develops a new protocol for introduction of fish seed in terms of new species or difference in timing and quantity of fish as part of adaptation strategy the suppliers will have to be informed and even trained in the new protocol.</i>
<b>Feed Supplier (Government)</b> Fish feed suppliers by government is subsidized and is available to fisher groups.	Fish Feed	Government fish feed supplier will <b>support</b> the project as it will imply increased market for its product.  Regular contact with the government fish feed supplier will enable the fisher to take advantage of the introduction of feed to their pond in time.	<b>Action:</b> <i>engage with the feed supplier to get quality feed for the fisher.</i>
<b>Supplier of Fish Net</b> Traditional fisher families and traders in large towns sell the fishing tools and equipment.	Fishing Tools and Equipment	Producers and suppliers of fish net will <b>support</b> the project as it implies increased demand for their product.	<b>Action:</b> <i>engage with net producers and suppliers in getting quality nets to the fishers.</i>

Profile of the stakeholder	Stage of value chain where the stakeholder will be affected	Description on how are the stakeholder affected by the project	Possible actions to address stakeholder's interests
<b>Boat supplier</b> Boat is supplied on order placed with the maker.	Fishing Tools and Equipment	Boat makers and repairers will find an increased demand for their product and hence will <b>support</b> the implementation of the project.	<b>Action:</b> <i>engage with boat makers and suppliers to get quality product for the fishers.</i>
<b>Fish Trader</b> Fish traders operate from nearby towns and they have their own supply chain that extends to outside the state.	Marketing and Sale	Fish Traders operate at a large scale. As such they are not likely to be threatened by the small scale fishers in local market. In fact these traders can provide a wider market for the fishers.	<b>Action:</b> Fishers to operate collectively and engage with Fish traders to be able to tap in to other markets.

#### 4. Civil Society Organisations

Profile of the stakeholder	Stage of value chain where the stakeholder will be affected	Description on how are the stakeholder affected by the project	Possible actions to address stakeholder's interests
<b>NGOs</b> Civil Society Organisations that are engaged in livelihood enhancement activities and on issues of climate change	All stages of value chain	NGOs in the project area are neutral to the fishers needs and have not looked in to the issue of climate change and fisheries at all. Their focus has been on migration and issues related to agriculture.	<b>Action:</b> <i>The project should engage with local NGOs so that they can be informed and sensitized on the issues related to fishers and fisheries. Workshops with the local ngos should be planned as part of upscaling strategy of the project.</i>
<b>Academic Institutions</b> This group includes institutions engaged in studies and research related activities in government or non government sector including Krishi Vigyan Kendras.	All stages of value chain	Academic institutions from the project districts have neither identified nor explored identified the issue of fishers, traditional fishermen or fisheries and climate change. Even at the state level there is no study that has been conducted on the state and status of fisheries and climate change in the state. The academic institutions are <b>neutral</b> towards the project.	<b>Action:</b> <i>presentations on the experiences and findings of the project should be shared with academic institutions so that they initiate a process of systematic inquiry on the issue.</i>
<b>Media</b> Media includes persons engaged in print and electronic media.	All stages of value chain	The media in the project district and at the state level is largely unaware of the issues related to fisheries and fishermen. The issue of climate change has been dealt largely at the level of climatic changes and only in case of extreme weather events.	<b>Action:</b> media visit to the project area and their interaction with the fishers can be facilitated by the project to increase media visibility in the issue of fisheries and fishermen in the region.

## Annexure 5 Technical Plan

### I. INTRODUCTION

#### 1.1 Context

Of the total 120 million people directly dependent on commercial capture fisheries globally, 97 per cent live in developing countries; 92 percent of them are involved in the small-scale fisheries sector. About 48% of people in the small-scale fisheries work in inland waters (lakes, rivers, wetlands), and 47 percent of them are women, mainly engaged in the post-harvest activities. In some cases, the unrecorded subsistence fish production is greater than the officially recorded production, particularly in inland waters and for dispersed coastal communities (FAO; 2009, World Bank; 2010)

India ranks second in the global inland fish production and contribute 4.8% of total global fish production and nearly 9.75% of total global inland fishery. The fisheries sector is a source of livelihood for over 14.49 million people engaged fully, partially or in subsidiary activities pertaining to the sector. Besides, an equal number are engaged in ancillary activities in fisheries and aquaculture. The sector contributes to about 1.04% of the Gross Domestic Product of the country amounting to Rs.356.5billion during 2007-08 (Govt. of India, 2008). The annual fish production in India goes to over 7.6 million ton during 2008-09, from around 0.75 Million Ton in year 1950-1951. The contribution of inland fishery sector to total fish production has increased from 0.218 MT (29%) during 1950-51 to 4.6 MT (56%) in 2008-09.

#### 1.2 Productivity Gap

The water spread area under ‘tanks and ponds’ of about 2.414 million ha (Govt. of India,2008) offer immense potential for increase in fish production, but uncertainty of production, irregular rainfall, denial of rights of production system, exploitation by contractors and money lenders brings difficulties (Allison, 2009).

**Table1 Productivity gap in different water bodies**

Water bodies	Present productivity (kg/ha/year)	Potential yield status with scientific management(kg/ha/year)
Small reservoirs	50-100	250-300
Floodplain wetlands	250	1500-2000
Tanks	300-500	2000-4000
Ponds	400-600	3000-5000

Source: Sub-Group-II Report anchored by CRIDA for the Agriculture production system (12 V year plan).

The gap between present and potential productivity is almost 5 to 7 times (Table 1). Such productivity gap existing over a potential water spread area of 1.23 million ha under small reservoirs across the country indicates the potential for fisheries in small water bodies, many of which are located in the rainfed areas. This potential still has to be explored.

### 1.3 Area Profile

The basic characteristics that affect conduct of fisheries in the three districts are as follows:

District	Avg. rainfall (mm)	Avg. Temp (°C)	Avg. fish production (kg/hac)	Fish seed availability	Ownership pattern	Extension system/ Centre
Dhar	900	Max- 45 Min- 12	200	<b>Private:</b> Sundrail, Dhar, Hoshagabad & Bhopal <b>Govt:</b> DoFisheries, Jhabua	Mostly common resources	Department of Fisheries
Jhabua	900	Max- 45 Min- 12	200	<b>Private:</b> Sundrail, Dhar, <b>Govt:</b> DoFisheries, Jhabua	Mostly common resources	Department of Fisheries
Alirajpur	900	Max- 45 Min- 12	200	<b>Private:</b> Sundrail, Dhar, <b>Govt:</b> DoFisheries, Jhabua	Mostly common resources	Department of Fisheries

### 1.4 Constraints in Small Pond Fisheries

The analysis identifies the following to be the major constraining factors for strengthening inland fisheries in small water bodies:

- Inter and intra year variability in filling / repeat filling of the small water bodies: while variability in intra-season filling increases risk, inter-year variability constrains continuous production/dependence on fisheries (as the activity cannot be taken up in some years)
- High intensity storms necessitating modification in the structural design of the tanks to secure fish and the water body.
- Low levels of development of tank/ reservoir bed area – infestation of weeds, improper landscaping imposes serious restrictions on harvesting.
- High mortality in fish seed due to uncontrolled conditions and predation necessitates rearing of fish seed to an advanced fingerling stage, this in turn requires an elaborate fish-nursery systems
- Inflow of water from surrounding catchments: while nutrient load in water may be beneficial, the farm-chemical pollution load threatens the fish culture
- The nutritional practices need to be optimized as there will be substantial in situ natural nutrition available

- Multiple uses / claims on the water bodies – competition between fish and agriculture production necessitate sound conflict management institutional systems
- Non availability of technical options for improved fish production and lack of extension support
- Need to maintain biological diversity of fish and a balance between natural species and cultured carps
- Ownership of the water bodies is in the nature of common property – increases transaction costs, particularly in protection. Unclear property/ usufruct rights deter flow of private investments in to fisheries
- Need for public investments in developing institutional capacities and fishery infrastructure as private investments are hard to come by in the common property regimes (Gucinski H.; Lackey RT, 1997)

## II. SCOPE OF TECHNICAL PLAN

### 2.1 Climate Variability and Impact of Fisheries

Improving fish production and productivity in the rain fed water bodies is however, a challenging task. Pronounced seasonality of water storage, high vulnerability to climate variability, higher risk, multiple uses of the water bodies, lack of infrastructure, limited fish seed production and supply system, lack of appropriate production technologies etc. are the major constraints in production system.

Changes in air and water temperatures, precipitation, salinity, nutrient levels, and other physical drivers affect fisheries through many pathways; both direct and indirect. Presently, infrequent rain fall is affecting maturity period of brood fish, early maturity of fish is also resulting in less time availability for breeding season and early absorption of eggs thereby resulting in lower fish seed production.

Higher temperature is resulting in evaporation losses which in turn reduce the time period available for growing of cultured and wild fish in ponds and tanks. The fish production system needs to be calibrated to the local time-trends in (repeat) filling of water bodies, changes in water spread area, changes in temperature, changes in nutrition etc.

The main climate change adaptation areas lie in evolving appropriate fish-nursery systems that make the best use of seasonality of water spread coupled with staggered harvesting. In a rainfed situation, this also needs to take into account dependable water sources over a cluster of water bodies as integral to systems.

It is difficult to estimate or predict the broader or aggregate effects of climate change at local and national level. To date, global and regional climate vulnerability assessments have focused on agricultural production; fisheries in rainfed areas have not yet been systematically evaluated.

Efforts are also required to reduce people's vulnerability to these impacts by identifying appropriate adaptation strategies; and to build local, national and regional capacity to implement adaptation and mitigation strategies for fisheries and aquaculture by informing policy processes. The vulnerability of fisheries and fishing communities depends on their exposure and sensitivity to change, but also on the ability of individuals or systems to anticipate and adapt.

Building adaptive capacity is a necessary response, both for situations where climate change may bring improved fishing opportunities and for those where detrimental impacts are foreseen.

### III. APPROACH AND TECHNOLOGICAL OPTIONS

#### 3.1 Approach

The project will adopt and adapt participatory technology development methods of action research wherein the community will be partners in the development of technological options and in related choices/ decision making.

The scope of technological options comprise of:

- Characterizing the natural resources base with respect to :
  - *Water bodies*: catchments, rainfall patterns, flow characteristics, water spread, dead storage, design of the water body – in particular sluice and spill ways etc. This will also look into patterns of changes over time.
  - *Water*: physical, chemical and biological properties of water including temperature, chemical loads, salinity, nutrient availability, floral and faunal characteristics etc.
  - *Fish Species*: local biological diversity in fish and their production traits, predator complex
  - *Institutional systems*: dependence of various communities and their primary and secondary stakes, institutional norms, social and cultural links, conflicts, nature of conflicts and their resolution etc.
- In view of the assessment made, evolve through action research - appropriate adaptation strategies, scientific management protocols and technical options,
- Develop appropriate extension protocols, convergent processes and administrative mechanisms for evolving local, regional and national capacity to implement adaptation and mitigation strategies for inland fisheries and to inform policy.
- Support and add value to existing system by providing low cost technology of fish seed production and fish culture, so that they become self sustainable in fish seed production and take part in growing table size fish to secure livelihood and ensure food and nutritional security.
- Support small-scale low-risk intervention that implies nursing fish seed, utilizing small seasonal water bodies for low-input aquaculture, fish netting teams, group-based aquaculture in perennial ponds (including women's groups, fishers groups, SHGs), and fish marketing to local *baats*.

### 3.2 Technological Options

- Integrated Agriculture Aquaculture (IAA) is a viable diversification strategy for implementing risk hedging mechanism for small and marginal farmers on whose land farm pond is located. IAA strategy will be piloted on lands of small and marginal farmers where ponds have been constructed from their own funds or any scheme of the government.

#### 3.2.2. Specific Climate Resilient Technological Options

##### (a) Physical Water Bodies

- Effective treatment of tank beds
- Deepening of tank beds/ increasing dead storage at specific location to enable easy harvesting
- Institutional capacities for management of water bodies (repairs and maintenance)
- Re-designing the sluice and spill ways in view of the potentially high storms due to climate change.
- Landscaping protocols for efficient fish production and accommodating various competing claims on water (washing, managing chemical pollutant loads, siltation etc.) and incorporating the requirements of *in situ* nurseries. Landscaping protocol is about management of water body for uses other than fisheries:
  - In small ponds of size less than 0.5 ha with clear ownership it is proposed to renovate them by making them rectangular with some dressing on bunds so that they can be used as rearing ponds.
  - In large ponds with areas more than 1 ha and where water is retained till November – December it is proposed that bunds will be redesigned or renovated in such a way that floriculture cultivation can be taken up and flowers will be sold during festive season when prices are higher.
  - In large ponds with areas more than 1 ha and where water is retained till March .It is proposed that bunds will be used for horticulture [custard apple, lemon, papaya] as well as for vegetable cultivation. In western MP ponds are situated far away from dwellings and seldom do any family member made a daily visit. Putting bunds for use in horticulture and vegetables makes fishers or their family members visit the pond site at least once a day.
  - De-silting of common ponds and deepening of ponds through MGNREGA as it will increase their water capacity and these will in turn add to demand of seeds.
  - Catchment area treatment ( if required )

##### (b) Fish Seed Production

- Testing advanced low cost fish-hatchery technologies developed by CIFA such as portable fiberglass reinforced (FRP) carp hatchery
- A system of advanced fingerling supply / stunted fish supply for realising production potential of seasonal water bodies.
- Options of cage nurseries for *in situ* nurseries

- Evolving optimal stocking and protocols for maintaining fish stock in tandem with available water levels
- Evolving and testing out viability of fish nurseries as business models serving a cluster of sites
- Developing a nursery network to support production adapted to local climatic conditions

**(c) Feed Management**

- Optimal combination of enhancing natural feed in the tanks and developing low cost feed with locally available materials. The environment around the proposed clusters is suited to the culture of Indian Major Carps and Common Carp in ponds rich in natural feeds, fuelled by the energy in sunlight and nutrients and supplementary feeds (agricultural by-products) supplied by farmers. These agriculture by products include Mahua oil cake, raw and compost cow dung, mustard oil cake, ground nut oil cake etc.

**(d) Harvesting**

- Evolving methods of **staggered harvesting** of low volume of fish that can be marketed in the local areas at higher prices by fish vendors. Staggered harvesting methods need to be fine tuned with stocking rates.

**(e) Oxygenation**

Artificial mechanized aerators require electricity the supply of which is erratic in rural MP; secondly ponds are situated far way so security is an issue; and thirdly, ponds are situated away from agriculture fields so getting a electricity connection itself a daunting task. The project alternatively proposes to go for the best management practices. It is proposed that farmers will be given training on package of practices so as not to increase load which will reduce chance of oxygen deficiency. Other than aeration, it is less costly to introduce concept of using oxygen tablets during cloudy days and summer time when mortality of fish occurs due to oxygen depletion.

**(e) Institutional**

- Establish rights and responsibilities on management and usufruct sharing both in excess and deficit rainfall seasons
- Establish institutional mechanisms for sharing of water among conflicting uses (irrigation and fisheries)
- Evolving convergence mechanisms among various programs and departments and of scientific establishments with such programs

## IV. IMPLEMENTATION PLAN

### 4.1 Activity Plan

The proposed activity plan is as follows:

**0 to 6 months**

<b>Activities</b>	<b>Milestones</b>	<b>Deliverables</b>	<b>Monitoring Indicators</b>
<ul style="list-style-type: none"> <li>• Evolving water bodies and fisheries characterization tools and methods &amp; field testing including mapping tools</li> <li>• Multi stakeholder inception workshop</li> <li>• Scouting for innovations from formal and informal sources and compilation</li> <li>• Selection of tanks for detailed intervention</li> </ul>	<ul style="list-style-type: none"> <li>• Formalising relation with CIFA</li> <li>• Development of field tested research methodology</li> <li>• Inception workshop</li> </ul>	<ul style="list-style-type: none"> <li>• Project inception report with details of field tested protocols for characterization of in land fisheries in small water bodies.</li> <li>• Proceedings of inception workshop</li> </ul>	<ul style="list-style-type: none"> <li>• No of site selected</li> <li>• No of village selected</li> <li>• Monthly progress report</li> <li>• Inception report</li> <li>• No of tanks selected</li> </ul>

**7 to 12 month**

<b>Activities</b>	<b>Milestones</b>	<b>Deliverables</b>	<b>Monitoring Indicators</b>
<ul style="list-style-type: none"> <li>• Developing location specific technical interventions through an interface of fisherfolk communities and researchers.</li> <li>• Setting up data generation systems including field measurements.</li> <li>• Community level situational analysis, orientation and capacity building programs- including exposure to best practices and innovative technologies.</li> </ul>	<ul style="list-style-type: none"> <li>• Completion of base characterization of fisheries</li> <li>• Detailed plan of action in selected water bodies covering institutional and technical aspects.</li> <li>• A draft technical manual incorporating appropriate practices for fisheries in rainfed water bodies duly synthesizing indigenous knowledge with scientific analysis.</li> </ul>	<ul style="list-style-type: none"> <li>• Baseline characterization report</li> <li>• Detailed participatory action plan for the selected water bodies including establishment of support systems like nurseries.</li> <li>• The selected water bodies set up in all respects to initiate action-research.</li> </ul>	<ul style="list-style-type: none"> <li>• Base line survey report</li> <li>• Training need analysis report</li> <li>• No of trainings conducted</li> <li>• One hatchery in each of the three districts established</li> </ul>

Activities	Milestones	Deliverables	Monitoring Indicators
<ul style="list-style-type: none"> <li>• Establishing fish-nursery systems linked to cluster of water bodies.</li> <li>• Setting up at least one pilot hatchery</li> <li>• Assessment of establishing low cost hatchery</li> </ul>			

**13 to 18 month**

Activities	Milestones	Deliverables	Monitoring Indicators
<ul style="list-style-type: none"> <li>• Piloting of suggested technical and management interventions as per the plan – i.e. implementation of action research.</li> <li>• Compilation, verification and analysis of data</li> <li>• Organising field days on action reflection learning sessions with the fisherfolk in the blocks.</li> <li>• Selection of site for hatchery and detailed survey for feasibility</li> </ul>	<ul style="list-style-type: none"> <li>• Completion of one cycle of implementation.</li> <li>• Locally accustomed Seed production and seed rearing practices are adopted by community</li> <li>• Mid-term Reflection workshop with scientists and community</li> <li>• Establishment of local fish-marketing networks</li> </ul>	<ul style="list-style-type: none"> <li>• Report on the analysis of first year's experiences with <ul style="list-style-type: none"> <li>○ lessons learnt and research gaps</li> <li>○ Modified research plan for 2<sup>nd</sup> implementation</li> </ul> </li> <li>• Report on analysis of experiences in pilot phase</li> <li>• Proceedings of the reflection workshop</li> </ul>	<ul style="list-style-type: none"> <li>• Visit to CIFA is completed</li> <li>• Community learning process is set up and functioning</li> <li>• Survey for establishing hatchery is completed</li> </ul>

**19 to 24 month**

Activities	Milestones	Deliverables	Monitoring Indicators
<ul style="list-style-type: none"> <li>• Participatory assessment (along with scientists and community learning forum) and synthesis of lessons learnt</li> <li>• Preparation of 'Technological and</li> </ul>	<ul style="list-style-type: none"> <li>• Finalized manual for fish farmers in rainfed area</li> <li>• Preparation of last season action-research implementation plan</li> </ul>	<ul style="list-style-type: none"> <li>• Report on 'Technological and Institutional Options' published</li> <li>• Draft impact assessment report</li> </ul>	<ul style="list-style-type: none"> <li>• Draft impact report is published</li> </ul>

Activities	Milestones	Deliverables	Monitoring Indicators
Institutional Options' manual for practitioners	• Draft Impact assessment report		

**25 to 30 month**

Activities	Milestones	Deliverables	Monitoring Indicators
<ul style="list-style-type: none"> <li>Refinement of research plan</li> <li>Strengthening community organization towards sustainability.</li> </ul>	<ul style="list-style-type: none"> <li>Analysis of collected data and sharing</li> <li>Smaller policy-consultations to synthesize the emerging experiences into a policy brief.</li> </ul>	<ul style="list-style-type: none"> <li>Lessons learnt report</li> <li>Draft policy and technical brief publication</li> </ul>	<ul style="list-style-type: none"> <li>Lesson learnt report</li> </ul>

**31 to 36 month**

Activities	Milestones	Deliverables	Monitoring Indicators
<ul style="list-style-type: none"> <li>Exploring scope for scaling up the technical and institutional innovations in the districts</li> <li>Sharing learning of low cost hatchery</li> <li>National level dissemination efforts – through consultation meeting</li> </ul>	<ul style="list-style-type: none"> <li>National level Learning sharing workshop on climate resilient inland fisheries in water bodies in rainfed areas with key players</li> <li>Final impact assessment report</li> <li>Sharing of Climate resilient technologies and policy recommendation</li> </ul>	<ul style="list-style-type: none"> <li>Proceedings of national workshop</li> <li>Final technical-institutional and Policy Framework for strengthening inland fisheries.</li> </ul>	<ul style="list-style-type: none"> <li>No of workshop</li> <li>Final report is published</li> </ul>

**4.2 Expected Outputs and Outcome****Outputs:**

- Sustained fish production with appropriate technological packages internalized into community institutions reaching a productivity level of about 600 kg/ha

- A detailed process manual on coping mechanism for reducing risk and vulnerability by diversifying into fish seed production, nursing, dug out pond culture, IAA for improving productivity of rainfed fisheries.
- A technical manual with an array of technical, institutional and management options with case examples and necessary illustrations.
- Technical and management practices to enhance fish production and utilize productivity of water bodies will be developed and disseminated to all the rainfed area production support system

### **Outcomes**

- A policy framework on ‘Climate Change Resilient inland Fisheries in Rainfed Areas’ evolved through integrating scientific production technologies, appropriate community institutional systems and management practices .

## Annexure 6 Business Development and Market Analysis

### I. INTRODUCTION

Fishing is one of the important livelihood options in the western tribal districts of Madhya Pradesh. Madhya Pradesh is full of ponds, lakes, rivers and other types of water bodies that make the local people to take up fishing both for consumption and livelihood.

There are four major types of fishing activities found in this part of the country:

- (i) fishing as commercial activity in ponds/lakes,
- (ii) fishing as semi-commercial activity in ponds/lakes,
- (iii) fish hunting for consumption purpose in ponds/lakes,
- (iv) fishing as semi-commercial activity in rivers and rivulets.

The major communities involved in fishing here are the Bhils and Bhilalas (tribal community), Bhois, Kahars and the Dhimars (traditional fisher folks). Fish hunting is primarily done by tribals in the natural water bodies with no private or semi-private ownership. Commercial fishing is done by other communities either in private water bodies or in water bodies on lease from government.

Commercial fishing is profitable; but fishers that are engaged in semi-commercial variety take to fisheries to complement their main livelihood activity that is agriculture. In recent decades, climatic changes have made it difficult to get a good catch for a longer period year after year. The pattern of rainfall has changed and it has adversely affected the fish population and in turn, their earning. This has enhanced risks associated with fishing and fisheries, especially undertaken by small pond fishers have become a risky proposition in recent times.

However, if the problem areas are mapped properly and reasons are specified, adaptive measures can be taken up which will help the fishermen come over the risk factor and their livelihood security can be enhanced. To make the fishermen adapt better to the climate change adversities, a number of measures need to be taken; this project aims at the same.

### II. OBJECTIVES, SCOPE, METHODOLOGY

#### 2.1 Objectives

The objective of the project is to enhance the adaptive capacity of fish farmers to ensure their livelihood security in the agro-climatic zone of Jhabua hills comprising the districts of Jhabua, Alirajpur and Dhar. Activities will include the construction of 75 fish farming tanks / ponds and the related development of an insurance product to support the modifications to the technical design of original tanks, the diversification of fish species and the development of adaptive fish farming systems, building capacities of fish farmers to enhance their productivity and enhance access to market and

finally to develop and disseminate evidence based resilient climate change adaptation strategies for inland fisheries for small pond fishers.

The project presents four specific components:

- **Component 1:** Adaptive measures to address rainfall variability;
- **Component 2:** Adaptive measures to address warmer climatic regime;
- **Component 3:** Building resilience for climate adaptation;
- **Component 4:** Knowledge generation and management.

## 2.2 Scope of Study

The scope of the present Market Study and Analysis study is as follows:

- Look at the value chain of fishery in the locality- with a historical perspective to understand the climate related variations
- Identify gaps/ constraints/ limitations in the value chain (to focus on both the back end and the front end or only the front end?)
- Find out vulnerability of various groups, especially women and prepare strategy to reduce such vulnerability
- Find out the total potential of fish harvest per year and the long term assessment in order to understand the sustainability factors
- Study the current marketing practices
- Analyze the demand-supply gap in the local and adjacent bigger markets
- Devise a suitable marketing strategy to ensure better deals (price, value and terms of trade) for the fishermen
- Find out the infrastructural needs of the project
- Find out the need and types of institutional mechanism
- Prepare a Capacity Building Plan
- Prepare a business plan for a hatchery
- Prepare a business plan for a pond (as a fishing unit/ business)
- Study and Design a model for providing financial services to the fishermen in terms of:
  - Saving-credit functions
  - Insurance products
  - Investment options
- Devise the working modalities of the project implementation (defining roles and responsibilities of various stakeholders and partners)

## 2.3 Methodology

The methodology adopted for the study included:

- i. **Focused Group Discussion (FGD)** with the fishermen/women for assessing the socio economic profile, impact and opportunity at the village level. A detailed discussion guide has been prepared for this.
- ii. **In-depth Interviews** of the Key Informants (at least 2 in each district; i.e. 6 in total)
- iii. **Interviews market players:** Discussion guides were prepared for Local Traders and Traders in away markets.
- iv. **Interviews with Government officials and bank officers**
- v. **Hatchery visits** (two- one government; one private)
- vi. **Fishing unit** (ponds/ tanks) visits



**An FGD in progress, Khalghat**

## 2.4 Works done during field visits

The details of the works done during the field study are presented in the table below:

S. No.	Date	Place	District	Activity
1	05-05-14	Megh Nagar	Jhabua	Fish Market Visit, Discussion with traders and Analysis of market volume.
2	05-05-14	Jhabua	Jhabua	Meeting with Assistant director Fisheries.
3	06-05-14	Narvali	Jhabua	FGD in Narvali village with local fishermen (Tribals)
4	06-05-14	Maud Sagar Dam	Jhabua	<input type="checkbox"/> Visit to Fisheries department's hatchery at Maudsagar dam.
				<input type="checkbox"/> Understand the entire process of Hatchery at there.
5	07-05-14	Borkudia	Alirajpur	<input type="checkbox"/> Conducted FGD with Fishermen.

				<input type="checkbox"/> Personal Interviews of fishermen are taken.
6	07-05-14	Bhabhra (Chandra ShekharAajad Nagar)	Alirajpur	Fish Market Visit, Discussion with traders and Analysis of market volume.
7	07-05-14	Ranapur	Jhabua	<input type="checkbox"/> Fish Market Visit, Discussion with traders and Analysis of market volume. <input type="checkbox"/> Discussion with fishing net waivers.
8	08-05-14	Dhamoi Dam	Jhabua	<input type="checkbox"/> FGD with local fishermen. Visit of dam to see the live process of fishing. <input type="checkbox"/> taken Personal Interviews of some fishermen
9	08-05-14	Para Haat Market	Jhabua	Haat market visit of Para, discussions held with Fish traders.
10	08-05-14	Gulabpura Dam	Jhabua	Personal interviews of fishermen were taken.
11	08-05-14	Jhabua	Jhabua	Meeting with Key fishermen who takes pond on lease and supply the fishes to traders.
12	09-05-14	JhabuaHaat Market	Jhabua	Haat market visit in JhabuaHaat market, Discussions held with some fishing traders.
13	09-05-14	Bank of Baroda, Jhabua	Jhabua	Meeting with LDM Jhabua, regarding the financial product available for fishing.
14	10-05-14	Sundrel	Dhar	Visited the Hatchery unit in Sundrel village and understand the entire process of Hatchery.
15	10-05-14	Kunda Dam	Dhar	Had a discussion with Fishermen from Maharashtra who comes here to catch the fishes.
16	11-05-14	Kalghat	Dhar	<input type="checkbox"/> FGD conducted with fishermen. This fisherman catches the fishes from Narmada River. <input type="checkbox"/> Personal Interview of some fishermen were also taken.
17	11-05-14	Kunda Dam	Dhar	<input type="checkbox"/> FGD Conducted with the members of Fishermen Institution.

				<input type="checkbox"/> Observed entire live process of fishing. <input type="checkbox"/> Discussion with traders who were at dam to purchase the fishes.
18	11-05-14	Dharampuri	Dhar	Visited the ornamental fishing unit.
19	11-05-14	DharHaat Market	Dhar	DharHaat market visit. Discussions held with fishing traders.
20	11-05-14	Indore market	Indore	Discussions with fish traders
21	2-6-14	Dahod market	Dahod (Gujarat)	Discussions with traders and retailers
22	3-6-14	Jhabua market	Jhabua	Discussions with traders and retailers
23	3-6-14	Alirajpur market	Alirajpur	Discussions with traders and retailers
24	5-6-14	Indore market	Indore	Discussions with traders and retailers
25	6-6-14	Dhar market	Dhar	Discussions with traders and retailers
26	6-6-14	Dilavara village	Dhar	FGD with fishermen



Ramesh bhai in his Hatchery, Sundrel

### III. MAJOR FINDINGS

#### 3.1 Impact of climate change on fishing

Climate change is a reality; it comes out loud and clear while visiting the villages and talking to the elderly people. During Focused Group Discussions in various places, it came out clearly that climate change is happening in recent years. This can be seen in the matrix below; the monsoon rains earlier used to start around 15<sup>th</sup> June, which has shifted by at least 10-15 days now. The total precipitation is also on the downward trend. The rainfall has become very unpredictable and irregular. Some years, though the total precipitation is good, it happens within a short span of time, and the dry spells have increased. Given this situation, planning for fish cultivation has become difficult.

Monsoon progress	Earlier	At present
Beginning	Around 15 June	25 June to 05 July
Peak	15 July-15 Sept.	15 Aug-15 Sept.
End	Till September end	Till about 15 Sept.

The metabolic rates of organisms and the overall productivity of ecosystems are directly regulated by temperature. Thus, it is quite natural that fishes find it difficult to survive in the face of rising temperature in recent times. The specific points as gathered from the FGDs about the impact of climate change on fisheries are:

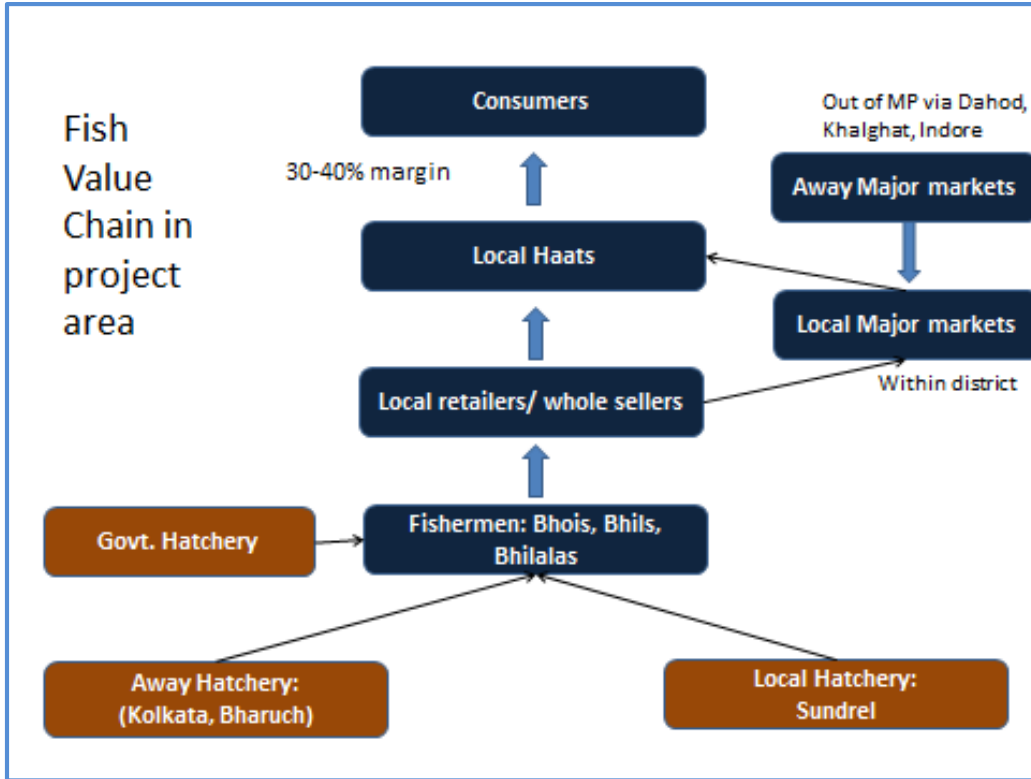
- Sometimes, after the fishermen put the fingerlings in the pond, it does not rain as expected, the mortality goes up due to lack of sufficient quantity of oxygen in reduced water and relative increasing temperature
- The increasing dry spells within the monsoon period means stunted growth of the fishes, thus achieving less production than expected
- The sudden and concentrated rains within a few hours or days results in flooding, which also makes the fingerlings go out of the ponds amounting to losses
- The mortality and the stunted growth of fishes lead to risks for the fishermen
- Even for the unorganized fishermen, the fish catch has been coming down in recent years



**An FGD in progress in Narvadi**

### 3.2 Value Chain

The fish value chain in the project area is not very long or complex, but the main player in the value chain, i.e. the fisherman does not get the value he deserves for all the effort/ investment/ risk he takes. The value chain of fisheries in the project area is presented in the chart below:




The value chain as studied in the field is presented briefly below:

Concept	Description
<b>Fishing communities</b>	<p>The main communities who are engaged in fishing are:</p> <ul style="list-style-type: none"> <li>• The tribals (<b>Bhil, Bhilala</b>): Fishing is not their only or the most important occupation. They do farming and other minor activities; fishing is one of the complementary activities. Thus, they are not very skillful fishers.</li> <li>• The traditional fishing community (<b>Bhoi/Kahar</b>): Fishing is a full time occupation for them. However, owing to decrease in fish catch in recent years, many have left the occupation for other livelihood options like trading, retailing, casual labour, etc.</li> </ul>
<b>Fishing practice/ models</b>	<p>There are four models of fishing business in the localities where primary research has been conducted:</p> <ul style="list-style-type: none"> <li>✓ <b>Gram Panchayat or Government giving water bodies on lease for fishing to fishing associations:</b> <ul style="list-style-type: none"> <li>○ The water bodies like small lakes, dams, or big tanks or ponds which are created by the Gram Panchayat or the Government, generally gives it on lease to the fishermen community for fishing purpose. The priority in this case is given to: (i) persons</li> </ul> </li> </ul>

Concept	Description
	<p>whose land has been acquired for the purpose, (ii) belong to the fishing community, (iii) resident of the village. The lease owners' association collects money among them and bear the variable costs (expenses like fingerlings, feed, labour charges, etc). At the end of the season, they distribute the benefit among themselves.</p> <ul style="list-style-type: none"> <li>✓ <b>Government owning the big dams and giving fishes on royalty basis:</b> <ul style="list-style-type: none"> <li>○ One damis owned by the Government- at Maud Sagar. Fishermen catch fish and pay a royalty to the Government at the following rates: <ul style="list-style-type: none"> <li>○ Fish size more than 1kg: Rs.14/kg</li> <li>○ Fish size less than 1kg: Rs.10/kg</li> </ul> </li> </ul> </li> <li>✓ <b>Individual fishing (mainly in rivers):</b> <ul style="list-style-type: none"> <li>○ They fish individually and sell individually; fish catch reported to be going down because of dam on the upper catchment.</li> </ul> </li> <li>✓ <b>Private Ponds/ tanks</b> The study team could not find one; but learnt that it exists</li> </ul>
<b>Fishing season</b>	<p>The fishing season is like following:</p> <ul style="list-style-type: none"> <li>● Mid or late June: Fingerlings are released into the water bodies</li> <li>● Late June- late August: Breeding period (ban on harvesting)</li> <li>● September: Small scale harvesting starts</li> <li>● October- January: Fish harvesting starts peaking</li> <li>● February- May: Intensive fishing</li> </ul>
<b>Hatchery</b>	<p>There are two fish hatcheries in the vicinity one owned by Government and one owned by Private.</p> <ul style="list-style-type: none"> <li>● There is a Government hatchery near Maud sagar dam in Jhabua district; there is a government fish nursery in Dhar district</li> <li>● One private hatchery is at Sundrel in Dhar district</li> </ul> <p>The capacity of a hatchery varies according to the local demand; but it is reported that the minimum size should be 1 billion spawns.</p> <p>The fishermen who are engaged in fish culture in local ponds and tanks buy the spawns, fries or fingerlings from these hatcheries. The presence of any middleman has not been reported in this process.</p> <p>It is reported that the local hatcheries satisfy the demand of almost 90-95% of the local demand. Some pond/lake owners/leasers procure fries/fingerlings from outside the state also (5-10%)</p>

Concept	Description
<b>Fish types/ volume</b>	<p>The major varieties of fishes in the locality are:</p> <ul style="list-style-type: none"> <li>• Rohu</li> <li>• Katla</li> <li>• Common Carp</li> <li>• Silver Carp</li> <li>• Bam</li> <li>• Singhad</li> </ul> <p>Some fishes which are imported from markets like Andhra Pradesh and Karnataka are:</p> <ul style="list-style-type: none"> <li>• Pangus</li> <li>• Mangur</li> </ul>
<b>Post-harvest</b>	<p>Generally, the fishermen in the locality do not engage in any kind of post-harvest practices; they just sell the fresh fishes to the retailers/ whole sellers. The dry fish sellers in the local markets also reported that the dry fishes mostly come from outside- Andhra Pradesh, Mumbai and West Bengal. Most of the varieties of dry fish are marine fishes.</p>
<b>Markets</b>	<ul style="list-style-type: none"> <li>• The fish pond/tank owners mostly sell the fishes to the retailers (whole sellers in some cases) who take away the fishes from their fishing site every day or every fishing day; the price is fixed at a particular level for the whole season together by the lease owners and the retailers</li> <li>• If the fish retailers do not turn up, the lease owners themselves sell the fish in the local market or 'Haat' (weekly); this happens very few times in a fishing season (2-3 times approximately)</li> <li>• Fishers harvest the fish and sell directly to the retailers in the local market. They do not have storage facility and they prefer selling the entire fish rather than cutting and selling it in pieces. Such fishers cover more than weekly market by harvesting the fish daily and selling it in different weekly markets in the region.</li> <li>• The local regular markets and weekly markets (Haats) are the main place of selling the fishes; in this part of Madhya Pradesh, local weekly 'Haats' are a common feature; there is a 'Haat' every few kilometers depending on the density of population in the area. The average physical distance between two 'Haats' would be between 10-15 kilometers. However, on a given day, the distance between two 'Haats' would be 25-30 kilometers as the 'Haats' are held on different days of the week.</li> <li>• Some of the traders from the nearer larger markets like district places (Dhar, Jhabua, Alirajpur, etc.) come and procure from the lease owners; or the lease owners send the fish to these traders on a regular basis as per demand;</li> </ul>

Concept	Description
	<p>however, fish flow from local area to bigger markets like Bhopal and Indore are not reported</p> <ul style="list-style-type: none"> <li>• There is a real gap between demand and supply in the market as fishes are imported from nearby states like Andhra Pradesh and West Bengal on a regular basis</li> <li>• Prices of fishes vary 20% to 40% from one level to another, i.e. from local market to district level market to state level market</li> </ul> <p>More information on markets and prices is given in a separate section later in the report below.</p>
<p><b>Picture of two women selling fish in Dhar 'Haat'; a common sight in western Madhya Pradesh</b></p>	 <p>The photograph shows two women sitting on the ground in an outdoor market setting. They are surrounded by a large quantity of fresh fish, including various species of carp and tilapia. The woman on the left is wearing a green and pink sari, and the woman on the right is wearing a green and black sari. They are both looking towards the camera. In the background, there are simple buildings and a dirt path, suggesting a rural or semi-urban market environment.</p>
<p><b>Problems/ Issues</b></p>	<ul style="list-style-type: none"> <li>• Late onset of monsoon and irregular rainfall has made the fish production process difficult; sometimes they put the fingerlings and there is not enough rainfall in time for which there are a lot of fish fatalities; this result in increasing cost as well as decreasing production.</li> <li>• Local level conflict: As per the rules, while leasing out the Government must give importance to the fishermen who have lost their land to the tank/lake construction, and they must belong to the local area. However, some vested interests, in spite of being outsiders, but having good reach in the government departments, produce fake documents and get the lease. This creates friction among the locals and the lease owners</li> <li>• The fishermen, who are not good enough to get the lease or cannot participate due to lack of financial resources, just suffer a lot. They just work as laborers and are paid meagre amount (Rs.5 per kg)</li> <li>• The fish producers being small ones, cannot reach out to the bigger markets like at district places or state level bigger markets like Indore and Bhopal</li> </ul>

Concept	Description
	<ul style="list-style-type: none"> <li>• Lack of financing: The banks do not provide loans to the individual fishermen. Though the banks give loans to cooperatives, generally the cooperatives find it difficult to furnish the documentation and processes; so, unable to get loans. This makes their business a low-yielding proposition.</li> </ul>
<b>Role of women</b>	<ul style="list-style-type: none"> <li>• In some pond/tank fishing cases, women have been found to help in dragging the nets</li> <li>• Individual women also engage in fishing</li> <li>• The women also play a major role in selling the fishes in the local market</li> <li>• Women are involved in making of the net. These women belong to the traditional fishing community.</li> </ul>
<b>Vulnerability</b>	<ul style="list-style-type: none"> <li>• Both the tribals and the traditional fishing communities are found to be vulnerable</li> <li>• Only some of the fishermen have capital or information tend to break the vicious cycle of poverty by investing in the business</li> <li>• Women, though play an important role in fishing, are often neglected; their role is not recognized properly.</li> </ul>
<b>Related Business options/ plans</b>	<p>✓ <b>Hatchery:</b> Hatchery is one of the most important activity in the aquaculture business. A hatchery is a facility where fish eggs are hatched under artificial conditions to be later transferred to the fish rearing ponds for commercial purposes. The local hatcheries as explained above just about fulfill the needs of the local area. So, in order to cater to the needs of the proposed ponds, a new hatchery has to be planned. The business plan for the same is prepared and given in annexure.</p> <p>✓ <b>Ornamental fish unit:</b> Keeping colorful and fancy fishes known as ornamental fishes, aquarium fishes, or live jewels, is one of the oldest and most popular hobbies in the world. The growing interest in aquarium fishes has resulted in steady increase in aquarium fish trade globally. The ornamental fish trade with a turnover of US \$ 6 Billion and an annual growth rate of 8 percent offers lot of scope for development. The overall domestic trade in this field cross ₹1000 lakh and is reportedly growing at the rate of 20 per cent annum.</p> <p>Considering the relatively simple techniques and low investment involved, this activity can be taken up in the project area. MPEDA supports this activity by providing grants and the technical expertise. Either individual entrepreneurs or the fishermen's group can undertake this business. MART can provide the requisite training and handholding support in marketing. The market for this product is fairly underexploited and readily available.</p> <p>The details of the business and the business plan is given in the annexure</p>

## IV. MARKET ANALYSIS

### 4.1 Size of Market

During the study, a total of 21 markets in Madhya Pradesh and a nearby market in Gujarat (i.e. Dahod) were visited. The major markets among them are the State level bigger markets of Bhopal and Indore; district headquarters like Dhar, Jhabua and Alirajpur; other important markets like Khalghat, Dhamnod, etc. A good insight into the selling practices, price variations and total volumes, etc has been gathered. This enables the project to make a better marketing plan.

#### Size of the market with sources: (figures in kilogram/ day)

District	Name of the Market	Local Fishes (Cultivated in Dams/Pond)				Big Ponds /River	Fishes from Andhra Pradesh and other places		Total
		Rohu	Katla	Common Carp	Local Fish (Small Size)	Other Fishes- Singhad, Padin & Papada	Pangus	Magar	
Jhabua	M.Nagar	30	30	5	10	5	25	20	125
Jhabua	Ranapur	200	200	50	50	10	250	200	960
Jhabua	Jhabua	80	80	10	30	10	50	50	310
Jhabua	Para	60	60	15	25	5	35	30	230
Jhabua	Kala Devi	50	50	5	15	5	40	40	205
Alirajpur	Alirajpur	35	35	5	20	5	30	25	155
Alirajpur	Bhabhra	35	35	10	20	5	25	20	150
Alirajpur	Jobat	50	50	10	25	10	50	45	240
Dhar	Thikri	25	25	5	10	0	20	20	105
Dhar	Damana	20	20	5	10	0	20	20	95
Dhar	Aujar	20	20	5	10	0	20	20	95
Dhar	Jhilwania	20	20	5	10	0	20	20	95
Dhar	NaganBedi	20	20	5	10	0	20	20	95
Dhar	Dhar	60	50	15	15	20	50	40	250
Dhar	Dhamnod	75	75	15	20	20	60	50	315
Dhar	SagarKuti	40	40	5	5	10	30	30	160
Dhar	Indorama	30	30	5	5	10	30	25	135
Dhar	Rajgadh	50	50	10	10	20	50	40	230
Dhar	Khalghat	300	300	50	80	300	500	500	2030
Indore	Indore	5000	5000	500	200	2000	6000	5000	23700
Bhopal	Bhopal	6000	6000	250	100	2500	5000	4500	24350
	<b>Total</b>	<b>12200</b>	<b>12190</b>	<b>985</b>	<b>680</b>	<b>4935</b>	<b>12325</b>	<b>10715</b>	<b>54030</b>

#### 4.2 Demand- Supply gap

As can be seen above, there is a clear gap between demand and supply in all the local markets. This is because fishes are imported to the local markets from far off places like Andhra Pradesh, and to some extent, Karnataka and West Bengal. As can be seen in the table above, in the sample markets, out of 54 tonnes of daily consumption, approximately 23 tonnes are imported from outside, especially Andhra Pradesh.

#### 4.3 Price variation

The prices of fishes across varieties show two kinds of variation:

- High variation in prices between local whole sale price (i.e. fisherman level) and local retail price
- Low variation in prices between whole sell prices and retail prices of smaller markets and bigger markets

This price scenario is precisely because there is very little movement of fishes from local level to bigger markets like Bhopal/Indore. The fishes that are produced locally are consumed locally; and the even there is a gap, which is filled up by the fishes from outside.

#### Prices of different varieties in different markets:

Variety of fishes	Size of the Fish (gm)	Fishermen Price (Rs.)- whole sell	Local Retail Market Price (Rs.)	Whole sell Prices in Bhopal/ Indore Market	Retail Market price in Bhopal/ Indore	Prices in Mumbai (Wholesale Market) (Rs.)
Rohu	100-750	35-40	45-50	N/a	N/a	N/a
Rohu	750-250	60	100-120	90-120	120-150	90-100
Katla	100-750	35	45-50	N/a	N/a	N/a
Katla	750-2000	60	100-120	90-120	120-150	80-100
Mrigal	1000+	50	80	80-100	100-120	N/A
C. Carp	1000+	60	80-100	80-100	100-120	N/A
Balm	1000+	180	200	250	300	250
Singhad	2000+	150	175	200	250	220
Local	(Small size)	40	60-80	N/A	N/A	N/A
Pangus	3000+	N/A	100	55	90-100	N/A
Mangur	500	N/A	100	70	90-100	N/A

#### 4.4 Traders in the retail market

##### Number of traders and retailers in the markets

District	Name of the Market	No. of traders	No. of retailers
Jhabua	Megh Nagar	0	5
Jhabua	Ranapur	2	8
Jhabua	Jhabua	2	8
Jhabua	Para	0	6
Jhabua	Kala Devi	0	8
Alirajpur	Alirajpur	2	6
Alirajpur	Bhabhra	1	4
Alirajpur	Jobat	1	5
Dhar	Thikri	0	4
Dhar	Damana	0	5
Dhar	Aujar	0	4
Dhar	Jhilwania	0	5
Dhar	NaganBedi	0	5
Dhar	Dhar	4	6
Dhar	Dhamnodb	2	6
Dhar	SagarKuti	0	5
Dhar	Indorama	0	5
Dhar	Rajgadh	0	6
Dhar	Khalghat	4	10
Indore	Indore	40	250
Bhopal	Bhopal	20	80

The retailers reported that on a 'Haat' day, they are able to sell up to 50 to 100 kgs per day; however, the sales volume comes down drastically to 20-30 kgs on a no-Haat day. So, Haats are important places for selling in this region.

#### V. CASE STUDIES

During the course of investigation for the study, a large number of dams and ponds were visited to observe the fishing, harvesting and marketing practices. A brief summary of the ponds/ lakes visited is given in the table below:

Name of pond/lake	Size (Ha)	No. of fishermen		Annual fish production (Quintal)	Approx. revenue (Rs. Lakh)/year
		Organized	Unorganized (labour)		
Narvali Pond (Dhar)	34	6	10	150	9

<b>Maud Sagar Dam (Dhar)</b>	82	0	40	N/A	N/A
<b>Borkudia (Ali Rajpur)</b>	9	12	30	50	2.5
<b>Dhamoi Dam (Jhabua)</b>	70	40	150	120	6
<b>Kunda dam (Dhar)</b>	141	42	80	150	8.5
<b>Dilavara Pond (Dhar)</b>	7.6	21	30	80	3.5

Note:-1. Total annual production of the entire Dam/ Pond is approximate; this data was provided by the lease holders of dam/pond, Fishes caught for consumption is not included due to absence of such data.

Note:-2- Since Maud sagar dam is under fisheries department, data could not be collected during the visit.

Note:-3- Table shows that **large ponds have lower productivity** as compared to small Dam/Ponds, reasons behind this are following

- Less number of fishing days in large ponds due to high volume of water during late monsoon and resultant less number of fishing days
- Generally do not put any kind of fish feed
- In large ponds, a number of people caught the fishes for consumption purpose
- Due to big size of pond fishes have large space for movement which makes fish catch much difficult.

It would be great to discuss a few cases in brief and make a summary of the learning. Three ponds/ lakes have been chosen for the purpose: a big one (Kunda), a medium one (Dhamoi) and a small one (Borkudia)

## Case: Kunda dam

### Location and size:

- Dam is located in the Kunda Village of Dhamnod Taluka in Dhar District.
- The size of the dam is 141 hectares
- It's a big dam and was constructed by the government mainly for irrigation purpose and was later given away for fisheries on lease

### Fishing Cooperative:

- Land of a few farmers had gone in to the dam at the time of dam construction. These farmers have formed a Cooperative society for fishing in the Village. The cooperative is registered under the Cooperatives Act.

- Name of the Institution formed by these farmers is PragatiAdivasiMatsayaSamitiSankota
- This institution was formed in 2003, and today it has 54 Members under it out of these 42 members are active and these members do participate in day to day activities of fishing
- All the members of this institution are from tribal community and they are not the traditional fisher folks
- President of this institution is from the Government while secretary is from the community
- This institution has taken the Pond on lease in Year 2010 from District Panchayat for fishing and since then they are engaged in fish rearing and harvesting practices here.

#### **Fishery practice:**

- In the beginning of Monsoon season, the members collect money (Rs 10,000/Member) from each member for initial investment like fingerlings, fish feed and gears, etc.
- Fish seeds are cultivated in July-Aug.
- Fishing remains closed from June-Oct, as monsoon is the breeding season for fishes.
- Fishing Starts in November but peak season for the fishing is Between March-May when water recedes



- Fishes are caught by the members of this institution themselves in winter season when fish catch remains low, but in summer season when fish catch gets higher professional fishermen from out-side mainly either Maharashtra or Bihar are hired to catch the fishes.
- These outside fishermen remain at dam in a tent like structure with their entire family till the time fishes are caught at the dam.

- Fishes are caught for 15-20 days' time period in a slot and then fishing is stopped for few days and then it restarts; this practice is used due to some behavioral change in the fishing.
- These outside fishermen bring their own fishing nets for catching the fishes while boat is provide by the Institution.
- Fishes are caught jointly by the members of Cooperative and professional fishermen both.
- Labour charges are shared among both as per the predetermined terms. During visit of the study team, terms were as follows: Rs 10/kg is provided for the fish catch, which later on divided in two equal parts out of which Rs 5/kg goes to the professional fishermen, while Rs 5/Kg goes to the institution against the labor of its members for fish catch.

#### **Selling method:**

- Traders/ retailers from nearby markets of Dhamnood, Dharampuri and other towns come here to buy the fishes. Price is fixed and do not vary with the market Price.
- Margin of retailers on fish selling is around Rs 20-40/kg. This margin includes the cost incurred by retailers in transportation, ice and other expenses.
- In case retailers do not purchase the fishes from the dam, committee members go in to the nearby markets to sell their fish catch.



#### **Fish Catch and revenue:**

- Fishes are caught between 90-100 days in a year.
  - Average catch of the day is around 200 Kg. In winter it varies from 50-80 Kg while in summer it varies from 200-500 Kg in a Day.
  - Average prices of fishes is Rs 60/Kg
- Total Revenue: 100 days \* 200 KG \* Rs 60 = Rs. 12 Lac

**Expenses**

Particulars	Amount (Rs)
Fish Seed-40 Lac Fry	600000
Lease	43992
Labor @ Rs 5/kg (Fishermen)	100000
Labor @ Rs 5/kg (Members)	100000
Other expenses	20000
<b>Total</b>	<b>8,63,992</b>

- So, the institution made a profit of around Rs.3.5 lakh last year. Profits are shared among the members of the Cooperative at the end of year.

**Case: Dhamoi dam****Location and purpose:**

- Dhamoi dam is one among the largest dam of Jhabua district.
- Land of a lot of farmers has gone at the time of dam construction. These farmers have given preference at the time of lease.
- Drinking water supplied from this dam to Jhabua City. Dam is also used for the irrigation Purpose.
- Water remains for the entire year in this dam and quantity of water is sufficient to conduct commercial fisheries.

**Fishing/selling practice:**

- Fishermen Cooperative formed in the village mainly consists of people from tribal community. These people are not the traditional fishermen.
- Fishermen are called from outside to catch the fishes from this dam. They are provided their share as per the predetermined terms.
- Around 100 fishermen catch the fishes in very less quantity for their consumption purposes and sometimes also sell in to the local markets.
- Around 10-15 professional fishermen come at the dam to catch the fishes. These people live at dam by constructing a Tent structure. These people catch the fishes for around 20-25 days.

- Share of these fishermen in the fish catch is as:
  - On Big Fishes (More than 1 Kg they get Rs 14/Kg
  - On small fishes they get 50% of total fish catch.
- Generally Local traders/retailers come here to buy fishes, in case of trader does not come fishes are sold in to the local markets.

### Case: Borkundia pond

#### Location and basic details:

<b>Name of the village:</b>	Borkundia	<b>Taluka (Block):</b>	Bhabhra (Chandra Shekhar Aazad Nagar)
<b>Number of total households:</b>	1200	<b>Total Population:</b>	5000
<b>Number of fishing families:</b>	50	<b>Number of fishing population:</b>	250

- Borkundia Village is located in Bhabhra Block of Alirajpur district.
- Village pond size is 9 hac. It has been taken on Lease by the village's fishermen community from Gram Panchayat.

#### Fishing community:

- Village has 100% tribal community and dominant tribal community in the village are Bhil and Pateliya.
- Both the Pateliya and Bhil community is involved in the fishing.
- Main source of livelihood in the village is Agriculture and Migration of Labor to Gujarat.
- Fishing is an alternative source of livelihood.

#### Fishing practice:

- A fishermen's cooperative has been formed in the village, Members of this cooperative take care of all the fishing related work.
- Cooperative has a Small Boat and fishing nets for catching the fishes.
- Fishes caught by the fishermen generally being sold to the local traders or retailers of nearby area. In case of very less fish catch it's been sold in the village itself or in nearby areas.
- Generally 2-3 People go in to the markets to sell the fishes by their Bikes.
- Fishing is done on around 75-80 Days.

<b>Fishing</b>	<b>Summer (March-May)</b>	<b>Monsoon (June-Sept)</b>	<b>Winter (Oct-Feb)</b>
No. of days go for fishing	40	0	40

**Fish catch and revenue details**

Variety	Summer		Winter	
	Average Quantity (KG/Day)	Summer (average price: Rs./ kg)	Average Quantity (KG/Day)	(average price: Rs./ kg)
Katla	50	55	25	55
Common Carp	40	40	10	50
Rohu	20	55	20	55
Naran	30	30	20	30
Local Fish (Small Size)	10	20	5	20
Total	150		80	

- Fishes are sold in the local market of Bhabhra, Verger, Alirajpur&Jobat. Sometimes fishes are directly sold to the retailers while sometimes fishes are sold to the consumers by fishermen.
- Expenses incurred in fishing

S. No.	Particulars	Amount (Rs)
1	Fish Seed	20000
2	Fish feed	10000
3	Net & Boat	20000
4	Fish saving kit (Jali)	10000
5	Selling exp.	10000
6	Lease	5000
7	Other expenses (Urea, Gobar, Chuna etc.)	3000
	<b>Total Exp.</b>	<b>78,000</b>

**Income:-**

Average catch of the day (kg)	Total days of fishing (Number)	Average Price (Rs)	Total Income (Rs)
115	80	44	4,04,800

**VI. CONCLUSION, SUGGESTIONS AND WAY FORWARD**

Some of the important suggestions for the project is as follows:

Parameters	Suggestions
<b>Size of pond and scale of operation</b>	<ul style="list-style-type: none"> <li>• 1 ha to 5 ha size; both legally better option and more efficient</li> <li>• 10 to 15 ponds in a cluster of villages should be selected for the project</li> <li>• Scaling up is important and not much risk is there in scaling up; there is enough unsaturated demand in the market at the moment</li> </ul>

<b>Fishermen's institution</b>	<ul style="list-style-type: none"> <li>• Fishermen's institution should play an important role</li> <li>• Fishermen's capacity building in managing fishery as a business and marketing practices would be crucial</li> </ul>
<b>Marketing</b>	<ul style="list-style-type: none"> <li>• Concentrating on local markets and district head quarters</li> <li>• Emphasis needs to be put on better handling and processing the fish from pond to market; women can be entrusted with this work</li> <li>• Better mobility between local markets would help a lot; small vehicles should be planned for</li> </ul>
<b>Business opportunities</b>	<p>Given in annexure:</p> <ul style="list-style-type: none"> <li>• Aquaculture</li> <li>• Hatchery</li> <li>• Ornamental fish</li> </ul>

## Business Plans

Three Business Plans are given below. These Business Plans have been developed based on the information received and cost estimates from the region. These business plans will be used as reference in the project and all the 75 fishers will be trained to develop their respective business plans based in their own situation.

### Business Plan-1: Aqua Culture (Intensive Carp Culture)

#### Introduction

Fish is the cheapest and most easily digestible animal protein caught from the natural sources since time immemorial for consumption of human beings. However, due to over exploitation and pollution, the availability of fish in natural waters has declined considerably forcing fishermen and scientists to adopt various methods to increase its production. Fish farming in controlled or under artificial conditions has become the easier way of increasing the fish production and its availability for consumption. Farmers can easily take up fish culture in village ponds, tanks or any new water body and can improve their financial position substantially. It also creates gainful employment for skilled and unskilled youth.

The technology developed for fish culture in which more than one type of compatible fishes is cultured simultaneously is the most advanced and popular in the country. This technology is known as Composite Fish Culture. This technology enables to get maximum fish production from a pond or a tank through utilization of available fish food organisms in all the natural niches, supplemented by artificial feeding.

## Fish species involved in fish culture and their feeding habits

### Indian Major Carp

<b>Catla</b>	<b>Zoo plankton feeder</b>	<b>Surface feeder</b>
<b>Rohu</b>	Omnivorous	Column feeder
<b>Mrigal</b>	Detritivorous	Bottom feeder

### Exotic carps

	<b>Phytoplankton feeder</b>	<b>Surface feeder</b>
<b>Silver carp</b>		
<b>Grass carp</b>	Herbivorous	Surface, column and marginal areas
<b>Common carp</b>	Detritivorous/Omnivorous	Bottom feeder

### Technical Parameters

Technical parameters that need to be considered for intensive fish culture project are as follows:

1. **Selection of Pond:-** The main criteria to be kept in mind while selecting the pond is that the soil should be water retentive, adequate supply of water is assured and that the pond is not in a flood prone area. Derelict, semi derelict or swampy ponds can be renovated for fish culture by dewatering, desilting, repair of the embankments and provision of inlet and outlet.
2. **Pond Management:-** Pond Management plays a very important role in fish farming before and after the stocking of fish seed. Various measures that are required to be undertaken in pre and post stocking practices are tabulated below
3. **Pre Stocking:-** In case of new ponds, pre-stocking operations starts with liming and filling of the pond with water. However, the first step for existing pond requiring development deals with clearing the pond of unwanted weeds and weed fishes either by manual, mechanical or chemical means.
  - 3.1. Removal of unwanted and predatory fishes and other animals by repeated netting or using mahua oil cake @ 2500 kg/ha meter or by sun drying the pond bed.
  - 3.2. **Liming** - Tanks which are acidic in nature are less productive than alkaline ponds. Lime is used to bring the pH to the desired level.
  - 3.3. **Fertilization:-** Fertilization of the pond is an important means for intensifying fish culture by increasing the natural productivity of the pond. The fertilization schedule has to be prepared after studying the quality of the pond soil. A combination of both Organic and Inorganic fertilizers may be used for better results. The fertilizer programme has to be suitably modified depending on the growth of the fish, available food reserve in the pond, physical-chemical conditions of the pond and climatic conditions.

**3.4. Stocking:-**The pond will be ready for stocking after 15 days of application of fertilizers. Fish fingerlings of 250 gms weight (approx) should be used for stocking @ 5500 nos. per hectare.

**Species combination (ratio) (Per Hectare)**

Species	2-species
Catla	500
Rohu	5000

**4. Post Stocking:**

**4.1. Supplementary feeding:-**The stocked fishes need much more food than what is available naturally in the pond. Fishes can be fed with a mixture of bran and oilcake in various proportions based on their stage of growth. The feed should be placed on a bamboo tray and lowered to the pond bottom or it can be broadcasted at the corners. After some time the fishes will get used to this type of feeding and aggregate at the same place at particular times of the day. The recommended feeding rate is as under:

Feed	%	Kgs
Rice bran	80	9600
Ground Nut Oil Cake	10	1200
Cotton Seed Cake	10	1200
Total	100	12000

**5. Harvesting:** Harvesting is generally done at the end of 6 months, when the fishes attain average weight of 1 to 1.25 kg. A production of 4 to 5 tons/ha/ crop can be obtained in one crop and two crop cycles that can be taken in a year. However, for the purpose of working out economics a production level of 8.8 tons/ha/year may be considered. Harvesting is done by partial dewatering and repeated netting while in some cases complete dewatering of ponds is also resorted to.

**6. Marketing:-**Fishes produced in the pond will be sold in to the local markets of Mandvi, Gandhidham and nearby towns. In case of higher production fishes can directly linked with the wholesaler of Ahmedabad, Surat and Mumbai.

**Indicative Unit Cost of Intensive carp culture and Income for 1 Ha pond**

S.No	Particulars	Units	Quantum	Rate (Rs.)	Total (Amount Rs)
A	<b>Capital cost</b>				
1	Construction of pond including digging, bund construction and compaction and consolidation	Hrs			900,000
2	Diesel Pump Set	5HP	1	60000	60,000
3	Store / Office Space	Sq ft	350	250	87,500
4	Nets and other implements			L/S	5,000
5	Miscellaneous			L/S	3,500

	<b>Total "A"</b>				<b>1,056,000</b>
<b>B</b>	<b>Operational cost for one crop ( 6 months)</b>				
<b>1</b>	Drying, de-silting and ploughing	LS	LS	LS	5000
<b>2</b>	Lime	Kgs	500	5	2500
<b>3</b>	Single Super Phosphate	Kgs	250	5	1250
<b>4</b>	Urea	Kgs	125	5	625
<b>5</b>	Raw Cow Dung	Tons	10	500	5000
<b>6</b>	10000 Fish Seed 70 to 80 gms weight Catla, Rohu, Mrigal, Common Carp ratio 3:2:1:4 @Rs6 each	Nos	10,000	6	60000
<b>7</b>	Fish Feed Oil cake , Rice bran & Cotton Seed Cake @ 80% 10% and 10% ratio ( 9600kgs of Rice bran, 1200 kg of Oil cake & 1200 kgs of Cotton Seed Cake @ Rs 8/- ,Rs 22/- and Rs 12/- per kg respectively)	Kgs	5,000	10	50000
<b>8</b>	Human Resource 2 persons for 12 months	Number	2	3000	72000
<b>9</b>	Harvesting charges per kg		4400	5	22000
<b>10</b>	Miscellaneous	LS	LS		2200
	<b>Total "B"</b>				<b>218375</b>
	<b>Total A +B</b>				<b>466,875</b>
<b>C</b>	<b>Production Norms:</b>	Fish	10000		
<b>1</b>	Survival (%)	80	8000		
<b>2</b>	Average weight at harvest 1 kg	1	8000		
<b>3</b>	Total production (Kg)	8000			
<b>4</b>	Farm gate price (Rs.)	60			
<b>5</b>	Number of Crops per annum	1			
<b>6</b>	Income during 1st year from 1 crop	480000			

**C) Financial Analysis –**

Financial Analysis								
A. Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8 - 15
<b>1. Fixed Costs</b>	156,000	0	0	0	0	0	0	0
<b>2. Recurring Costs</b>	218375	218375	218375	218375	218375	218375	218375	218375
<b>Total</b>	374,375	218,375	218,375	218,375	218,375	218,375	218,375	218,375
<b>Income from sale of fish</b>								
<b>1. Income from sale of fish</b>	480000	480000	480000	480000	480000	480000	480000	480000
<b>2. Net Income</b>	105,625	261,625	261,625	261,625	261,625	261,625	261,625	261,625

## **Business Plan- 2: Fish Hatchery**

### **Introduction:-**

Hatchery plays a vital role in the production of fish seeds. Quality fish seeds are the first and foremost requirement of a successful inland fishing. Hatchery can be known as the place where artificial environment is created for the fish breeding. The commonly cultivated species of fish like Rahu, Katla, Mrigal, Common carp and Silver carp require revirine (Flood Like) conditions for breeding. These varieties can attain the maturity in still water sources like Pond or Tank but they do not breed in these kinds of water sources.

The technique of breeding fish by other than its natural course is known as **Induced Breeding**. Induced breeding techniques have been developed for production of quality fish seed of culturable varieties. It is one of the most dependable methods of producing pure seed of desired species of fish. Further this technique has helped to produce fish seed in those areas where natural collection of fish seed was not possible. In all 3 districts of our project there is a few hatcheries, due to that availability of fish seeds is very low.

### **Method of Induced Breeding (Hypophysation) :-**

The technique of breeding the fish by administering pituitary gland extract injection is known as induced breeding or hypophysation. The pituitary gland secretes several hormones of which Gonadotropin is the most important for breeding.

The increasing demand of fish pituitaries have now been solved to some extent by the introduction of HCG, now readily available in the market. The HCG is now increasingly becoming popular due to its low cost. A mixture of HCG and pituitary hormone extract in definite proportion are employed successfully for breeding fish.

### **A Hatchery generally contains following things**

- Over Head Tank:- for the supply of water in Chinese Hatchery & Incubation Tank
- Chinese Hatchery:- For the breeding of fishes in artificial conditions.
- Incubation Pond:- Conversion of Eggs in to Spawn
- Spam Collection pond:- Spawn are collected from here.
- Breeder Pond:- Male& female fishes are kept separate in these breeder ponds.
- Nursery Pond (Rearing Pond):- Spawn are kept in these ponds where they grows in to Fry and Fingerlings.
- Source of water (Pond/River).

### **Identification and selection of breeders for breeding:-**

The success of induced breeding depends on the proper selection of breeders. The identification of the sex of the fish is made on the basis of the external characters. The mature males are distinguished from the females by the presence of denticulation on the dorsal surface of the pectoral fin which is rough to touch. Further, in males the abdomen is comparatively flat and the vent is not swollen but they ooze milt at slight pressure on their abdomen. The ripe females have soft and bulging abdomen with swollen pinkish genital opening. The presence or absence of pre-anal ridge is also taken into consideration as a sign of maturity for selection of female breeders.

For the better quality of seeds selection of quality breeder is very important. Breeders should be matured enough for breeding, Size and weight are the important things needs to be taken in consideration while selecting them, and their weigh should be as follows:

Catla-3kg and above, Rohu, Grass and Silver carp-2kg and above, Mrugal -1kg and above.

### **Maintenance of Breeder**

After the selection of breeders their maintenance is very important in order to get the optimum results of these breeder fishes. Taking care of their feed and other is also important. Organic manure along with low dose of single super-phosphate (17 to 20 kg. per hectare) may be applied at fortnightly intervals in the pond where catla and silver carp is stocked as major species. Pond/tank stocked with grass carp as the major species need not be manure regularly. It may be fed with submerged aquatic vegetation during winter months and with grass on the advent of the spring (at the rate of 2-3% of the body weight) for acceleration of gonadial development. For other species feed prepared by mixing de-oiled rice bran and oil cake at the rate of 2-3% of the body weight of fish stock is desired in the initial stages. Fish meal containing 30% protein could be a better substitute for oil cake at the later stage (advent of the spring).Mature Male & Female fishes (Breeders) are kept in separate ponds for the entire year.

### **Preparation of gland extract**

Once proper dosages are determined, the quantity of glands required for injecting the breeders is calculated. The required quantity of glands is then taken out from vials, dried on a filter paper and macerated in a tissue homogenizer with a little distilled water or 0.3% common salt solution. The homogenized glands are then centrifuged and the supernatant liquid is decanted and diluted with the same solvent to a known volume. The following dilutions are recommended.

Weight of brooder prepatory dose final dose

- 1 to 2.0 kg 0.50cc/fish 0.75 cc/fish
- Above 2 kg 0.75 cc/fish 1.50 cc/fish

### **Process of Breeding**

Breeding of fishes is a very systematic process, which need to be followed carefully. Taking care of time in each process is very important. The entire process includes following steps.

1. **Injection of Breeders:-** All the selected Male and female breeders needs to be injected with fish pituitary extract before breeding. These injections of hormones increase the fertility rate of fishes and breed more no. of eggs.
2. **Eco-Hatchery (Chinese Hatchery):-** Injected breeders are brought in the Eco-Hatchery for the breeding. It is circular cement pool (around 8 meter in diameter) with 50 cubic meters of water holding capacity. The bottom of the pool slopes to the centre where there is an outlet pipe (10 cm dia) leading to the incubation pond (egg collection chamber). The wall of the spawning pool is provided with diagonally fitted inlet pipes at an angle of 450for circulation of water creating artificial riverine (Flood like) conditions. After circular pool is filled with water, about 50 kg of females and 50 kg of males are released into the pool. When the breeders start coming up to the surface the valves are opened so that a circular current is created. The speed of water current is maintained at about 30 meters per minute. This process is mainly done in the night (From 7:00PM to 6:00 AM) reason behind doing

this at night is that the environment in night remains peaceful without any disturbance to fishes, in that kind of environment breeder fishes have better fertility and lay the more no. of eggs.

**This entire process takes 6-10 Hrs. time.**

3. **Eco-hatchery-Incubation pool:-**Fishes lay the eggs in above process, these eggs are brought in the Incubation Pool from Eco-Hatchery through a out-let pipe. Incubation pool are the 3 meter in diameter - double walled circular pool, with inner wall of regulated mesh permitting outflow of water) where water at a regulated speed enters through the duck mouth valves fitted on the floor of the outer chamber. The speed of the water is regulated @2.5 litre/sec. in the initial stage and then reduced to 2.0 litre/sec. when movement of embryo inside the eggs starts. Along with water movement rain like condition is created by the showers, these all conditions make a flood like condition which is ideal condition for the eggs to grow in to the Spawns. Through a outlet pipe these spawns goes in to the Spawn collection pond.

This circulation of eggs in Incubation pond takes around 72 hrs, after 72 hrs these eggs are converted in to a spawn. These Spawns can be sold for fish culture in Pond or Tanks.

4. **Rearing of Spawn in to Fry and Fingerlings:-** Spawns are collected from the Spawn collection box and kept in to the rearing ponds for the rearing. Rearing ponds are the Square cement made ponds, which can be made of any size depending upon the requirement. Proper feed is provided here for the growth of Spawn. These Spawns grows in to fry in 6-7 Days. These fry can be sold for the Fish Culture. Most of the fishermen purchase fry for their ponds in all 3 districts in the project area.

If these spam are reared for 20-25 days in rearing ponds these are converted in to fingerlings. This can also be sold as fish seed. Rate of fingerlings is much higher as compared to Spawn or fry.

#### **Difference between Spawn, Fry and Fingerlings:-**

<b>Size of the Fish</b>	<b>Name</b>
5 mm	Spawn
25 mm	Fry (Cultivated in Medium sized pond)
25 mm	Fingerlings (Cultivated in Big size ponds)

#### **Marketing arrangement:-**

There is a good demand of fish seeds in all 3 project districts. Looking at the current supply there is only a few hatchery units, which cannot supply the demanded fish seed in the districts. There is only one government Hatchery in Jhabua and Alirajpur district which is not meeting the current demand, People of Jhabua and Alirajpur Purchase fish seed from Sundrel village of Dhar district. This shows that if a hatchery unit is made available in these districts it will be helpful for fishermen to purchase fish seed from nearby areas and it will also provide good opportunity of business to Hatchery owner as well.

**Economics of a Hatchery unit****A. Capital Cost**

S.No.	Item	Cost(Rs.)
1	2 Kachha Pond (100*200 Feet)	200000
2	Circular breeding pool & hatching pools	
2.1	Breeding pool of 8 m diameter	100000
2.2	2 Hatching pools of 3m diameter @ Rs.20,000/- per pool	40000
3	Overhead tank of 5000 gallons capacity	100000
4	Shallow tube well 8"x6"x200'	100000
5	Pumpset(5HP)	20000
6	Generator set with 10 KVA alternator	50000
7	Guard shed and office room	25000
8	Brood stock-1 tonne	100000
9	Contingent expenses for nets, equipments hapas etc.	30000
	<b>Total</b>	<b>765000</b>

**B. Recurring Cost**

S.No.	Item	Amount (Rs)
1	Feeding of brood stock @ 3% body weight for 1 tons of fish.	50000
2	Salary of 3 persons @ Rs.4000/pm	144000
3	Cost of Hormones (5 Quintal)	25000
4	Cost of Lime, Fertilizers and other Manure	50000
5	Cost of Electricity on an average @ Rs 5000/ Month	60000
6	Cost of 6 more persons for 2 months @ 10000 per month	120000
	<b>Total</b>	<b>449000</b>

**Unit Cost:-**

S.No.	Cost	Amount (Rs)
1	Capital cost	765000
2	Recurring cost	449000
	Total	1214000

**PRODUCTION**

S.No.	Particulars	Unit	Number
1	Per batch requirement of female brood fish	KG	60
2	Per batch requirement of brood fish for single run (male and female)	KG	100
3	Total number of hatchery runs @14 run/month for 2 months	Runs	25
4	Total requirement of brood fish in 2 months (100 kgs.x25 runs)	KG	2500
5	Number of spawn produced per kg body weight of female brood fish (considering @ 1.5 lakh/kg female, 70% fertilisation 60% hatching rate)	Number	63000
6	Spawn produced from female brood fish in a single run (60 KG Female Breeder)	Number	3780000
7	Spawn produced from female brood fish in all 25 run	Number	94500000

**Income**

S.No.	Gross income/run	Amount (Rs)
1	From sale of 37.8 Lac spam @ Rs 1000/Lac spawn	37800
2	Gross income/month (Rs.37800 *12 runs)	453600
3	Gross income in 2 operative months (Rs 453600*2 Months)	907200
	Net income	
4	Total Income	1398600
5	Total Recurring Expenses	449000
6	Net income	534000

**Financial Analysis of Eco Hatchery**

Particulars	Years				
	1	2	3	4	5
Capital Cost	765000	-	-	-	-
Recurring Cost	449000	449000	449000	449000	449000
Total	1214000	330000	330000	330000	330000
Income	1398600	1398600	1398600	1398600	1398600
Net Income	-264400	619600	619600	619600	619600

## Business Plan 3- Ornamental Fish Breeding

### 1. Introduction

Keeping colourful and fancy fishes known as ornamental fishes, aquarium fishes, or live jewels, is one of the oldest and most popular hobbies in the world. The growing interest in aquarium fishes has resulted in steady increase in aquarium fish trade globally. The ornamental fish trade with a turnover of US \$ 6 Billion and an annual growth rate of 8 percent offers lot of scope for development.

The top exporting country (with percentage contribution to global trade) is Singapore (19.8%) followed by Czech Republic (7.8%), Japan (7.4%), Malaysia (7.3%), Indonesia (5.3%), Israel (4.3%), Thailand (3.9%), Sri Lanka (2.9%) and India (0.008%). The largest importer of ornamental fish is the USA followed by Europe and Japan. The emerging markets are China and South Africa. It shows India has huge potential for growth in this sector. The overall domestic trade in this field cross ₹ 100million and is reportedly growing at the rate of 20 per cent annum. Considering the relatively simple techniques involved, this activity has the potential to create substantial employment opportunities.

### 2. Ornamental Fishes

Aquarium fishes are mainly grouped into two categories, viz., Oviparous (egg - layers) and Viviparous (live-bearers). Further, the fresh water ornamental fish varieties can be broadly grouped into Tropical and Cold water species also. Management of these two categories is different in nature.

According to water tolerance fishes are hard water tolerant, soft water tolerant species and those with wider tolerance. The common varieties of fishes and the details of grouping is given below.

Species	Water Quality	Breeding Season	Breeding Type	Parental Care
<b>Molly</b>	Hard water Sp.	Summer/Monsoon	Live Bearer	Young Ones
<b>Guppy</b>	Hard water Sp.	Summer/Monsoon	Live Bearer	Young Ones
<b>Platy</b>	Hard water Sp.	Summer/Monsoon	Live Bearer	Young Ones
<b>Swordtail</b>	Hard water Sp.	Summer/Monsoon	Live Bearer	Young Ones
<b>Blue Gourami</b>	Wide Tolerance	Summer/Monsoon	Nest Builder	Male Guard eggs
<b>Pearl Gourami</b>	Wide Tolerance	Summer/Monsoon	Nest Builder	Male Guard eggs
<b>Rosy Barb</b>	Wide Tolerance	Summer/Monsoon	Egg Scatterer	Adhesive
<b>Gold Fish</b>	Wide Tolerance	Monsoon/Winter	Egg Scatterer	Adhesive
<b>Z/P/VIDanio</b>	Wide Tolerance	Summer/Monsoon	Egg Scatterer	Non Adhesive
<b>S Fighter</b>	Wide Tolerance	Summer/Monsoon	Nest Builder	Male Guard eggs
<b>Catfish</b>	Wide Tolerance	Monsoon/Winter	Egg depositor	Enclosures Reqd.
<b>Angel*</b>	Soft Water	Summer/Monsoon	Egg depositor	Airing of eggs with fins
<b>FM Cichlid</b>	Soft Water	Summer/Monsoon	Egg depositor	Enclosures Reqd.

Monsoon - June to August, Summer - March to May, Winter - November to January.

<b>R D Cichlid</b>	Soft Water	Summer/Monsoon	Egg depositor	Enclosures Reqd.
<b>Bl W Tetra</b>	Soft Water	Summer/Monsoon	Egg Scatterer	Adhesive
<b>B A Tetra</b>	Soft Water	Summer/Monsoon	Egg Scatterer	Adhesive
<b>Serpa Tetra</b>	Soft Water	Summer/Monsoon	Egg Scatterer	Adhesive
<b>Manila Carp</b>	Soft Water	Monsoon/Winter	Egg Scatterer	Adhesive

### 3. Technology

At present in India, hundreds of exotic and indigenous ornamental fish varieties are being bred under captive condition. Majority of the production goes to domestic market and to some extent for export.

There are quite a large number of tropical aquarium fishes known to the aquarists. While many of the fishes are easy to breed, some of these are rare, difficult to breed and expensive. Most of the exotic species can be bred and reared easily since the technology is simple and well developed. It is advisable to start with common, attractive, easily bred and less expensive species before attempting the more challenging ones.

#### An ornamental fish project can be either for

- 1) Rearing only
- 2) Breeding only
- 3) Breeding and rearing depending upon the space available/ scale of operations desired and the expertise.

#### 3.1. Culture/Rearing

The culture/rearing of these fishes can be taken up normally in cement tanks. Cement tanks are easy to maintain and durable. One species can be stocked in one tank. However, in case of compatible species two or three species can occupy the same tank. Ground water from dug wells/ deep tube wells/ bore wells are the best for rearing fish. The fishes reach marketable size in around 4 to 6 months. Eight to ten crops can be taken in a year.

#### 3.2. Feeding

Young fish are fed mainly with Infusoria, Artemia, Daphnia, Mosquito larvae Tubifex and Blood worms. For rearing, formulated artificial or prepared feed can be used. At present no indigenous prepared feed for aquarium fish is available. The amount and type of food to be given depends on the size of the fry. Feeding is generally done twice in a day or according to the requirement. For rearing from fry stage dry/ prepared feed can be used.

#### 3.3. Breeding

The method of breeding is based on the family characteristics of the fish. The success of breeding depend on the compatibility of pairs, the identification of breeders which is a skill gained through

experience. Generally the brooders are selected from the standing crop or purchased and reared separately by feeding them with good live food. However, it is always better to buy good brood stock and replace the breeders. Otherwise, the original characteristic of the species keeps on getting diluted because of continuous inbreeding. Brooders especially egg layers should be discarded after few spawning.

### 3.4. Health Care

Water exchange, is a must for maintaining water quality conducive for the fish health. Only healthy fish can withstand the effects of transportation and fetch a good price. Permitted chemicals / antibiotics, vitamins, etc can also be used for preventing / treating diseases.

### 3.5. Market

At present the market is mainly domestic and the demand is increasing steadily. The export market for indigenously bred exotic species is also fast growing and encouraging.

## 4. Ornamental Fish breeding project

### 4.1. Site selection

Site should be located in a flood free area having continuous supply of good quality water. The water source can be dug well or tube well, ponds and rivers having required water quality parameters conducive for breeding of aquarium fishes.

### 4.2. Water quality parameters

Following Parameter needed to be followed in order to maintain water quality.

<b>Temperature</b>	<b>24 to 28 degrees C</b>
<b>pH</b>	7.0 to 8.5
<b>Carbon di oxide</b>	<10 ppm
<b>Alkalinity</b>	75 to 120 ppm as CaCO <sub>3</sub>
<b>Hardness</b>	60 to 100 ppm as CaCO <sub>3</sub>
<b>Dissolved Oxygen</b>	6.0 to 8.0 ppm
<b>Free Ammonia</b>	< 0.05 ppm
<b>Ionized Ammonia</b>	< 0.4 ppm

### 4.3. Tanks

The tanks can be of RCC or brick masonry work having flat bottoms with inlet and outlet pipes. Clay, cement, fiber glass or plastic tanks can also be used. Rearing of fishes should be done in large tanks. Size of the tanks varies according to the space, the number and type of fish cultured.

### 4.4.

#### Aquariums

Glass tanks of varying size are required for breeding. Small glass bottles of 250 ml are used for keeping individual male fighter fishes. Number and size of the glass tanks depend on the specific breeding / spawning behavior of the species selected.

#### 4.5. Over-head tank:

An over-head tank of suitable size for storing and to enable sedimentation of water is required.

#### 4.6. Water Supply

Deep tube wells would be the best source of water. Recycling of water through bio-filters or other sort of filtering mechanism can be tried. Other sources like dug wells, municipal water if available can also be used. A small pump to lift the water to over head tank and a network of pipes are needed to feed the culture tanks.

#### 4.7. Work Shed

Work shed should be designed in such a way that the tanks get filtered sunlight. Translucent HDPE sheets can be used. This also protects the culture tanks from falling debris and bird dropping etc.

#### 4.8. Aeration equipments

A blower pump with net work of tubes for aeration is a must. Continuous power supply should also be ensured through generator set or UPS or inverter.

#### 5.0. Assumptions

For the purpose of working out economics of breeding unit, a unit size of 100 sq.mts with partly covered glass tank area with tin sheets and the entire cement tank and glass aquaria tank area covered with green shade net. Average production capacity of 0.163 million fry per year. The operations provide for flexibility of live bearers, egg layers and various combinations of species depending upon the market demand.

Unit of this size has been designed considering the small entrepreneurs in view. However, the same could be increased on modular basis and the economics can be worked out in project situation accordingly. In case water source already not available, bore well of appropriate depth also can be considered.

#### 6.0. Project cost for the ornamental fish breeding unit.

##### A) Capital and recurring Cost

Sl No	Particulars	Nos / units	Unit rate (Rs)	Cost (Rs)
<b>A</b>	Breeding Section			
<b>1</b>	Aquarium tanks of @ 250 L capacity each	30	1375	41250
<b>2</b>	Cement tanks for brood stock @ 1000 L capacity each	5	3500	17500

<b>3</b>	Shed (Civil work and Shade net (for 100 sq m) with tin roofed area of 15 sqm)	100	1500	150000
<b>B</b>	Rearing Unit			
<b>1</b>	Cement tanks for brood stock (5000 Lit capacity)	8	10000	80000
<b>C</b>	Packaging unit			
<b>1</b>	Marketing stock tanks (2000 L capacity)	3	4000	12000
<b>2</b>	Aquarium tanks (250 L capacity)	30	1375	41250
<b>3</b>	Oxygen cylinder, accessories			10000
<b>4</b>	Aeration blower			20000
<b>5</b>	Hand nets			5000
<b>6</b>	Plumbing components			10000
<b>7</b>	Electrical components			7000
<b>8</b>	Generator			25000
<b>9</b>	Motor			12000
<b>10</b>	Filtration equipment			67500
<b>11</b>	Tube well			50000
<b>12</b>	Lab Equipment			7500
	Sub Total- Capital cost			556000
	Recurring Expenditure			
<b>1</b>	Brood stock fish			25000
<b>2</b>	Feed (live feed + formulated feed)			36500
<b>3</b>	Management			90000
<b>4</b>	Power & Fuel			15000
<b>5</b>	Packing & Transport			10000
<b>6</b>	Miscellaneous			15000
	Sub Total - Recurring cost			191500
	<b>Total Project Cost</b>			<b>747500</b>

#### B. Production and Income

Particulars	No of brood stock-Female	No of brood stock-Male	Young ones produced per brooder	Total young ones produced / cycle	50% Survival after 2 months of rearing

1	Live Bearers (guppies, molly, platy, sword tail etc) OR	3640	910	10	36400	18200
	Egg Layers (Gourami, Barb,	27	54	1350	36450	18225
2	Total Average Production from 1 Cycle	18200				
3	Total Production from 9 cycles per year	163800				
4	Sale price per piece in Rs	2.5				
5	Total Income	409500				

### C. Financial Analysis

Particulars/ Year	1	2	3	4	5	6
Capital cost	556000					
Recurring cost	95750	191500	191500	191500	191500	191500
Total cost	651750	191500	191500	191500	191500	191500
Income	204750	409500	409500	409500	409500	409500
Net Income	-447000	218000	218000	218000	218000	218000
Discount Rate	15%					
Present Worth of Capital	1124946					
Present Worth of Benefit	1371702					
Benefit Cost Ratio	1.2:1					
Net Present Worth	246756					
Internal Rate of Return	>40%					

Source:-NABARD

## Annexure 7 Capacity Building Strategy

### 1. Introduction

The project aims to make the inland fishery sector adaptive to climate variability and enhance the adaptive capacity of the fish farmers to ensure their livelihood security in Madhya Pradesh. The project's interventions are focused on small and marginal farmers. The ponds selected for intervention will be small ponds less than 10 hac that are within the jurisdiction of Gram Panchayats. The project will work with fishers who are directly involved in the process and act of fishing and who have been able to secure the leasing rights for fishing from the Gram Panchayat.

Fisher(s) for a pond may be individual or as members of a formal or informal livelihood group. These may be persons who have practiced systematic fish farming or be persons who do not have enough experience of fish culture in the area.

### 2. Capacity Building Strategy

#### 2.1 Existing Barriers

##### (a) Institutional Barriers

The existing source of providing capacity building inputs is the Department of Fisheries at the district level. The department does not have any strategic plan for the conduct of training on fisheries. The identification of training event is not based on any systematic assessment of the training need or for the achievement of specific objective. The department does not have the data base that provides information on the existing capacities of the fishers and the capacity gaps in their skill and knowledge level.

Department of Fisheries has not identified climate change as one of the issues on which the fishers need to be informed, trained or sensitized. So far no training has been organized for fishers on climate change, or its impact on fisheries, or possible adaptive strategies.

##### (b) Barriers of Awareness, Education and Training

The fishers belonging to scheduled tribe community are primarily small and marginal farmers. They decided to get in to fisheries as a supplementary source of income. To conduct activities related to fisheries they are dependent on their peers who have been practicing fisheries for some time. In the absence of any other source of information or training and the learning is through a process of hit and trial.

The farmers turned fishers have not undergone a systematic process of preparation of business plan nor have engaged with different stakeholders. Their levels of awareness of the value chain is limited and they do not have the capacity to manage business of fisheries at scale. Most of the fishers operate at sub optimal level of production and the productivity of pond is well below the state average.

##### (c) Market Barriers

The market as it operates at different stages of the value chain does not provide adequate infrastructural support to the fisher. The market for supply of fish seed is monopolistic and is

dominated by few suppliers. This creates terms of trade that favour the supplier than the fisher. Similarly, the market for sale of fish does not provide storage or chilling facility as a result of which the fisher harvests fish that he estimates can be sold in the local market. His lack of access to wider markets acts as a constraint in enabling him to operate at optimal levels and negotiate better price for his product.

The barriers define the scope for capacity building strategy that has to take in to account the need to develop capacities that bring about changes at the policy and institutional level; to develop skills and knowledge among the practicing fishers; and development of infrastructural capacities for the fishers and to develop skills and knowledge within the fishers to enter in to trade and business partnerships with other stakeholders in the market.

## 2.2 Approach and Principles of Capacity Building Strategy

### 2.2.1 Approach

The capacity building strategy will adopt a comprehensive approach and will consequently focus on the individual, at the organizational and systemic level:

- **Individual level:** capacity building primarily refers to the process of changing attitude and behaviour such that the fishers are able to develop and adopt climate resilient and adaptive strategies. This change will be brought about by enhancing the levels of information and knowledge that exists with fishers related to fisheries, on process and impact of climate change; and how adaptive strategies can be developed to deal with vulnerabilities arising out of the processes of climate change. At the skill level capacity building will include mechanisms of learning by doing and, participation and achieving level of competency in the conduct of fisheries and in developing and implementing different strategies.
- **Organisational level:** capacity building will include mechanisms that improve relationship between fishers and groups and between fishers and other stakeholders. The ability to identify and negotiate terms of business with other stakeholders and strengthen the fisher group at the same time will include training inputs in the process of development of business plan, identification and development of stakeholder management strategy; and a macro understanding of the fishery sector and its cyclical and seasonal behaviours.
- **Systemic level:** capacity building focuses on strengthening enabling environment that is concerned with overall policy environment, relationship and processes between institutions in the external environment, and economic frameworks that guide the conduct of business of fisheries. The capacity inputs will be in the form of generating discussions based on knowledge products of the project by direct interaction with fishers and through sharing of experiences and learning with policy makers and community of practitioners.

### 2.2.2 Principles of Capacity Building

The guiding principles for the strategy for capacity building will be as follows:

**(a) Comprehensive**

Capacity building plan will address all the barriers that have been identified for fishers. This implies that capacity building will go beyond just training events and will include elements of facilitation, handholding and mentoring at the individual level and creating conditions for learning at the policy level.

**(b) Accountability**

Accountability refers to that of the resource person and the resource institute. The capacity building events will are not viewed in isolation where the contact between the trainee and the trainer ceases after the event. The trainer will be accountable to the trainees in the post training scenario and will be available to handhold and trouble shoot for the fishers. There will be direct contact between the resource person and the practitioners so that there is minimal transmission loss in learning for the trainee (fisher).

**(c) Participative**

The capacity process and the methodology will be participative. The participation will include involvement of different stakeholders in project processes and in adopting participative methodologies for the conduct of capacity building events.

**(d) Learning by Doing**

The proposed project is in the nature of an action research project. It has string elements of documentation of project processes and benefits as these can be then reflected upon and analysed as learning from the project. The next level is to interpret these learning to feed in to policies, programmes and institutional systems of the government and other stakeholders. The knowledge however is generated from the experiences of the project and community of practitioners and will be primarily based on the concept of learning by doing.

**3. Capacity Building Strategy**

The capacity building strategy of the project will be as follows

Target Group for Capacity Building	Issues for Capacity Building	Methodology of Capacity Building
Fisher and Project Staff	<b>Development as Climate Resilient Fisher</b> <ul style="list-style-type: none"> <li>● Responsible Fishing</li> <li>● Factors of Climate Change</li> <li>● Impact of Climate Change</li> <li>● Alternative Strategies for responding to Climate Change</li> </ul>	<ul style="list-style-type: none"> <li>- Classroom Training events</li> <li>- Demonstration by experts</li> <li>- Learning by Doing process/ facilitation</li> <li>- Exposure visits</li> </ul>

	<p><b>Development of Climate Adaptive Strategies</b></p> <ul style="list-style-type: none"> <li>• Livelihood security and Adaptation</li> <li>• Coping vs adaptation strategies</li> <li>• Risk and Vulnerability assessment in fisheries</li> <li>• Identification and Implementation of Risk management strategies</li> <li>• Adaptive strategies and their adoption</li> </ul>	<ul style="list-style-type: none"> <li>- Classroom training</li> <li>- learning by doing/ facilitation</li> <li>- Action reflection sessions</li> </ul>
	<p><b>Development of Fishers as Climate Champion</b></p> <ul style="list-style-type: none"> <li>• Forging partnerships with other stakeholders</li> <li>• Networking skills with other fishers and fishing communities</li> <li>• Forums to address impact of climate change</li> </ul>	<ul style="list-style-type: none"> <li>- Classroom training</li> <li>- learning by doing/ facilitation</li> <li>- Making presentations</li> </ul>
Members of Steering Committee (State and District level)	<p><b>Sensitisation on Climate Change and Livelihood Security</b></p> <ul style="list-style-type: none"> <li>• Factors of Climate Change and impact of fisheries</li> <li>• Government response to climate change in the state and the region</li> </ul>	<ul style="list-style-type: none"> <li>- Participation in Steering Committee meetings</li> <li>- Direct interaction with fishers</li> </ul>
	<p><b>Adaptive Strategies for Fishers</b></p> <ul style="list-style-type: none"> <li>• Risks and Vulnerabilities arising out of climate change for fishers</li> <li>• Adaptive strategies developed and their effectiveness for fishers</li> <li>• Policy implications of adaptive strategies</li> </ul>	<ul style="list-style-type: none"> <li>- Participation in Steering Committee meetings</li> <li>- Direct interaction with Fishers</li> <li>- Perusal of Monitoring and Evaluation reports</li> </ul>
Panchayat Representatives	<p><b>Climate Change and Livelihood Security</b></p> <ul style="list-style-type: none"> <li>• Factors of Climate Change</li> <li>• Impact of Climate Change</li> <li>• Vulnerabilities arising from process of climate change</li> </ul>	<ul style="list-style-type: none"> <li>- Classroom training</li> <li>- Interaction with Fishers</li> </ul>

#### 4. Capacity Building Plan

The timeline for the capacity building process will be as follows:

Capacity Building Process	Project Period											
	Year 1 (Quarter)				Year 2 (Quarter)				Year 3 (Quarter)			
	01	02	03	04	05	06	07	08	09	10	11	12
Climate Resilient Fisher <i>(Fishers and Project Staff)</i>												
Climate Adaptive Strategies <i>(Fishers and Project Staff)</i>												
Climate Champion Fishers <i>(Fishers and Project Staff)</i>												
Sensitisation on Climate Change and Livelihood Security <i>(Steering Committee)</i>												
Adaptive Strategies for Fishers <i>(Steering Committee)</i>												
Climate Change and Livelihood Security <i>(Panchayat Representatives)</i>												

The Resource Persons for capacity Building events and processes will be drawn from the Technical Advisory Group formed at the state level. These Resource Persons will be available to the project and the fishers on a regular basis. The Technical Resource Persons will also provide specific inputs related to their field to the members of the Steering Group on need basis.

## Annexure 8 Human Resource Plan

### 1. Activity Analysis

The activities to be carried out under the project to make the fishers efficient and climate resilient farmers have been listed below. These activities are not listed sequentially as there will be activities that will be carried out simultaneously as well. The aim of listing these activities is to assess the project staffing requirement and to facilitate in the development of respective Job Descriptions of the project personnel.

	Efficient Fisher	Climate Resilient Fisher
Pre construction	<ul style="list-style-type: none"> <li>• Approval from Gram Sabha</li> <li>• Finalisation from Gram Panchayat</li> <li>• Sanction from Collector/ Department of Fisheries</li> </ul>	<ul style="list-style-type: none"> <li>• Identification of cluster on geo hydrological suitability</li> <li>• Community mobilisation and sharing of information</li> <li>• PLA for finalization of site</li> <li>• Pond design and development of climate resilient plan</li> <li>• Orientation on climate variability and its impact on fisheries</li> </ul>
Construction	<ul style="list-style-type: none"> <li>• Mobilisation of labour and resources for construction</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of catchment treatment plan</li> </ul>
Pre Fishing	<ul style="list-style-type: none"> <li>• Formation of Fisher Livelihood Group</li> <li>• Development of business plan</li> <li>• Training and orientation in responsible fish farming practices</li> <li>• Input mobilization</li> </ul>	<ul style="list-style-type: none"> <li>• Training and orientation on climate variability and its impact on fisheries</li> <li>• Development of climate adaptation plan</li> <li>• Institutional linkages (credit, insurance etc)</li> <li>• Inputs of fish seed based on climate adaptability</li> </ul>
Fish Farming	<ul style="list-style-type: none"> <li>• Training on responsible fisheries</li> <li>• Package of practice related to responsible fishing</li> </ul>	<ul style="list-style-type: none"> <li>• Training on climate adaptation protocols</li> <li>• Implementation of protocols that are part of climate adaptation plan, e.g. timing for introduction of fish seed, harvesting practices</li> <li>• Introduction of appropriate technologies to enable fish farming to adapt to warmer climatic regimes</li> </ul>

<b>Knowledge Management</b>	<ul style="list-style-type: none"> <li>• Tracking and quantification of benefit received by the project</li> <li>• Evidence of resilience of climate benefit strategy</li> </ul>
<b>Learning and Advocacy</b>	<ul style="list-style-type: none"> <li>• Dissemination of impact and benefit from fisheries</li> <li>• Dissemination of climate adaptation strategy</li> </ul>

## 2. Job Descriptions

The organisation structure of the project comprise of three levels: state level that will provide the overall leadership and coordination to the project and undertake monitoring and supervision of project activities; district level structure that comprise the field management team to spearhead implementation of project activities at the district and sub district level; and cluster level teams to ensure execution of project activities at the pond level and with targeted fisher community.

### 2.1 Project Coordinator

#### 2.1.1 Position Description

Project Coordinator is the executive head of the project and will be the nodal contact person for external stakeholders. The Project Coordinator will be placed at the state headquarter at Bhopal.

#### 2.1.2 Job Responsibility

##### (a) *Monitoring*

- Presenting project activities to the Steering Committee and incorporating their recommendations as part of project implementation plan
- Ensuring that the project activities are carried out according to the agreed project protocols and systems
- Participating in planning meetings and tracking of activities to agreed timeline
- Quality monitoring to ensure that the project processes are being adhered to by the project team
- Identifying and implementing corrective measures on operational problems and slippages
- Ensure financial utilization adheres to highest ethical standards and accounting procedures

##### (b) *Reporting*

- Preparing financial and activity reports according to the reporting cycle to National Implementing Entity

- Consolidation of project related documentation
- (c) *Meetings with other stakeholders*
  - Making presentation of the project to other stakeholders
  - Engaging with external stakeholders to achieve the project activities
- (d) *Communication*
  - Develop communication protocols within the project team and with external stakeholders
- (e) *Staff Training*
  - Facilitating conduct of staff capacity building at different stages of the project
- (f) *Reviews and Evaluation*
  - Facilitate conduct of reviews and evaluations as per the agreed monitoring and evaluation plan of the project
- (g) *Climate Change*
  - Identify, collate and analyse climate change parameters and adaptation measures within the project and in the external environment of the project
- (h) *Action-Reflection-Learning*
  - Facilitate learning within the project team and with intervened stakeholders including fishers through the process of action-reflection-learning cycle
  - Document learning from the project for wider dissemination
- (i) *Knowledge Management*
  - Coordinate with knowledge management team to ensure that experiences and learning from the project are documented with evidence and available for wider dissemination

## **2.2 Senior Technical Member**

The technical members identified for the project include technical experts in the fields of Fisheries; Agriculture Engineering; Rural Marketing; and Institution Development.

### **2.2.1 Position Description**

Senior Technical Member is responsible for the execution of the project at the district and sub district level and provides subject inputs to the project team. The Senior Technical Person will be placed at the district level and will be members of the Field Management Team.

### **2.2.2 Job Responsibility**

#### *(a) Execution*

- Preparation of district level plan for implementation of project activities
- Implement project related activities in the district as per implementation plan and protocol
- Participate in the project meeting at the state level to plan and review project activities
- Monitor the activities of the project team to ensure that the activities are carried out in adherence to the project time line

- Monitor the processes and protocols followed by the project team so that the quality of intervention is ensured
- Ensure that the report of the district is prepared and submitted in time to the state office

*(b) Subject input*

- Provide subject related technical input to other team members and target fisher groups
- Be the resource person in capacity building activities for the project team and target group of fishers for matters related to their subject
- Provide subject matter inputs in the preparation of business plan and climate adaptation plan for the target fishers

*(c) Stakeholder Engagement*

- Engage with district level external stakeholders according to the stakeholder management strategy of the project
- Represent the project to external stakeholders and make presentation if required
- Develop linkages with technical institutions to draw upon their technical inputs and bring them as part of project activities and interventions

*(d) Community engagement*

- Undertake community engagement in the project area for sharing project related experiences and learning

*(e) Climate Change*

- Pro actively identify, collate and analyse climate change parameters and adaptation measures within the project and in the external environment of the project

*(f) Action-Reflection-Learning*

- Facilitate learning amongst project members and intervened group of fishers through the process of action-reflection-learning

## **2.3 Knowledge Manager**

### **2.3.1 Position Description**

Knowledge Manger will be responsible for the initiating knowledge generation processes and development of knowledge products from the project. The Knowledge Manager will be placed at Bhopal.

### **2.3.2 Job Responsibility**

*(a) Protocols for Knowledge Generation*

- Development off protocols for knowledge generation
- Ensure the implementation of protocols, data collection, collation and analysis based on pre agreed hypothesis

*(b) Accessing secondary sources of information*

- Pro actively searching information and knowledge products from other projects and initiatives related to climate change and fisheries to provide inputs to the project

- Keeping the project informed of policy developments on climate change and fisheries so that these can be fed in to project activities

*(c) Development of Knowledge Products*

- Development of knowledge products for different audience especially on issues related to climate change and inland capture fisheries
- Dissemination of knowledge products and gaining feedback from different audience for providing as input to the project

*(d) Climate Change*

- Explore micro to macro level linkages of experiences and learning from the field to policy level inputs on issues related to climate change
- Accessing knowledge products developed by other projects and initiatives

*(e) Facilitate Evaluations and Reviews*

- Facilitate implementation of evaluations and reviews as per the monitoring and evaluation plan of the project
- Developing action taken report on the recommendations of the mid-term evaluation and reporting the same to NIE

## **2.4 Junior Technical Member**

The technical members identified for the project include technical experts in the fields of Fisheries; Agriculture Engineering; Rural Marketing; and Institution Development.

### **2.5.1 Position Description**

Junior Technical Member is responsible for the execution of the project at the sub district level and provides subject inputs to the cluster team and fishers. The Junior Technical Person will be placed at the district level and will report to the Senior Technical Member.

### **2.5.2 Job Responsibility**

*(a) Execution*

- Implement project related activities in the district as per implementation plan and protocol
- Participate in the project meeting at the district level to plan and review project activities
- Monitor the activities of the project team at the cluster level to ensure that the activities are carried out in adherence to the project time line
- Monitor the processes and protocols followed by the project team so that the quality of intervention is ensured

*(b) Subject input*

- Provide subject related technical input to other team members and target fisher groups
- Be the resource person in capacity building activities for the project team and target group of fishers for matters related to their subject

- Provide subject matter inputs in the preparation of business plan and climate adaptation plan for the target fishers

*(c) Community engagement*

- Undertake community engagement in the project area for sharing project related experiences and learning

*(d) Participate in project processes as per Implementation Plans and Protocols*

- Actively engage with target group of fishers for the implementation of project activities as per plan and protocols

*(e) Support Cluster Team Members*

- Provide technical and administrative support to the cluster team members to enable them to carry out their planned activities in the cluster

## **2.5 Field Associates**

### **2.5.1 Position Description**

Field Associates will have the responsibility of executing project activities with community, at the pond level and with targeted fisher folk in the project villages in the three districts. The Field Associates will be placed at the district level and as a team they will cover all the ponds that are selected by the project. The team of Field Associates will comprise of person with knowledge and skill to undertake Fisheries; Rural Marketing; Institution Development; and Research Investigator.

### **2.5.2 Job Responsibility**

*(a) Information dissemination*

- Inform the village community about the project objectives and activities
- Making community aware on the process of climate change and how does it impact their livelihoods

*(b) Mobilisation*

- Mobilisation of the community and fisher(s)/Group to undertake project related activities
- Mobilisation of Gram Sabha and Gram Panchayat to provide support to the project activities at the village and Panchayat level

*(c) Capacity Building*

- Facilitate implementation of capacity building plan of the fishers to enable them to become efficient fishers and climate resilient fishers
- Facilitate learning among the fishers that have gone on exposure visit to other project and institutions

*(d) Meetings*

- Conduct regular meetings of the fisher and their groups to develop them as saving and credit group
- Attend meeting at the district level conducted by Field Management Team to plan, monitor and review the implementation of activities under the project

*(e) Data Collection*

- Collect data and information from different stakeholders and report on the processes and impacts of the project
- Collect and maintain evidence of project processes, benefits and impacts so that the same can be used for documentation and development of knowledge products

## Annexure 9 Financial Service Plan

### 1. Capital Cost - Fish Farming on Common Property

- Major items of capital cost
  - Pond Construction
  - Boat

Present Source of Financial Service	Constraints and Challenges	Proposed Financial Service Plan
<ul style="list-style-type: none"> <li>• <b>Grant funding from government</b></li> </ul>	<ul style="list-style-type: none"> <li>• Government scheme for pond construction does not have specific design for pond for fisheries and for design that takes the impact of climate change in to account</li> <li>• Process with government involves multiple stakeholders</li> <li>• Long time duration for processing and implementation</li> <li>• Delays, leakages and issues of quality</li> </ul>	<ul style="list-style-type: none"> <li>• Project will pilot pond construction with design that takes in to account the impact of climate change on water retention require for fisheries.</li> <li>• Project will also select ponds where the design will be modified according to the needs and requirements of fisheries to adapt to climate change.</li> <li>• Project will provide grant funding for the construction/modification of the pond.</li> </ul>

### 2. Capital Cost - Fish Farming on Private lands

- Major items of capital cost
  - Pond Construction
  - Boat

Present Source of Financial Service	Constraints and Challenges	Proposed Financial Service Plan
<ul style="list-style-type: none"> <li>• <b>Grant funding from government</b></li> <li>• <b>Own source/labour</b></li> <li>• <b>Borrowed from friends/relatives (Boat)</b></li> </ul>	<ul style="list-style-type: none"> <li>• Capital is available in small installments hence delays in implementation</li> <li>• Required amount may not be available hence compromises in size and quality</li> </ul>	<ul style="list-style-type: none"> <li>• Project will pilot pond construction with design that takes in to account the impact of climate change on water retention require for fisheries.</li> <li>• Project will also select ponds where the design will be modified according to the needs and requirements of fisheries to adapt to climate change.</li> <li>• Project will provide grant funding for the construction/modification of the pond.</li> </ul>

### 3. Capital Cost - Hatchery by Private Operator

- Major items of expenditure include:
  - Pond Construction

- Breeding and hatching pools
- Overhead tank
- Generator
- Tube well and Pump set
- Office and Packing space

Present Source of Financial Service	Constraints and Challenges	Proposed Financial Service Plan
<ul style="list-style-type: none"> <li>● <b>Own investment by private operator</b></li> </ul>	<ul style="list-style-type: none"> <li>● Require large amounts that is not available with small and marginal farmers</li> <li>● Banks have not identified hatchery units as viable business propositions and do not provide funding for the same</li> </ul>	<ul style="list-style-type: none"> <li>● Experiment with low cost hatchery unit developed by CIFA will be undertaken. The project will provide grant funding for pilot nurseries</li> </ul>

#### 4. Working Capital - Fish Farming

- Major items of working capital expenditure are:
  - Fish seed
  - Fish Feed
  - Net and equipment
  - Labour
  - Fish Feed
  - Transportation Cost

Present Source of Financial Service	Constraints and Challenges	Proposed Financial Service Plan
<ul style="list-style-type: none"> <li>● <b>Government grant funding</b></li> <li>● <b>Contribution pooled by members of fisher groups</b></li> <li>● <b>Fishermen Credit Card scheme that provides credit at 1% (reported by Apex Bank)</b></li> </ul>	<ul style="list-style-type: none"> <li>● Credit from financial institutions and government is available only to cooperative societies. Livelihood Groups/ SHGs and other forms of informal groups do not access to these sources of credit</li> <li>● Contribution pooled from members sets limit to the extent to which the group will be able to do business though the potential may be higher</li> <li>● Fishermen Credit Card scheme has been a non starter and no example of</li> </ul>	<ul style="list-style-type: none"> <li>● Project will prepare business development plan of each pond and train and orient the fisher(s) group to track their expenditure so that they can assess for themselves the cost and income implications of adaptive strategies and also use the documentation for accessing credit from formal sources</li> <li>● Orientation of banking representatives on business plans developed through the Lead Bank</li> </ul>

<p><b>to Cooperative Societies only</b></p>	<p>the card being issued or used was found in proposed districts</p> <ul style="list-style-type: none"> <li>• None of the fisher groups (formal or non formal) keep track of their income and expenses as a result of which they are unable to access credit from</li> <li>• Credit to modify or make mid course corrections to adapt to climate change or extreme weather events is not available</li> </ul>	<p>Officer to provide credit on a pilot basis to fisher groups</p> <ul style="list-style-type: none"> <li>• Fisher groups to be facilitated to form cooperative society so that they can increasingly access banking services for savings, credit an for making investments as well</li> <li>• Regular facilitation, handholding and mentoring to fisher groups for their institutional strengthening</li> </ul>
---	---	--

### 5. Working Capital - Hatchery by Private Operators

- Major items of expenditure for working capital of hatchery are:
  - Netting cost
  - Labour
  - Hormones
  - Lime fertilizer and manure
  - Electricity
  - Packing cost

Present Source of Financial Service	Constraints and Challenges	Proposed Financial Service Plan
<ul style="list-style-type: none"> <li>• <b>Own investment by private operator</b></li> </ul>	<ul style="list-style-type: none"> <li>• Investments are large and generally the hatchery is conducted by an individual operator. Small and marginal farmers find it difficult to access funds to operate the hatchery.</li> <li>• Private hatchery has not emerged as a bankable business proposition to be funded by financial institutions</li> </ul>	<ul style="list-style-type: none"> <li>• Development of business plan for hatchery units and training fishers to run and operate the unit on business lines</li> <li>• Grant funding will be provided by the project for low cost hatchery units</li> </ul>

### 6. Business Development Cost

- Major items cost include:
  - Making investments for storage
  - Backward/forward integration of production/ business processes
  - Mechanisation and investments to improve farm productivity

Present Source of Financial Service	Constraints and Challenges	Proposed Financial Service Plan
<ul style="list-style-type: none"> <li>• <b>Own investment</b></li> <li>• <b>Ploughing back of profits</b></li> </ul>	<ul style="list-style-type: none"> <li>• Fishers have not assessed the benefits of backward and forward linkages that will help them in developing adaptive capacity for fish farming. The access to these linkages is negligible.</li> <li>• Lack of knowledge about the development of machines and other technologies constraints the fishers in allocating part of their profits from fisheries for making growth related investments</li> <li>• Financial institutions do not have credit products that allow fishers to make growth related investments</li> </ul>	<ul style="list-style-type: none"> <li>• Train, orient and develop the skill of the fisher in alternative technological options to adapt to vulnerabilities arising out of climate change.</li> <li>• Project to provide grant funds as pilot for installation and rolling out of adaptive technological options for the fishers.</li> <li>• Regular account keeping by the fishers group will be facilitated that will allow assessment of surplus and allocation of fund for growth related activities and technologies.</li> </ul>

## 7. Capacity Building and Skill Enhancement

- Major items of expenditure are:
  - Cost for skill enhancement for developing and implementing strategies that adapt fisheries to climate change
  - Exposure visit to other farms that have employed adaptive strategies in fisheries to climate change
  - Regular contact with source of information on the impact of climate change on fisheries and innovations and experiments being tried at other places

Present Source of Financial Service	Constraints and Challenges	Proposed Financial Service Plan
<ul style="list-style-type: none"> <li>• <b>Own investment</b></li> <li>• <b>Government bearing cost of training and exposure</b></li> </ul>	<ul style="list-style-type: none"> <li>• Government has not specifically identified vulnerabilities arising out of climate change for fishers. The training programmes are in development of skill and capacities related to business as usual fisheries</li> <li>• No credit or support facility available to fishers for undergoing skill enhancement</li> </ul>	<ul style="list-style-type: none"> <li>• Project to provide grant fund to fishers for their capacity enhancement relate to climate change adaptive strategies</li> <li>• Fishers that have gained higher degree of competence will be developed as peer educators</li> </ul>

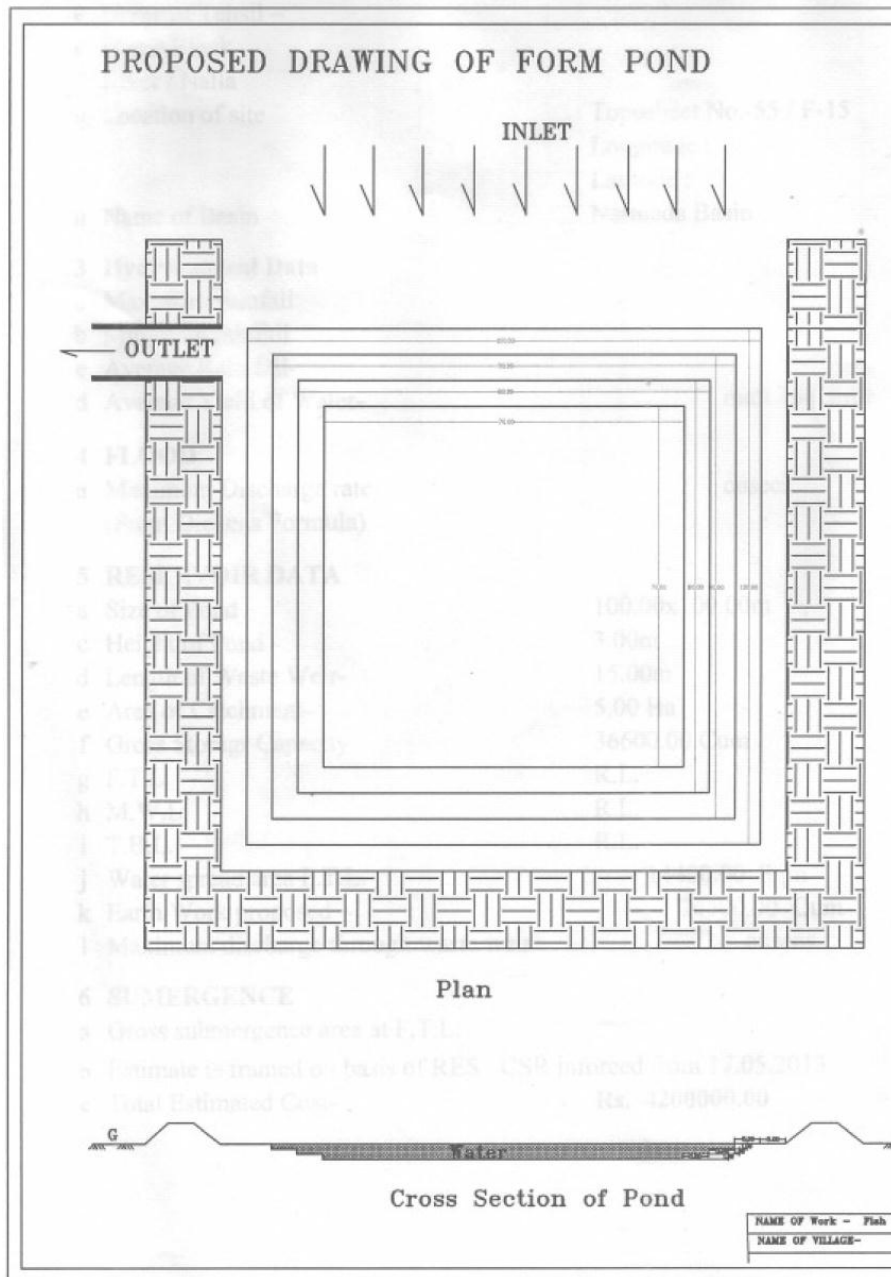
		<p>so that they can develop themselves as service providers to a larger group of fishers on issues related to fisheries and climate change</p>
--	--	--

## 8. Insurance

- Major source of expenditure is:
  - Premium money for insurance

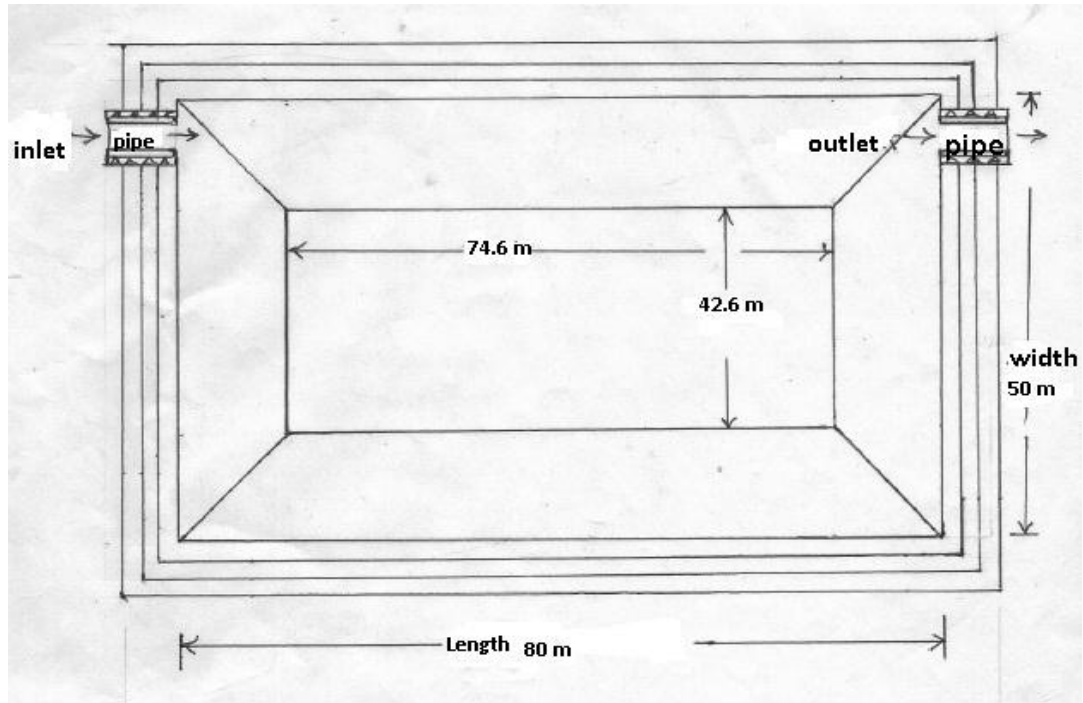
Present Source of Financial Service	Constraints and Challenges	Proposed Financial Service Plan
<ul style="list-style-type: none"> <li>• <b>Present schemes are for life and accident insurance of fishers</b></li> <li>• <b>Insurance product that protects loss of business due to disease exists</b></li> <li>• <b>Insurance product based on to weather based insurance to protect against loss of business due to climate change have been launched by private companies</b></li> </ul>	<ul style="list-style-type: none"> <li>• Lack of information with the fishers on the need for insurance as protection against business</li> <li>• There are no micro insurance schemes in the state (ILO report)</li> <li>• Lack of knowledge among fishers on weather based insurance products and their ability to assess different products that will suit their requirement</li> </ul>	<ul style="list-style-type: none"> <li>• Training fishers on basic of insurance and weather based insurance products</li> <li>• Fishers to make their own investment on premium to protect against loss due to factors of climate change</li> <li>• Project will engage intensively with the private insurance companies to increase direct interaction between fishers and insurance companies with the aim of improvement in the operation of the insurance product</li> </ul>

**Annexure 10: Pond Design**



**POND DIMENTION**  
 GROUND LEV PART-120.00X120.00M  
 UPPER PART- 100.00 X 100.00 M  
 MIDDLE PART- 90.00 X 90.00 M  
 LOWER PART- 80.00 X 80.00 M  
 POND DEPTH -3.00M  
 WATER CAPACITY- 36600.00 Cum  
 Chatment Area - 5.00 Ha

NAME OF Work - Fish Pr
NAME OF VILLAGE-



## **Annexure 11 Representative Case Studies form Project Area**

### **Case Study: Gildar (Fish Culture Practiced by Tribal Fisher on Panchayat Land)**

#### **1. Organising Business of Fish Culture**

The story of how Gilda established his business of fish culture is an example of movement of a tribal fisher from being a Novice to the present day Fish Entrepreneur. This movement can be viewed in three phases: the first is the phase of initiating and starting business activity; second is the learning phase; and third is the phase of systematizing business of fish culture. Each of these phases are detailed below.

##### **1.1 Getting Started**

Gildar Singh resides in Sur Baidi hamlet of Badala village. The hamlet had a pond constructed in 1998-99 primarily for nistari purpose at a cost of Rs 8 lakhs. In official records it is recorded as pond for to provide water for animals. The pond area is 2.67 hectares and is located at a site that has hills on three sides that make the natural drainage and catchment area for the pond. The fourth side has been embanked to create a water body. Since its construction the pond has been a perennial source of water.

Gildar Singh during his visits to nearby market places- Alirajpur and Umralli observed fish being sold in the market. On his own initiative he asked some fishers about the process and economics of fisheries. According to his calculation he found it to be a lucrative business and decided to start fisheries in the pond constructed near his house at Sur Baidi.

Gildar Singh bought fish seeds from one of the neighbouring fisher and introduced them in the pond. As the fishes started growing he found that other people would enter the pond and catch these fishes. When he protested he was told that this is a common pond and everybody has a right to access fish from the pond and he cannot stop people from catching fish. The net result was that in the first year Gildar was not able to earn anything substantial from fish culture.

Not willing to give up Gildar inquired from other similar fishers and found out that there is provision of taking pond on lease from Gram Panchayat and then he will have exclusive rights over fish. This brought him in to contact with Manager at Fish Development Centre at Alirajpur.

##### **1.2 Learning Fish Culture**

Gildar's foray in fish culture was dependent on technical guidance from the Manager at Government Fish Development Centre and Bhuvan Singh who was doing fish culture nearby his village. He applied for and obtained lease for the pond for 5 years. He brought seeds from the Manager and would harvest and sell fish in the nearby market at Alirajpur, Umralli and Sarvai.

This phase was a learning phase for Dildar. He was operating all on his own. He would go at different times of the day to ensure that there are no poachers. He would hire labour and harvest fish and carry

fish on a cycle and sell it as a retailer in the local markets. He learned about the preference of the consumer and how much fish could be sold in these markets so that he does not have to resort to distress selling.

Gildar got his lease renewed for another five years and practiced fish culture that was providing him 40% of his total income from all sources that included agriculture and poultry as well.

### **1.3 Organising Fish Business**

In the third phase of practicing fish culture Gildar used his learning to develop a business organisation and made the activities related to fisheries systematic:

**First**, Gildar realized that it is not possible for him to manage the fish culture from the pond all on his own. He was spending too much time in protection and he required labour to harvest larger quantities of fish. To overcome this he entered in to partnership with four more people who lived around the pond so that they will always be there to keep an eye on potential poachers.

The partnership is on the basis of equal contribution in terms of labour and money and equal sharing in profits. In case any of the partners are not able to participate in their share of work it is their responsibility to engage labour and get the work done. One of the partners, Gildar, keeps records of all expenses and income and every 10-15 days the partners will sit down and settle their accounts.

**Second**, to increase their sales the business now covers three local haats and also goes to villages and sell their fish as vendors. To be able to cover a larger area Gildar has brought a motorcycle through which he conducts his business.

**Third**, in the third round Gildar purposefully did not take the lease in his own name as it would create jealousy among other villagers that why it is Gildar who is always taking lease of the pond. The lease is in the name of one of the partners, Dukal Singh. This has ensured building of stakes of other partners in the business.

**Fourth**, there is a realization that the silt load in the pond has increased and it requires to be de-silted and its depth should increase. Gildar and the partners are trying to convince the Gram Panchayat to undertake deepening of the pond under MGNREGS scheme. There has been one instance when the pond was de-silted in 2008 but the work was of poor quality and the implementing agency was corrupt and siphoned money for its personal gains.

## **2. Package of Practice**

The package of practice of fish culture practiced by Gildar is given in the ensuing paragraphs:

### **2.1 Inputs**

#### **(a) Seeds**

Gildar places the order for fish seeds to the AFO at Alirajpur. Over the years he has come to estimate his fish seed requirement and he places his order accordingly. This year he had placed an order of 50,000 fish seeds for which he paid Rs 25,000 (no receipt was given to him). The fish seeds are made available to him in closed plastic bags. Cost is incurred in transporting these bags from Alirajpur to the pond site.

Gildar is under the impression that he is bound to purchase seed from AFO. He tried buying seed from Sundrail but he was told that if he did so he will not get lease from the Gram Panchayat! Secondly, in case he has to purchase seed again he is refused if he does not buy seed from the AFO.

The seeds purchased are that of rohu, catla and naren. For common carp he does not purchase seed. However one year he was asked by the AFO to give some fish of common carp and later on he had to buy the seed of carp from the AFO.

The proportion in which he purchases seed of different fish species is not clear to him. It is how the AFO tells him that he places the order. The fish seed given to him is fry and it is transported from Gujarat. According to him the mortality of the fish is high.

### **(b) Feed**

Fish feed is purchased from the AFO at Rs 29 per kg. This year he bought 17 quintals of fish fed from the AFO. Cow dung is also used that is collected from the animals at home and used in the pond.

### **(c) Labour**

Normally it is the partners who work at the pond. However if they have to employ labour it is not less than Rs 100 per day though there have been instances when they had to pay higher as there was demand for labour for other purposes during that time.

Labour, own or hired, is required for two purposes: one, for the security of the pond during the day and at night and second, for harvesting of fish. In both these cases only men are hired and employed.

## **2.2 Equipment**

### **(a) Net**

Two types of net are used- drag net and throw net. The former includes net of different sizes- one inch to five inches; and latter includes net of smaller size only. The drag net purchased is made by company and is available in Alirajpur. The throw net is made by traditional fishers living around the Narmada river and is bought from them.

### **(b) Boat**

A boat was purchased from the Fisheries department for which Gildar was given subsidy. The boat is of poor quality and will not last long.

### **(c) Marketing**

Motorcycle and jute bags are used for carrying fish to the local market and to the villages. He has weighing scale to enable him to sell fish in the market.

### **2.3 Fish Rearing and Harvesting**

Fish feed is used after 2-5 to 2 months of introduction of the fish seed in the pond. The time gap is to allow the fish to grow to a size where it can then be fed on the feed. Feed is provided as long as the fish is harvested during the fishing cycle.

Fish needs to be secured from poachers, birds, frogs and water snake (dengla). Partners or labour is engaged to provide this protection during the day and at night.

Pre harvesting activity includes throwing the net at random in the pond and catching fish to assess their growth and whether they are big enough to be sold in the market. Drag net is used to make this assessment.

Harvesting of fish is done by using drag net and throw net. When they have to catch small fish throw net is used. The drag net is used to harvest bigger fish. Normally the harvesting is done at two different times- one when the aim is to sell in the local market then harvesting is done in the forenoon; and when the fish is to be sold in the villages as vendor then the harvesting is done in the afternoon. These time periods ensure that there will be less chances of encountering the water snake and the fish harvested can be immediately sold in the market as it will be fresh.

The question of how much of the fish is harvested at one time is based on the assessment of how much of it can be sold in the market. Normally, Gildar has never harvested less than 20 kgs at one time. The maximum that he has been able to sell in one day has been 40 kgs.

There is preference for purchase of whole fish by the consumer. So the fish that is harvested are not too big but of medium size- 1 to 2 kgs so that selling is easier.

### **2.4 Marketing Strategies**

There are three marketing strategies employed by Gildar:

- (a) *Sale through local markets (baat)*: Gildar covers three local markets during the week. These markets are at Alirajpur, Umrali and Survai. During the season (Oct-Feb) most of the time Gildar sells his fish stock to the traditional fishers as they will conduct their shop during the day and he will not have to spend on ice etc to keep his fish fresh. Here his aim is to sell his stock quickly and let the traditional fisher sell or consume it during the day. His fish sells at Rs 100 per kg whereas traditional fishers sell their fish at Rs 120 per kg on the pretext that they are selling fish from Narmada. There is no difference in price of fish according to the species as sold by Gildar. However according to him common carp is sold quickly and then other fishes are sold.

(b) *Sale in villages:* Gildar loads his bags with fish and travels in motorcycle selling his fish in the villages. He has to stand near a hamlet and announce that he has fish to sell. Households from the hamlet immediately converge and he sells his fish to them. Such selling requires that his fish is of small size so that he can sell it in round no e.g. 1 kg or 2 kg. He does not have to cut and sell the fish in such cases and disposal of his stock is faster. Selling in the village is his strategy that he employs whenever he assesses there are demand and he has enough of fish stock to sell. The price of the fish remains the same at Rs 100 per kg. Gildar is covering villages in the radius of 20-25 kms through the sale of his fish through this method.

(c) *Selling from the pond site:* Over the years the consumers have realized that the fish from Gildar's pond is tastier than fish from Narmada or other ponds. They come to the pond site and purchase fish from Gildar. In such cases he harvests fish for them and sell it from the site itself. This is random and there is no effort on part of Gildar to develop this as a regular marketing strategy.

### **3. Constraints and Risks**

#### ***(a) Threat to life***

There is danger to life by entangling in the net while harvesting fish. This has happened to Gildar once and this has prompted the partners to buy boat on subsidy from the department.

#### ***(b) Flooding and loss of fish***

Unseasonal excessive rain has often led to flooding and the fish stock has been severely depleted due to this factor. Last year after introducing 50000 fish seed there were excessive rains towards the end of September and Gildar was forced to purchase another 20,000 fish seed to compensate for his loss.

#### ***(c) Poor Quality of fish seed***

The fish seed provided to Gildar is of poor quality. It is spawn size and there is high degree of mortality among them due to transportation over long distance. This is also an area where he has the least control over his fish culture.

#### ***(d) High temperature and fish mortality***

During summer due to increase in temperature there is mortality among fish as there is lack of oxygen lowering of the water level in the pond.

#### ***(e) Poor Institutional Support***

Gildar and his partner have not been able to access credit from any of the financial institutions. This is despite the fact that Gildar has Kisan Credit Card and he has not been able to use it for making investments in his fish culture practices.

Gildar and Dukal (who has the lease in his name) have been covered under life insurance scheme of the department. They are however not aware of the details of the insurance policy.

#### **4. Opportunities**

##### ***(a) Demand for Fish***

The tribals in Alirajpur are fish eating community. Fish is an aspired food during the toddy season that starts from November and lasts till March. Traditionally the tribals were hunting for fish from the seasonal rivers and rivulets in their area. However these water sources have dried up as a result of which fish hunting has almost vanished from the area.

Though fish eater tribals, were not practicing fish culture. The other source of fish was from traditional fishers who catch fish from Narmada river and sell it in the local markets. The preference of the tribals however is for pond fish as according to them these (pond) fishes get better feed and hence are tastier than the river fish.

Many ponds have been constructed in the area but most of them are not being used for fish culture as there is not knowledge and experience of undertaking fish culture as a regular activity.

The opportunity for Gildar is that there is local demand for fish and that there is gap in the demand and supplies of fish at present that can be used to promote similar initiatives.

##### ***(b) Fish + Agri Culture***

Gildar is not solely dependent on income from fish culture alone. About 40% of his income is from fisheries. This is significant and substantial enough to motivate him to continue practicing fish culture as well as not being wholly dependent on fisheries he is able to optimize his income from agriculture. This seems to be a opportunistic livelihood diversifying strategy that suits to Gildar Singh.

##### ***(c) Backward and forward integration***

Purchase of seed, feed and selling whole fish without resorting to any form of packaging represents area where additional intervention can reduce the expenses and or increase profitability of the fisher. These types of integration at small scale also have the potential to involve women from the household.

##### ***(d) Absence of organized fish market***

There are no organized markets for fish in the area. Only traditional fishers have regular market place though they too don't have enough market infrastructural support. Developing and linking Gildar with organized market will allow him to optimize his production with maximizing his profitability.

## Case Study: Hatchery Unit, Sundrel

### 1. Background:

Ramesh Chandra Bhoi's hatchery unit in the remote location of Sundrel village in Dhar district of Madhya Pradesh is an example of rural entrepreneurship worth emulating. Running a hatchery is not a simple job, especially when it is located in the rain-stressed district of a central Indian state; besides a hatchery involves specific technicalities and special skills. So, a common man from a modest background excelling in this business is quite an achievement.

There are four major types of fishing activities found in this part of the country: (i) fishing as commercial activity in ponds/lakes, (ii) fishing as semi-commercial activity in ponds/lakes, (iii) fish hunting for consumption purpose in ponds/lakes, (iii) fishing as semi-commercial activity in rivers and rivulets. The major communities involved in fishing here are the Bhils&Bhilalas (tribals), Bhois andKahars. Fish hunting is primarily done by tribals in the natural water bodies with no private or semi-private ownership. Commercial fishing is done by other communities either in private water bodies or in water bodies on lease from government.

**The early days:** In his early days, Ramesh bhai used to fish with his family in the nearby water bodies. Later they started taking ponds on lease. However, later the Government brought in a new regulation that lease could be given only to tribals in that locality; this saw the end of his business. But his relations with the Government officials proved to be good for his life. One Government officer suggested him to start a hatchery. He liked the idea and took the plunge into entrepreneurship.

In those days, fish seed was available only with the Government hatchery; and the gap was filled up by fish seed businessmen coming all the way from West Bengal. So, there was a perceivable demand-supply gap in the area. This idea got him going.

Ramesh Bhoi, the entrepreneur belongs to the Bhoi community, which is a traditional fishing community. He has got education till Higher secondary School. In the beginning, he was just a poor man having very modest assets; his family including himself were engaged in fishing occupation. Having Felt a gap in demand for and supply of fish seeds in the locality, he entered the business of hatchery and proved to be a huge success. He has been awarded by the State Government for his efforts.

**Initial investment and business start-up:** From his earlier business he had saved Rs.4 lakh, which he used as investment for the hatchery; besides, he had some land for the purpose too.

The Fisheries department of the government of Madhya Pradesh helped him with the technical knowledge of establishing and managing a fish hatchery.

In his first investment he constructed the 4 Kachha and 4 Pucca Ponds; constructed one big pond for the collection of rain water and purchased other important inputs for the hatchery. Initially he purchased the breeder fishes from the Fisheries department's hatchery. Later on he did not have to purchase any breeder fish as he started producing himself. All the support services like medical, technical knowledge, etc were provided by the fisheries department.

**Expansion:** Gradually, he saw the demand increasing and a steady flow of income. Encouraged by this trend, he kept on adding on to his investment and created newer infrastructure for the purpose and expanded his capacity. Now he has 100 ponds in his hatchery along with a Chinese hatchery. He now calls a special team of expertson managing hatchery from Kolkata in the hatching season to take care of his hatchery operations.

At one point of time, he realized that the available water sources were not enough to fulfill the growing requirement so now he has taking the water from Narmada river through a Pipe Line. He is providing employment to around 15 people for the 7 months of season. Now capacity of his hatchery unit is 4 Crore Spam/day. His annual turnover from this hatchery unit is around 2 Crore.

**Marketing:** Marketing fish seeds has never been a problem for his unit from the day-1, because there has always been more demand for fish seeds in the locality than the supply. Now fish leasers from nearby districts also come to his hatchery for buying fish seeds. He feels there is even higher demand, which he falls short of fulfilling.

## 2. Hatchery Unit

### 2.1 Technicalities of the unit:

A fish hatchery is a place for artificial breeding, hatching and rearing through the early life stages of fishes. Hatcheries produce larval and juvenile fish primarily to support the aquaculture industry where they are transferred to on-growing systems i.e. fish farms to reach harvest size.

#### The infrastructure at the hatchery:

- Over Head Tank:- for the supply of water in Chinese Hatchery & Incubation Tank
- Chinese Hatchery:- For the breeding of fishes in artificial conditions.
- Incubation Pond:- Conversion of Eggs in to Spam
- Spam Collection pond:- Spam are collected from here
- Breeder Pond:- Male & female fishes are kept separate in these breeder ponds.
- Nursery Pond (Rearing Pond):- Spam are kept in these ponds where they grows in to Fry and fingerlings.
- Source of water (Pond/River).

### 2.2 Process of Breeding:-

Breeding of fishes is a very systematic process, which need to be followed carefully. Taking care of time in each process is very important. The entire process includes following steps.

- **Injection of Breeders:-** All the selected Male and female breeders needs to be injected with fish pituitary extract before breeding. These injections of hormones increase the fertility rate of fishes and breed more no. of eggs.
- **Eco-Hatchery (Chinese Hatchery):-** Injected breeders are brought in the Eco-Hatchery for the breeding. It is circular cement pool (around 8 meter in diameter) with 50 cubic meters of water holding capacity. The bottom of the pool slopes to the centre where there is an outlet pipe (10 cm dia) leading to the incubation pond (egg collection chamber). The wall of the spawning pool is provided with diagonally fitted inlet pipes at an angle of 45° for circulation of water creating artificial riverine (Flood like) conditions. After circular pool is filled with water, about 50 kg. Of females and 50 kg of males are released into the pool. When the breeders start coming up to the surface the valves are opened so that a circular current is created. The speed of water current is maintained at about 30 meters per minute. This process is mainly done in the night (From 7:00PM to 6:00 AM) reason behind doing this in night is that the environment in night remains peacefully without any disturbance to fishes, in that kind of environment breeder fishes have better fertility and lay the more no. of Eggs. This entire process takes 6-10 Hrs. time.
- **Eco-hatchery-Incubation pool:-** Fishes lay the eggs in above process, these eggs are brought in the Incubation Pool from Eco-Hatchery through an out-let pipe. Incubation pool are the 3 metre diameter - double walled circular pool, with inner wall of regulated mesh permitting outflow of water) where water at a regulated speed enters through the duck mouth valves fitted on the floor of the outer chamber. The speed of the water is regulated @2.5 litre/sec. in the initial stage and then reduced to 2.0 litre/sec. when movement of embryo inside the eggs starts. Along with water movement rain like condition is created by the showers, these all conditions make a flood like condition which is an ideal condition for the eggs to grow in to the Spams. Through an outlet pipe these spams goes in to the Spam collection pond.
  - This circulation of eggs in Incubation pond takes around 72 Hrs, after 72 Hrs these eggs are converted in to a spam.
  - These Spam can be sold for fish culture in Pond or Tanks.
- **Rearing of Spam in to Fry and Fingerlings:-** Spams are collected from the Spam collection box and kept in to the rearing ponds for the rearing. Rearing ponds are the Square cement made ponds, which can be made of any size depending upon the requirement. Proper feed is provided here for the growth of Spam. These Spam grows in to fry in 6-7 Days. These fries can be sold for the Fish Culture. Most of the fishermen purchase fry for their ponds in all 3 districts of our Project.

If these spam are reared for 20-25 days in rearing ponds these are converted in to fingerlings. This can also be sold as fish seed. Rate of fingerlings is much higher as compared to Spam or fry.

#### Difference between Spam, Fry and Finger Lings:-

Size of the Fish	Name
5 mm	Spawn
25 mm	Fry (Cultivated in Medium sized pond)
25 mm	Fingerlings (Cultivated in Big size ponds)

### 2.3 Economics of the hatchery:

#### • Investment:

The total investment in the hatchery till now is given in the table below:

S.No.	Item	Size	Unit	Unit Cost (Rs Lakh)	Total Cost (Rs Lakh)
1	Over Head Tank	30*30*6 Feet	1	3	3
2	Chinese Hatchry	2.5 Feet diameter	1	1	1
3	Incubation Pond		6	0.2	1.2
4	Puccaa Ponds	40*80*6ft	50	1	50
5	Big Kachha Ponds	100*200*5ft	50	1	50
6	Tube well Connection		1	3	3
7	Water line from Narmada (Approximate)				10
	Total				118.2

#### • Income- Expenditure statement/ Profitability of the unit:

The rough estimate of the income and expenditure statement or the profitability of the unit per a season at the moment is given in the table below:

Particular	Amount (Rs.lakh)
Expenditure:	
Fish feed	40
Labour	20
Electricity bill	2
Medicines, etc	2
Miscellaneous	1
Total expenditure:	65
Total revenue:	200
Net Income:	135

### 3 SWOT Analysis

Strength	Weakness
<ol style="list-style-type: none"><li>1. Have enough physical &amp; financial resource to expand further</li><li>2. Availability of water is easy in Narmada river</li><li>3. Good technical knowledge of hatchery</li></ol>	<ol style="list-style-type: none"><li>1. Price of fish seed is higher as compared to Government hatchery.</li><li>2. Low on professionalism</li><li>3. Very little accounts maintained at the unit in the books of accounts</li></ol>
Opportunities	Threat
<ol style="list-style-type: none"><li>1. There is no private hatchery in the area.</li><li>2. Demand of fish seed is increasing rapidly.</li><li>3. High Income business.</li><li>4. Recurring expenses are relatively low.</li></ol>	<ol style="list-style-type: none"><li>1. Loss of breeder due to disease or infection.</li><li>2. Dependence on Monsoon for demand.</li><li>3. Someone else may start the business.</li></ol>