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

Content

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:	**TOWARDS ACTION AND LEARNING(TAAL)**
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]

1.1.1 Fisheries in the Global Context[2]

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.

[1]In the document the term *Fishers* includes the entire inland community of fisherfolk whether they are engaged in fish hunting, capture fisheries or rearing of fish on fish farms etc. The term also includes traditional fishers who have been practicing fisheries as part of their caste based occupations. *Aquaculture* refers to the practice of farming of aquatic organisms that include fish as well. In this proposal it refers to the practice of fish farming that cultures fish in controlled water bodies under controlled conditions and management. The term *fish farmer* has also been used to refer to persons practicing aquaculture. *Inland fisheries* provide livelihood activities for a significant proportion of poor tribal communities in rural India.

[2] 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

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.

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[3]. 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[4]

India is the third largest producer of inland fish and second largest producer of farmed fish. Marine and inland fisheries including aquaculture 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.

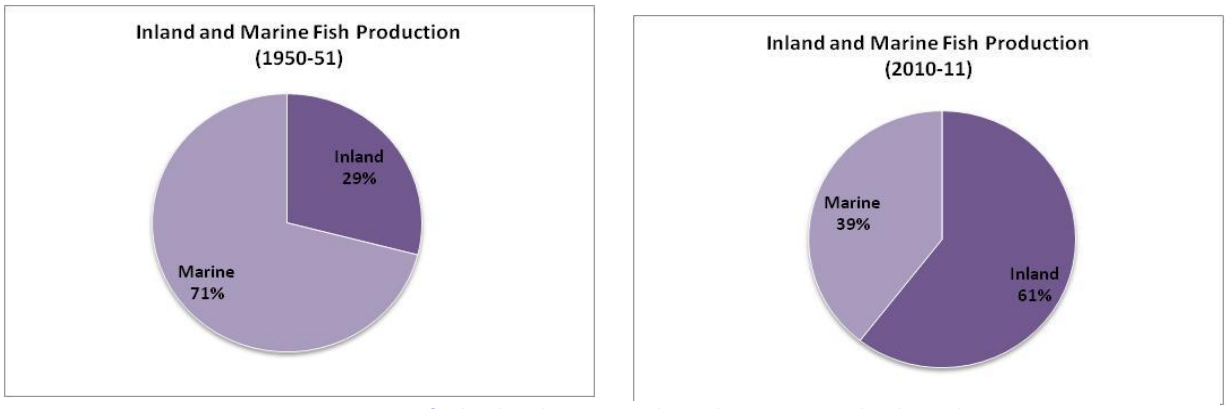


Figure 1 Proportion of Inland and Marine Fish Production in Total Fish Production

[3] *The Future We Want*, Rio+ Outcome Document; *Voluntary Guidelines on Responsible Governance of Tenure of land, fisheries an forest in the context of National Food Security*, FAO; *International Guidelines on securing sustainable Small Scale Fisheries*, FAO Feb 2014.

[4] 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 12th Five Year Plan, 2012*, Planning Commission Government of India.

The proportion of marine and inland fisheries within the total fish production has changed significantly between 1950-51 and 2010-11.The proportion of marine production decreased by 32 percent in the past seven decades that was replaced by an equal increase incontribution of inland fisheries/aquaculturedureing the same period. The two sectors reveal different growth rates during the 60-year period. The production of marine fisheries increased significantly in the first decade at 64% but the rate of increase has decreased gradually in subsequent decades. The growth rate of marine fisheries was 15% during 2000-01 and 2010-11 though the production was 6 times the level that was in 1950-51. The production of inland fisheries in the country was slow to grow in the initial decade at 11% but made a quantum jump in the very next decade when it recorded a decadal growth of 175%. Since then the decadal growth rate in inland fisheries has been at a high level throughout the last fifty years with the growth rate of inland fisheries in the last decade 2000-01 to 2010-11 recorded at 75%, with the production in 2010-11 being 22 times the level of production that was recorded in 1950-51.

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.

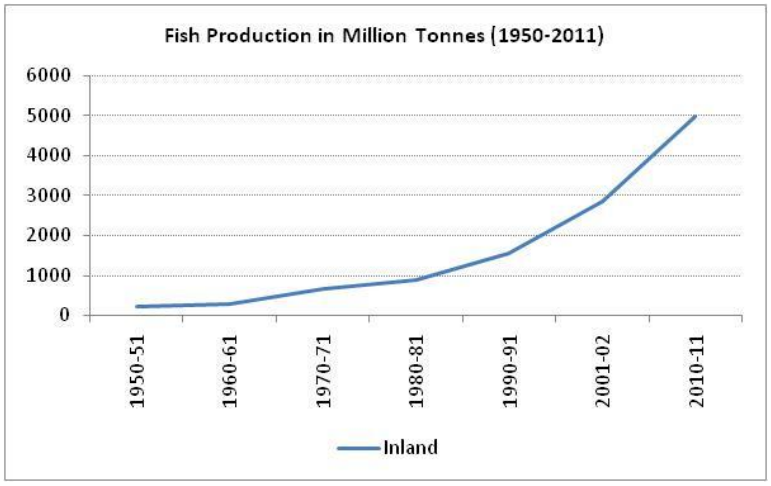


Figure 2 Inland Fish Production in India

A significant characteristic of inland fisheries is its small-scale nature. It is mostly a traditional economic activity undertaken by diverse fisher communitiesinvolving scheduled castes and tribes that rely on fish as a protein source, and are some of the poorest people in rural India. 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, lack of technology to increase productivity, and lack of awareness of how to guard against the impacts of future climate change:namely, the increased variability of precipitation, delayed monsoon, extreme weather events leading to high intensity rainfall, and lengthening of summer months.

India's aquaculture includes both freshwater and brackish water production. The brackish water aquaculture is primarily the culture of shrimp varieties namely: giant tiger prawn (*Penaeusmonodon*) and white leg shrimp (*Penaeusvannamei*). The freshwater aquaculture comprises of the culture of carp fishes, culture of catfishes, culture of freshwater prawns, culture of pangasius, and culture of tilapia. The three Indian major carps, namely catla (*Catlacatla*), rohu (*Labeorohita*) and mrigal (*Cirrhinusmrigala*) contribute the bulk of production to the extent of 70 to 75 percent of the total

fresh water fish production, followed by silver carp, grass carp, common carp, catfishes forming a second important group contributing the balance of 25 to 30 percent.[5]

Fresh water aquaculture has evolved as a viable commercial farming practice from the level of traditionally backyard activity over last three decades with considerable diversification in terms of species and systems. Induced breeding of carps and catfishes, hatcheries for mass-scale spawning, seed rearing and carp poly culture are increasingly being used in commercial freshwater aquaculture. The sector has also shown considerable diversification in recent years with the adoption of other species such as catfishes and freshwater prawns, due to their higher market demand and economic values[6].

Integrated fish farming with livestock and horticulture has not only been able to utilize the by-products/wastes as principal inputs, but also made the farming practice highly remunerative and farmer friendly. Availability of balanced supplementary feed for different life stages for diversified cultivable species and appropriate disease management measures are some of the important other developments. Almost five-fold growth in mean national pond productivity in last four decades is proof of the sector's vibrancy[7].

The water spread area under 'tanks and ponds' of about 24.14 million ha nationwide, 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	1,500-2,000
Tanks	300-500	2,000-4,000
Ponds	400-600	3,000-5,000

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

The fisheries sector is an important 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).

Currently India has no specific government guidelines that prioritisethe location of sites for ponds for inland fisheries. The government manual for design of ponds does not specify the factors that need to be taken into account if fisheries are to be conducted.At present the rural ponds for fisheries are selected on the basis of their ability to retain water for different periods of time. These

[5]http://www.fao.org/fishery/countrysector/naso_india/en
[6] ibid
[7] ibid

ponds originally were designed and constructed for different purposes, e.g. irrigation, percolation tanks, *nistari* tanks (to be used for washing, bathing and for providing water for animals) and so on. Selection of such ponds for fisheries is not by design but is incidental to their existence. The proposed project will seek to develop a protocol that will prioritise selection of sites where ponds for fisheries will be most suitable, as well as an integrated production system, as the primary adaptive capacity strategy for small-scale inland fisheries.A combined community based and ecosystem based approach is needed to reflect the context-specific priorities of local populations and the realities of ecosystem capacities.

1.1.3 Fisheries in Madhya Pradesh[8]

Madhya Pradesh is situated in the central region of India, and is the second largest state in the nation. The state is mainly plateau land with the exception of valleys of the Narmada and Tapti rivers and interspersed with mountains of the Vindhyas 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 3.98mha of water spread area in reservoirs represent

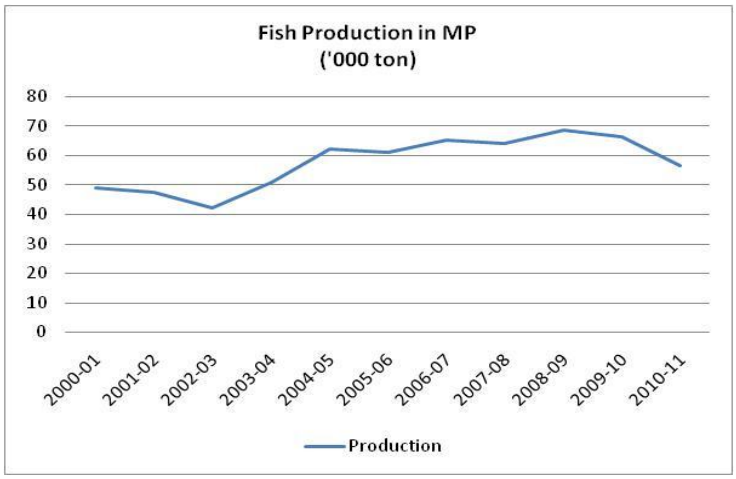


Figure 3 Fish Production in MP

the available resources of fisheries in the state. Of the available reservoir area, 98% has been brought under fisheries, including 0.64mha of rural ponds.

Fish production in the state was 56.45 thousand tonnes 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.

[8] Source: Department of Fisheries, Government of Madhya Pradesh

Fish Culture in Madhya Pradesh

Fisheries in Madhya Pradesh incorporate a range of techniques in rivers, reservoir and ponds. The riverine fishery is undertaken with capture fish techniques and by persons that have been granted license for the same. Fisheries in reservoirs and ponds include a range of culture-cum-capture techniques. Some reservoirs have also introduced cage culture practices under highly intensive fish cultivation arrangements.

Socially, fisheries have been the traditional occupation of persons belonging to caste groups such as the Bhoi, Dheemar, Kevat, Raikwar, Kahar, Mallah, and Nishad castes. These groups are classified as scheduled castes and are spread in different districts of the state. Caste based fishers have been practicing fisheries for commercial purposes for many generations, and have developed their own caste based linkages in the entire value chain related to fisheries, namely, raw material (net, seed, etc) to production-harvesting and marketing of fish. The caste based fisher community is well organized and have informal agreements amongst themselves where they divide the area with potential for fisheries so that their control over the value chain of fisheries is maintained. However, caste based fishers have lost out to the contractors who have taken fishing lease on large reservoirs and are employing the traditional fishing community as contract labour.

Tribal fishers have traditionally been fish hunters that practice capture fisheries. These fishers use bows and arrows for fish hunting, laying down fish traps and using cast nets for capture fisheries. Fisheries by tribal fishers used to be mostly practiced in shallow waters. However with government intervention these fishers have been organized and trained in practices related to fish culture. Mostly unorganized, tribal fishers are being gradually brought in to the ambit of organized fishing by mobilising them in to fish production cooperatives. Tribal fishers are taking leasing rights over ponds and have started employing aquaculture techniques to systematically employ fish culture in the state.

In areas that have been listed in Schedule V of the constitution the right and priority over use of natural resources vests with the tribal communities. Madhya Pradesh has sizeable tribal population and the geographical areas where there is predominance of the tribal communities such areas have been notified as Schedule V areas. In such areas the tribal fish farmer have the first right to seek lease of the pond and engage in fish farming. The traditional fishermen in these areas operate at the supply side of the value chain and as processers and traders in the fish market. The traditional fisher folk also seek employment as labour during the harvesting of fish and forge linkages with tribal fish farmer for regular employment as labour on the fish farms.

Poverty among fishers in Madhya Pradesh is mainly on account of their geographic marginalisation that places them low on human development indicators, namely, education, health and food security. Barriers such as lack of information and knowledge and devoid of representative institutions to provide them with market and institutional linkages further restricts their ability to proportionately gain from technological developments and access to freshwater sources (especially large reservoirs). Within the fisher community the scheduled tribe fishers are at various stages of transition (from capture to culture aquaculture practices) and it is their access to technology, information and skills that will be critical to enable them to contribute to, as well as take advantage of the growing fisheries sector in the state. Developing their ability to adapt to climate change will equip them to emerge as long-term player in the fisheries sector and provide them with viable alternative sources of income to complement their efforts to overcome the structural causes of their poverty and vulnerability.

1.2 Project Area

1.2.1 Geographical Coverage

Madhya Pradesh

The State of Madhya Pradesh lies between latitude 21^{0}04'N-26.87^{0}N and longitude 74^{0}02' and 82°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.

Figure 4 Map of State of Madhya Pradesh

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.

The climate risks identified in the State Action Plan for Climate Change (SAPCC, 2014) 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 21stcentury 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^{0}C	Across the state
Daily Min Temp	Increase by 2.0-2.4^{0}C	Increase by > 4.4^{0}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 districts. 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, Vindhyachal 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 when the monsoon sets in lasting up to September. With October and November as transitionary months, the winter months are from December to February.

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 valleys have been carved out in the district.

Figure 6 Location of Jhabua District in MP

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.

1.2.2 Social Context

The three districts comprising the project area, namely Dhar, Jhabua 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, and the Bhils and Bhilalasarethe major tribal groups.The average size of households is bigger than the state average indicating a larger family size.

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

Source: Census 2011; and Human Development Report 2007

The situation of women seems to 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 (13th) 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

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.

District Fact Sheet- 2				
Parameter	**State**	**Dhar**	**Jhabua**	**Alirajpur**
Working Population				
% Rural Population	47	50	52	52
% Main Worker	68	74	71	71
% Marginal Workers[9]	32	26	29	29
Work Participation Rates- Rural	41	46	54	54
Main Workers				
% Cultivators	47	51	78	84
% Agriculture Labour	38	39	14	10
% Household Industry	2	1	1	1
Others	13	9	8	5
Land holding				
Average landholding	2.2	2.8	2.0	
% Category of farmers				
Less than 1 ha		31	38	28
1 to 2 ha		27	31	30
Moe than 2 ha		42	30	42
Gini Coefficient	0.5	0.596	0.398	InclJhabua
Poverty				
% Below Poverty Line Households (2004-05)	54	39	68	InclJhabua

Source: Census 2011; Poverty Estimates, State Planning Commission Madhya Pradesh

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.

The presence of cultivators gains greater significance if their average holding is taken in to account which is higher than the state average in the case of Dhar and lower in the 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 the poverty line islower than the state average, compared with Jhabua where more than two thirds of the population is estimated to be below the poverty line.

[9] Marginal workers are those workers who had not worked for the major part of the reference period (i.e. less than 6 months)..

Bhils Tribe: Fish Hunters to Fish Farmers

Numerically Bhils are the third largest tribal group in the country and are mainly concentrated in the four states of Madhya Pradesh, Maharashtra, Gujarat and Rajasthan. In MP, Bhils are the second largest tribal group located mostly in the districts of Jhabua, Dhar and Alirajpur. The predominant sub groups of Bhils include the Bhilalas, Patelias and Barelas. Amongst these Bhilala outnumber Bhils in Dhardistrictthough they do carry most of the customs and traditions of Bhils.

Amongst Bhils the descent is patrilineal and residence is patrilocal with succession being petripotestal. Neolocal residence is common where a new hut for the newly married couple is built immediately after marriage. This has given rise to nuclear families and a settlement pattern that is based on hamlets. Each hamlet comprises of 5 to 20 houses and is located near the agriculture fields and houses persons from the same kin. Administratively, a group of hamlets comprise a village. The size of the village varies from 3-8 kms depending on the topography of the region. The Panchayat Extension to Schedule Area Act, which applies to the entire districts of Jhabua and Alirajpur and most of Dhar district, provides for recognition of a hamlet as a separate Gram Sabha if the residents of any particular hamlet want to establish their separate identity. In such cases all the rights and privileges of a Gram Sabha will be applicable to the *newly (hamlet based) Gram Sabha* as it is applicable to all the Gram Sabhas in the state.

Socially, a traditional Panchayat of Bhils has strong roots and is the major source of dispute resolution in the community. The strength of the Panchayat lies in its ability to provide justice to both the parties and despite presence of the formal systems of justice and conflict resolution mechanisms, Bhils still resort to traditional Panchayat for resolving most of their disputes related to division of property, marriage, conduct of livelihood activities, settlement of debts and even acts that fall within the ambit of criminal justice system of the modern Indian state.

Bhils by custom and tradition are non vegetarians. They had previously been hunters and wild life was a major source of nutrition for them. Undulating topography and the presence of numerous seasonal and perennial rivulets provided them a rich source of fish that was available locally and which was widely eaten as accompaniment to liquor locally brewed from mahua and toddy trees. In agriculture maize is the major crop and forms part of the staple diet. Amongst pulses *urad*(black gram) is cultivated and consumed on a wide scale. Millets, especially jowar, bajra, kodon and kutki, were part of the nutritional basket of tribals in the region and these were taken along with range of local vegetables that were grown seasonally. However, with increasingly restricted access to forest resources in the modern era, a major source of protein from the diet of the tribal group has been eliminated. Rapid changes in cropping patterns saw food crops being replaced with commercial crops, like soybean and cotton, and has resulted in making the nutritional basket of tribal people poorer. ***The net impact of these changes has been a high proportion of malnutrition among children as reported by the National Institute of Nutrition in 2011:under weight U5 children in Alirajpur, Jhabua and Dhardistrictsare 60.8%; 57% and 54.4% respectively.***

Traditionally, fisheries amongst the Bhil tribal group comprised of capture fisheries. Fish were captured from rivers and rivulets in the region. Pond fishery was practiced mostly in perennial ponds. The tribal fishers had the knowledge and skill of using fish traps to catch fish in rivers and rivulets and use of nets for catching fish from ponds. Traditionally, fishery was mostly for self-consumption and for occasional commercial purposes. With the construction of ponds and large reservoirs in the region the tribal fishers have learned the basics of aquaculture and there is an increasing trend to undertake systematic aquaculture especially in ponds and small reservoirs. Fishery that was initially a complementary income generating activity (mostly seasonal) is gaining ground as a major secondary livelihood option. ***In agriculture households practicing aquaculture throughout the year, the contribution of fisheries is 40% of the total income of the household.*** The market demand too is promoting aquaculture as there is a huge demand and supply gap for fish in the retail market. A study of 21 fish markets in the three districts has revealed that out of 54 tonnes of daily fish consumption 23 tonnes is imported from other states (TAAL _MART, Market Study of Fish Markets in Dhar, Jhabua and Alirajpur, 2014 Annexure 6).

Government promoted fisheries in the districts has helped to reform the previously unorganised activity to becomeorganised fish production. There are 6 Fishers Cooperative in Jhabua and Alirajpur districts and 62 in Dhar comprising of scheduled tribe members.

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
Capture Fishery			
(a) Tribal Community	Catching fish from rivers and rivulets	Consumption and commercial is incidental	Project will **not** work with this group
(b) Traditional Fishing community	Catching fish from rivers and rivulets	Commercial gain	Project will **not** 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 **not** work with this group
Fish Farmers			
(a) Tribal Community – Small and Marginal Farmers who take fishing lease rights over ponds	Practice fish culture	Commercial gain	Project **will work** with this group
(b) Non tribal community including traditional fishermen practicing *benami* fisheries	Practice fish culture	Commercial gains	Project will **not** work with this group as the leasing rights are in some other person's name (often a large farmer)

The project does **not** propose intervening in capture or wild fishery practices. The aquaculture proposed in the project is inland fresh water fish rearing in rural villages that will lead to production of table size fish.

The control factors for proposed inland fresh water fish rearing will be based on the following:

(a) Working on ponds situated on private lands or common land that has been leased out to the targeted beneficiaries. The lease conditions give absolute control to the lessee on the use of water and fish;
(b) The fish production factors such as choice of species, introduction of quantity and size of fish seeds in the pond, provisioning of fish feed, protection of fish from poachers and selective harvesting practices will be undertaken by the targeted small pond aqua culturists;
(c) Proposed project will develop hatchery, nursery and seed rearing units to enable poly-culture practices by small scale aqua culturists;
(d) Water quality measures to control silt load and regular water quality monitoring will be undertaken by the project with the targeted aqua culturists. This includes catchment

rehabilitation activities adjacent to target pondsand will bring environmental benefits to a wider village population.

The project will work with members of scheduled tribe community fish farmers 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[10]. 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 are residents of the village[11].
- 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 rights through *benami* transactions (where the right is in the name of a tribal but actual fishing is done by members of a 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 a 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.

Thus, the target group of the project will comprise of the small and marginal farmers belonging to the scheduled tribe households. The ownership and control of the target group over different aspects of small pond aquaculture will be as follows:

Ownership of Pond	**Control over Resources and Activities**				
	Pond and Fish	**Land around Pond**	**Management of Water**	**Quality of Water**	**Aquaculture activities**
Pvt land of SF& MF	SF & MF	SF & MF	Owner SF& MF	Owner SF - MF	Owner SF& MF
Common land belonging to Gram Panchayat	SF&MF after they have secured the leasing rights from GP	SF&MFwho had secured lease over pond during the period of lease	SF& MFafter they have secured leasing rights from GP*	SF& MFafter they have secured leasing rights	SF& MFafter they have secured leasing rights
*SF& MF= Small Farmer and Marginal Farmer; GP- Gram Panchayat ** In case of drought the lease conditions can be suspended temporarily by the Gram Panchayat and the control over use of water will be that of Gram Panchayat. In such cases the lease holders are paid compensation by the state Government through the respective Panchayat for the loss of income that they suffer on account of foregoing fisheries for the period the fishing is suspended.*					

[10]Tribes in India are collectively identified under Article 342 of the constitution as Scheduled Tribes. The constitution protects tribal interests through Schedule V and Schedule VI of the constitution. The Schedule V is applicable to the tribal regions of the country except the North Eastern states where Schedule VI is applicable. The Schedule V guarantees tribal autonomy and tribal rights over land through Tribal Advisory Council in each state. Panchayat Extension Scheduled Areas Act extends panchayat rule to tribal areas such that the power is devolved to Gram Sabha (village assembly) which command control over natural resources, resolves disputes and control institutions.

[11] 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*

Gildar Singh: Reality of Fish Culture in a Tribal Village

Gildar Singh resides in Sur Baidi hamlet of Badala village in Alirajpur district. The hamlet has a pond (2.67 ha) with perennial water. Observing the nearby fish market and after discussion with other fishers, he realized that fish rearing can be a lucrative business and decided to pursue fisheries in the pond constructed near his house at Sur Baidi.

Gildar, in the first year, bought fish seeds from one of the neighbouring fishers and introduced them in the pond. As the fish grew, other people entered the pond and caught fish. On his protest, he was told that this is a common pond and everybody has a right to access fish from the pond. Not willing to give up,Gildar inquired and found out that there is provision of taking pond on lease from Gram Panchayat that will give him exclusive rights over fish. This brought him in to contact with Assistant Fisheries Office (AFO) at Alirajpur. Mentored by him, Gildar obtained a 5-year lease for the pond and subsequently brought fish seeds and started harvesting and selling fish in the nearby markets.

Gildar soon realized that it is not possible for him to manage the fish culture from the pond, all on his own, if he were to harvest larger quantities of fish. To overcome this he entered in to partnership with four more persons who lived around the pond so that they can secure the pond from potential poachers. Partnership was based on equal contribution in terms of labour and money and equal sharing in profits. All expenses and income are settled every 10-15 days when the partners sit down and settle their accounts.

On the demand of the fisher group, the pond at Sur Baidi has been de-silted once in 2008 but the work was of poor quality and there were charges of corruption levied on the implementation agency. At present the group is engaging with the Gram Panchayat to undertake deepening of the pond under MGNREGS (Mahatma Gandhi National Rural Employment Gurantee Scheme).

Fish culture practiced by Gildar and his partners include:

- Fish seeds are purchased from the government farm at Alirajpur. It is by experience that an estimate of fish seed is undertaken and the order is placed accordingly for the seeds ofrohu, catla and naren species. The proportion in which seeds of different fish species are to be purchased is not clear to the group. The order is placed on the recommendation of the AFO. The fish seeds is of fry size that is transported from Gujarat. According to Gildar, the mortality of fish seeds is high.
- Fish feed is purchased from the AFO. Cow dung that is collected from the animals at home is also used in the pond. Fish feed is used after 2 months of introduction of the fish seeds and is provided as long as the fishes are harvested during the fishing cycle.
- Labour is normally provided by partners. However, if they have to employ labour, the wages are high as there is competing demand for labour in the village. Only men are hired as labour to provide security to the pond or for harvesting of fish.
- Pre harvesting activity includes throwing the net at random to assess the growth. Harvesting is done at different times of the day: in the forenoon, if the aim is to sell in the local market; and in the afternoon if the fish is to be sold in the villages. These time periods ensure that there will less chances of encountering the water snake and the fish harvested can be sold *fresh*.
- Quantity of fish to be harvested is based on the assessment of how much of it can be sold during the day. Normally, Gildar has never harvested less than 20 kgs at a time and 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 consumers. So the fish that is harvested are not too big- 1 to 2 kgs so that selling is easier.
- Motorcycle and jute bags are used for carrying fish to the local market and to the villages. The group has a weighing scale to enable them to sell fish in the market.
- Group uses drag net and throw net for harvesting of fish. The drag net is brought from the market at Alirajpur and the throw net is made by traditional fishers living around the Narmada river. A boat was purchased from the Fisheries Department for which Gildar was given subsidy.

The constraints and risks encountered by the group includes threat to life (getting entangled in net); loss of fish due to flooding; supply of poor quality of fish; high mortality among fish due to high temperature; poor institutional support from financial institutions; and lack of information about government schemes. 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.

Scope for Fisheries

Dhar and Jhabua/Alirajpur have 899 and 629 rural ponds respectively, 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 winter 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[12]:

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

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[13];
- 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 and commercially viable fishery is a critical factor that affects their decision - whether or not to migrate elsewhere to look for work
- 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

[12] Refer **Annexure 2***Policy Guidelines and Subsequent Orders of the Government of Madhya Pradesh applicable for Fish Culture on Ponds less than 10 hectares*

[13] Leasing rights for fishing can be given to a fish farmer or to a collective of fish farmers. The *fish farmer's collective* can have a non formal format like that of a livelihood group or a self help group, or it can be in the form of a formal organisation like that of a cooperative. The project will work with the leasee whether he is an individual fish farmer or it has any of the existing organizational forms.

- 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. Targeting this group will directly impact the poorest and most vulnerable members of the community. Developing cost-effective models for modernizing approaches to inland fisheries is highly scalable for MP and other states in India.

The existing practice and level of technical knowledge among the target group and the proposed intervention by the project has been summarised below:

Existing Practices of Target Group	**Proposed inputs in the project**
Ability of small and marginal farmer to undertake Mix of Farming and Fish rearing practices	
• Adult members of small and marginal farmers work as a kinship unit. • Small and marginal farmers have come together to form small group that adopt commercial fish rearing practices that divides responsibilities among themselves and will accomplish all the necessary activities related to fisheries. • Households adopting commercial fish rearing have overcome the need for distress migration from the area	• Project will treat the households as a unit in providing all its inputs- capacity building, information sharing, exposure visits, etc. The men and women from the households will have equal access to project activities and resources.
Target Group's access to financing and credit	
• Access of small and marginal famers to formal sources of credit is low, especially for fisheries • The input market for fisheries is *cash* market where the terms of trade do not provide credit purchases • Small and marginal farmers access credit from non formal sources where the rates of interest are high	• The credit need of the fisher is for (a) purchase of capital items; (b) operating costs; and (c) pond maintenance. • The proposed project has developed a detailed Financial Service Plan for each of these items that is given in Annexure 9 of the proposal. • In addition in Part III point B on Programme Risk Management, the second point on Institutional Risk has recognised the risk of leveraging funds for pond maintenance. The proposed response is to bring the issue of Pond Maintenance to the District Steering Committee so that a broad policy frame for the district in this regard can be developed. • The proposal has **added**Lead Bank Manager as a member of the District Steering Committee.
Target Group's technical knowledge of polyculture	
• Small pond aqua culturist practise two layered fisheries • Technical knowledge of polyculture is low	• Developing capacity of aquaculturistsin poly culture fisheries. Output 2.2 and Activity 2.3 in E of Part III titled Results Framework has listed the corresponding training activities. • Establishment of seed hatchery and nursery so that fish seed for poly culture is available to the small fishers locally. Activity 2.4 specifically details this activity.
Technical knowledge of water quality management	
• The technical knowledge about water quality is low with the target group of small and marginal farmers	• The project has defined activities that will introduce both water quality monitoring and

	water quality management practices in the selected pond sites. • The details of water quality management and monitoring are given in detail under Activity 2.2.
Ability to secure fish stock for the pond	
• Small farmers buy fish stock from government hatcheries and private hatchery in the region. Their 90% of the demand for fish stock is met from these sources.	• 3 hatcheries, 3 nurseries and 3 seed rearing units in each district will be constructed to make the fish stock available to the small aquaculturist to enable them to undertake poly culture, • Development of private small hatcheries and nurseries will also develop capacities among scheduled tribe aquaculturist to operate these profitably.
Securing investment from poachers and wildlife	
• Small farmers who are resident of the village and undertaking aqua culture develop partnerships with households living near the ponds to provide security to the fish.	• Approval process of the Gram Sabha will reduce the risk of poaching • Lease conditions provide for sharing 10% of the produce with local villagers. The lease holder will be encouraged to comply with the provision and negotiate security of the fish stock from the poachers. • Aquaculturist will be encouraged to develop partnerships with households living near the pond to provide security.
Pond catchment rehabilitation and management	
• Catchment treatment plans for ponds not prepared as part of the estimate and technical plan of the pond • There are no guidelines that mandate pond rehabilitation after a particular period. Repair and/or rehabilitation of ponds are based on demand raised by the Gram Sabha and approved so by the block and district Panchayats. • Catchment treatment does not form part of the pond rehabilitation plans	• Catchment treatment with the aim of decreasing the silt load on the pond, greening the pond surrounds to regulate temperature • Rehabilitation of pond through deepening, minor repair and modification in the design from the point of view of enhancing fisheries • Catchment treatment will be a negotiated plan with the farmers whose land will be in the catchment area and with the aim of enhancing the productivity of commons to provide improved ecological services to the community, especially women

1.3 Climate Change

1.3.1 Global Climate Change[14]

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.

[14]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.

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.[15].

1.3.2 Climate Change in India[16]

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.

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[17]

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 moths there has been a decrease of 1.74 mm per year and annual the rainfall decrease is recorded at 1.81 mm per year.

[15](Barange et al, 2009)
[16] Data from INCCA, Nov 2010 unless referred otherwise
[17] Data taken from *State Level Climate Change Trends in India*, Meteorological Monograph, Rathore et al, 2013 Ministry of Earth Science, Government of India

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[18]

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 20th century. The comparison revealed that the average minimum temperature in the 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.

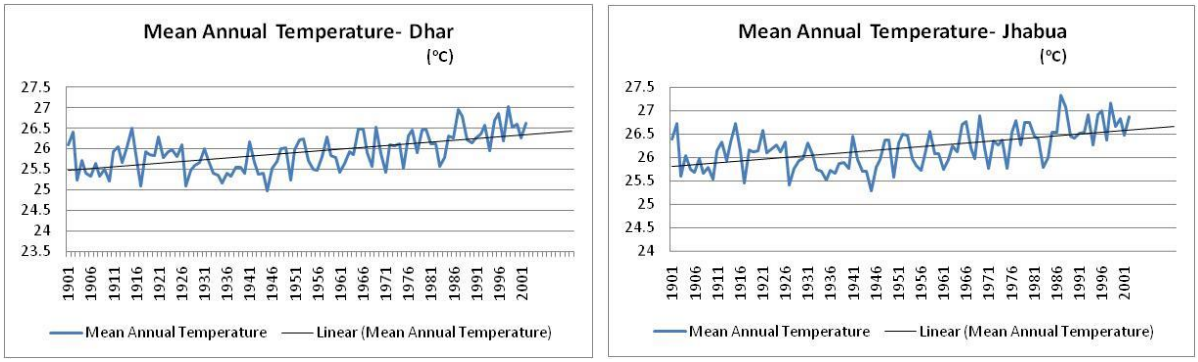


Figure 7 Mean Annual Temperature of Dhar and Jhabua

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.

[18] The data in this section is sourced from India Meteorological Department (IMD)

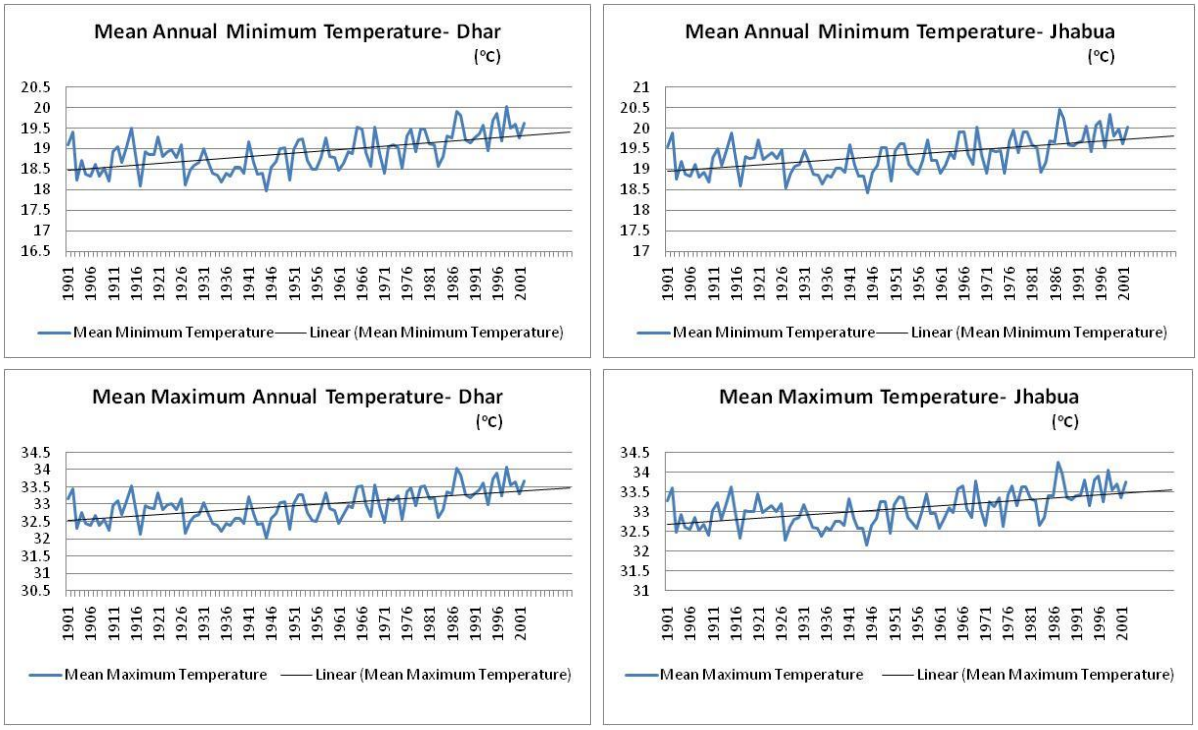


Figure 8 Mean Annual Maximum and Minimum Temperature in Dhar and Jhabua

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.

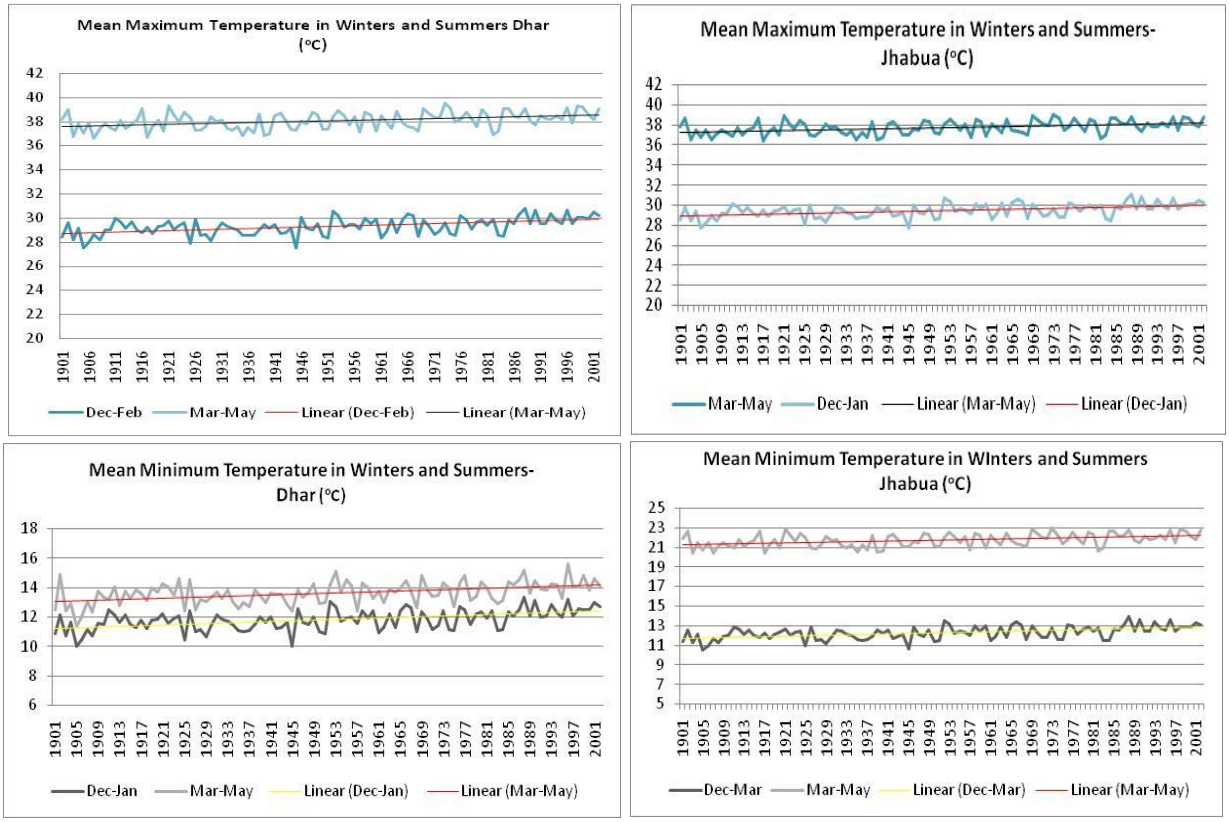


Figure 9 Mean Annual Maximum and Minimum Temperature for Summer and Winter Seasons for Dhar and Jhabua

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.

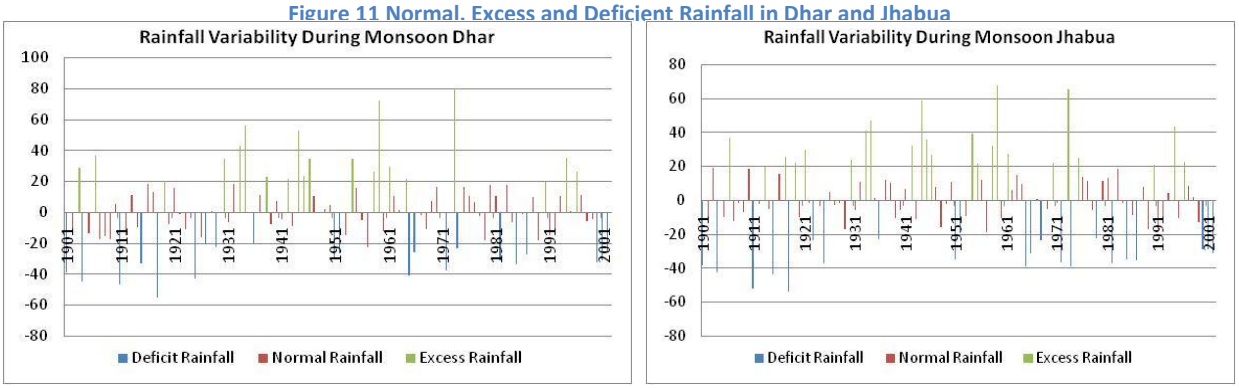
Table 1: Monthly Rainfall Variation in Project Districts

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
Source: IMD						

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 (± 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

Figure 11 Normal, Excess and Deficient Rainfall in Dhar and Jhabua



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

The monsoon has been undergoing a gradual change in both the districts. The average rainfall in June and July has been decreasing where as it has been increasing in the month of August. The month of September in Dhar shows an increasing trend where as in Jhabua it shows a decreasing trend. The observation of the people that the timing of the onset of the 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

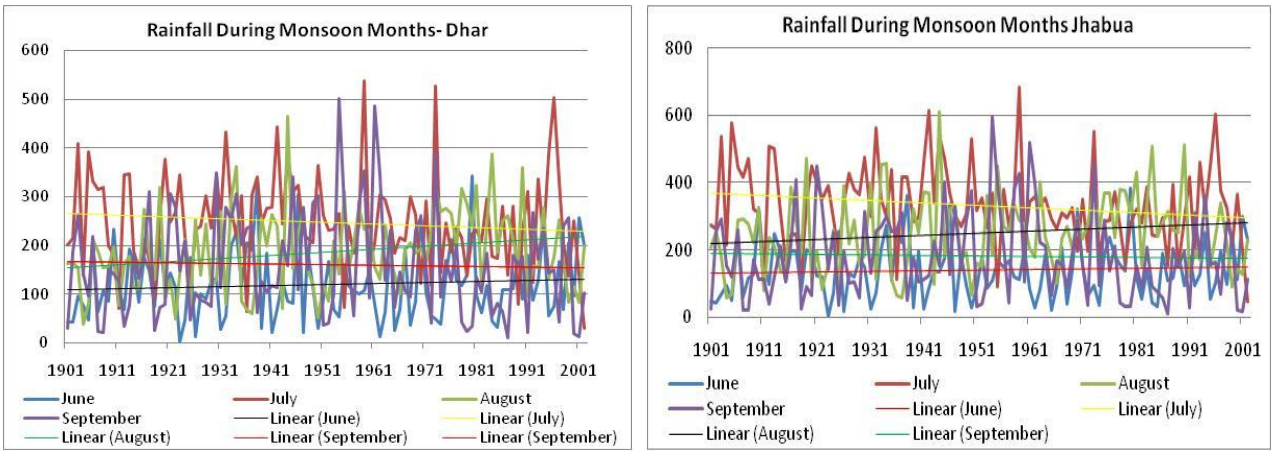


Figure 10 Trend of Rainfall During Monsoon Months Dhar and Jhabua

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.

Table 2: Annual Rainfall Variation					
Annual Rainfall- Dhar	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
Annual Rainfall- Jhabua including Alirajpur					
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 of the year.

1.4 Climate Change and its Impact on 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 are 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 thatare 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 fish farmersoperate in small ponds that dry up faster leading to shortened growing seasons 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 aquaculture is not transacted in the formal 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 fish farmers. 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.[19] 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 has beena 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 fish farmers 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 fish farmer.
- Decrease in post-monsoon rainfall implies fast depletion of quantity of water in fish ponds. Fish farmers 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 fish farmers, 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 fish farmers 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 fish farmers 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 fish farmer 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.

[19] *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

1.5 Climate Change Adaptation in Inland Fisheries

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 fish farmer 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[20] pond designs and catchment area protection, institutional arrangements between farmers and traditional fisherfolk, and insurance schemes which will provide fish 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 aimsto 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.

[20] 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 inland fishery sector for secured livelihoods ofsmalland 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 productivityenhancement by capacity building and institutional linkages;

Outcome 4: Preparing and disseminating evidence-based resilient climate change adaptationstrategies for inland fisheries for small pond fish farming.

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$)
Component 1: Adaptive measures to address rainfall variability	1.1 Ponds identified according to geo-hydrological protocol for fisheries	Improved spatial planning for fisheries and decrease in risk of drying of ponds for fish culture	682,000
	1.2 Modified pond design developed and implemented on existing ponds	Increased water availability for fisheries throughout the year	
	1.3 Small-scale fish famers linked to financial support systems to access resources for pond maintenance	Increased source of fund for the fish farmers to make own investment to modify the design of the pond to enhance its water retention capacity	
The Resultant Outcome will be: Increasing water retention capacity of the tanks as an adaptive measure to address rainfall variability by modifying technical specifications			
Component 2: Building resilience through adaptation of climate resilient technology	2.1 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	619,820
	2.2 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	

PROJECT/PROGRAMME COMPONENTS	EXPECTED CONCRETE OUTPUTS	EXPECTED OUTCOMES	AMOUNT (US$)
	2.3 Fish farmers trained in poly-culture fish culture and making fish seed for composite fish culture available to small-scale aquaculturist	Fish farmers capacity to optimise their production and income through use of staggered harvesting methodology increased	
The Resultant Outcome will be: Diversification of fish species and temperature regulation of ponds as adaptive measures to a warmer climatic regime			
Component 3: Building climate resilience through enhancement of adaptive capacity	3.1 Capacity building of Fish farmers on climate resilient fishing	Fish farmers developed as Climate resilient fish farmers and as Climate Champions	87,080
	3.2 Fish farmers trained on market analysis of fish and prepare their business plans	Strengthening of fish farmers 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 fish farmers	
	3.4 Fish farmers made aware on the weather based insurance product for fish culture	Fish farmers risk taking capacity increased as they share their risk with insurance companies	
The Resultant Outcome will be: Making small pond fisheries climate adaptation resilient through productivity enhancement by capacity building and institutional linkages			
Component 4: Knowledge generation and management	4.1 Institutional Processes for multi-stakeholder learning are established and activated	Key stakeholders involvement in identification of learning ensured	118,995
	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	

PROJECT/PROGRAMME COMPONENTS	EXPECTED CONCRETE OUTPUTS	EXPECTED OUTCOMES	AMOUNT (US$)
	4.4 Knowledge Products developed printed	Knowledge generated by the project documented for replication and up-scaling	
The Resultant Outcome will be: Preparing and disseminating evidence based resilient climate change adaptation strategies for inland fisheries for small pond aquaculture			
6. Project/Programme Execution cost			**143,192**
7. Total Project/Programme Cost			**1,651,087**
8. Project/programme Cycle Management Fee charged by the Implementing Entity			139,413
Amount of Financing Requested			**1,790,500**

Projected Calendar

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

MILESTONES	EXPECTED DATES
Start of Project/Programme Implementation	June 2015
Project/Programme Closing	March 2018
Terminal Evaluation	May 2018

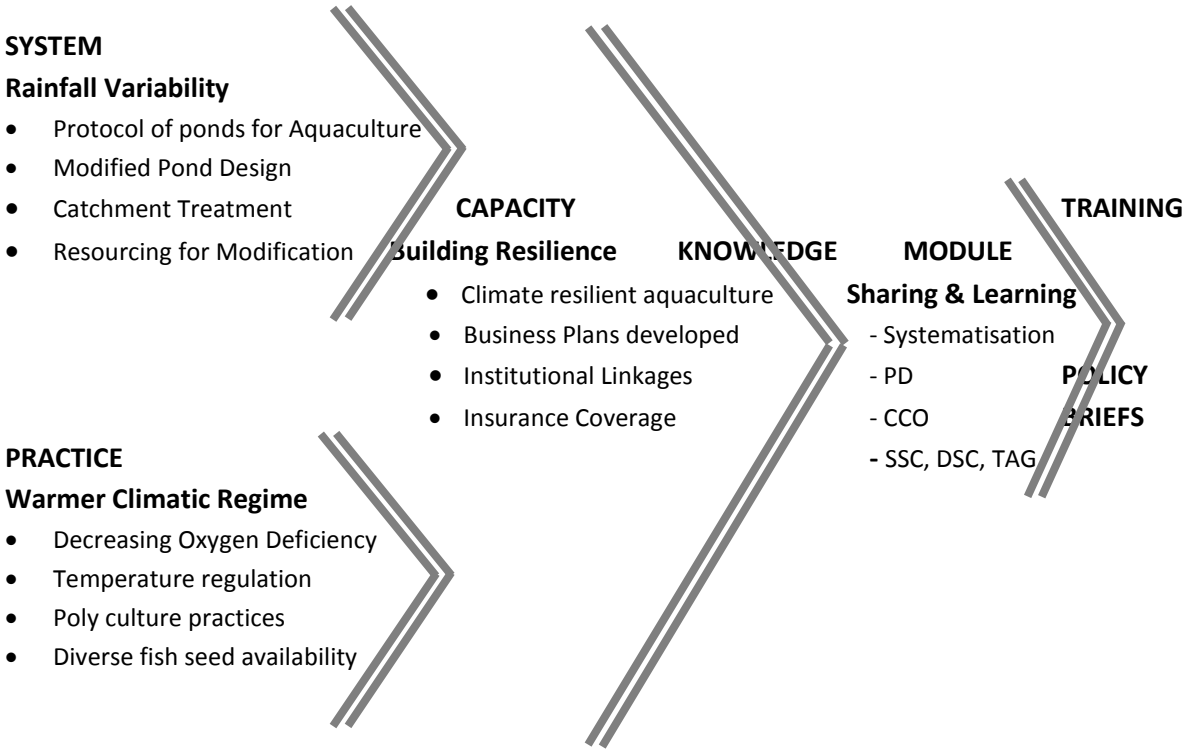
PART II: PROJECT / PROGRAMME JUSTIFICATION

A.*Describe the project / programme componentsparticularly 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.*

Overall Project Plan

The components comprising of the project activities have been identified and designed to develop, implement and replicate comprehensive adaptation strategies for conduct of small pond fisheries and aquaculture in the state. The components are complementary in nature and together seek to make changes in the way small pond fisheries and aquaculture is planned and practised in the state. To achieve this, the project intervenes to develop one set of activities that lead towards the development of adaptive measures to address rainfall variability; which will be complemented with measures that enable the aquaculturist to deal with warmer climatic regimes through adoption of best management practices; capacity enhancement and insurance as protective measures to gain resilience for adaptation. Processes, experiences and learning captured as part of the project will be used to develop policy level briefs that will be placed before government and other stakeholders for adoption and replication on a wider scale.

The project seeks to redefine the present practice of treating small scale fisheries and aquaculture as a residual rural livelihood activitytowards a paradigm where small scale fisheries and aquaculture are based on scientific data and knowledge, and where the community of practitioners have the opportunity to share their experiences and make a contribution in policy development directly. The process diagram of the project is as follows:



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 prioritisethe 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 (to be used for washing, bathing and for providing water for animals) 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 which is competent with open source software) for mapped and digitisation of data. Triangulation of the maps is undertaken with satellite data or with web based maps after making necessary corrections.

Maps for geo hydrological assessment include:

Map	**Source**
Topographical Sheet	Survey of India
Revenue Map of District	Sub Divisional Magistrate Office
Revenue Map of Tehsil (Tehsil is a revenue sub division in the district)	Sub Divisional Magistrate 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 the 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

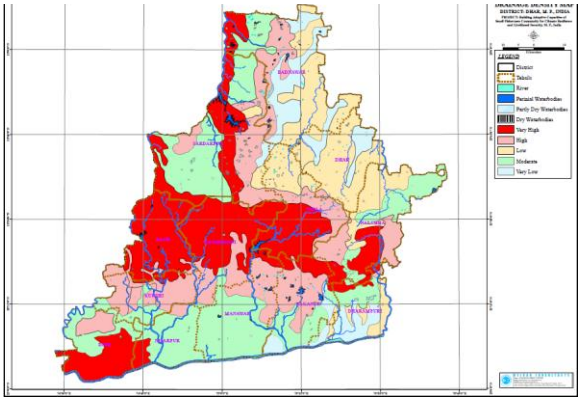
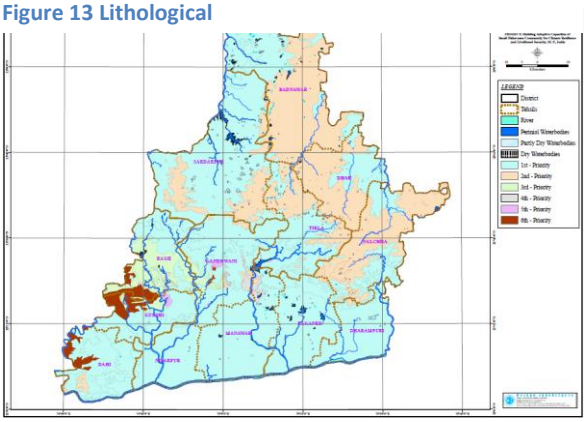


Figure 13 Lithological



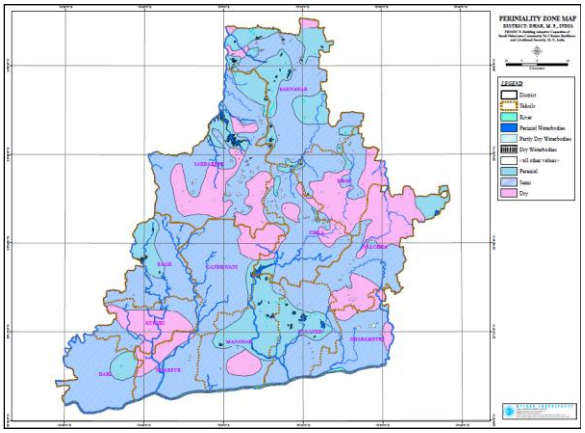


Figure 12Perenniality

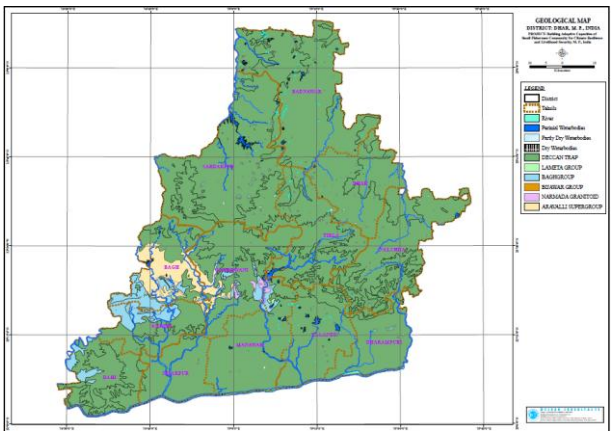


Figure 13 Geology

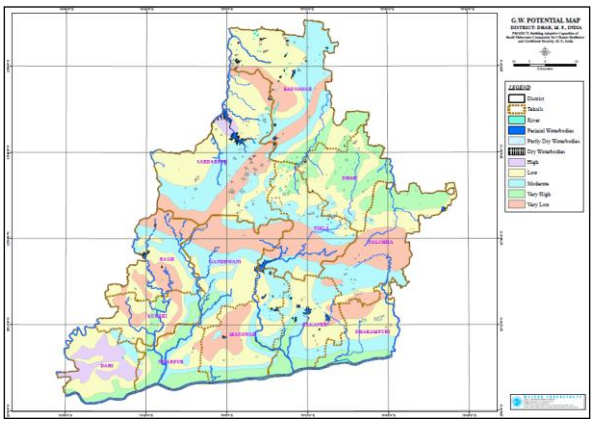


Figure 16 Ground Water Potential

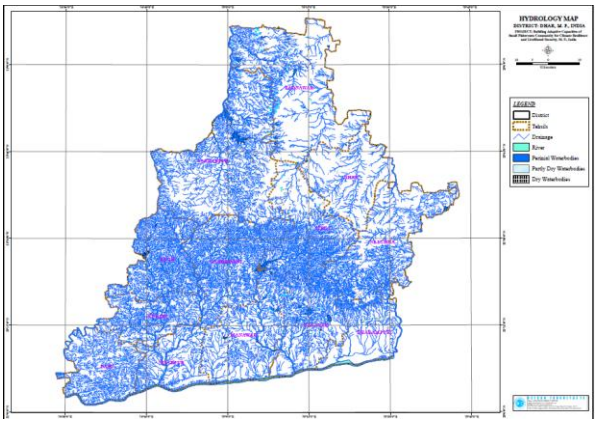


Figure 17 Hydrology

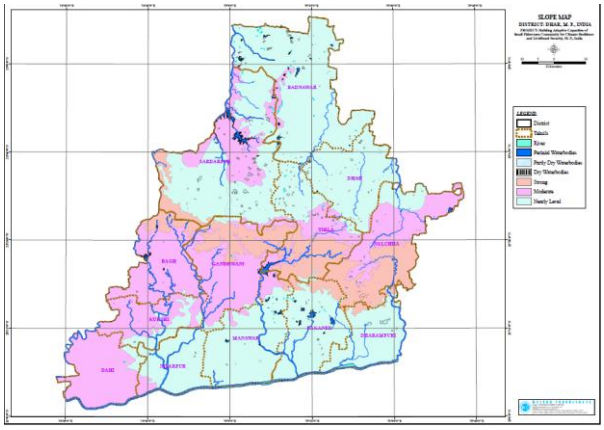


Figure 18Slope

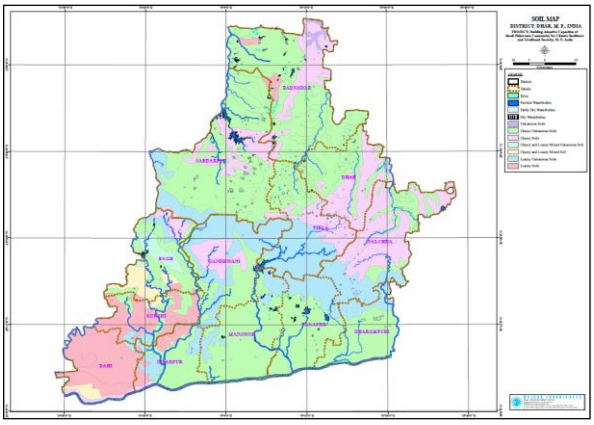


Figure 19Soil

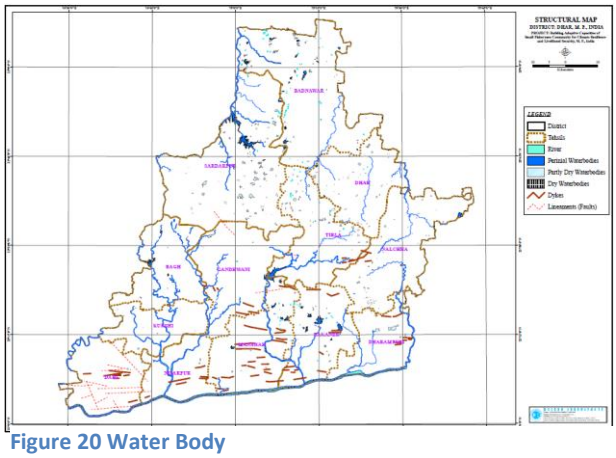


Figure 20 Water Body

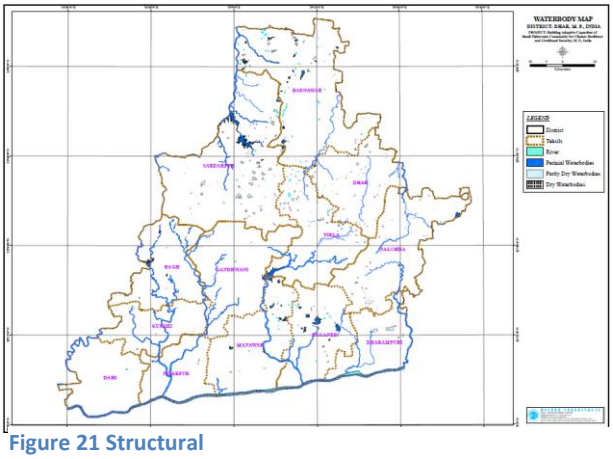


Figure 21 Structural

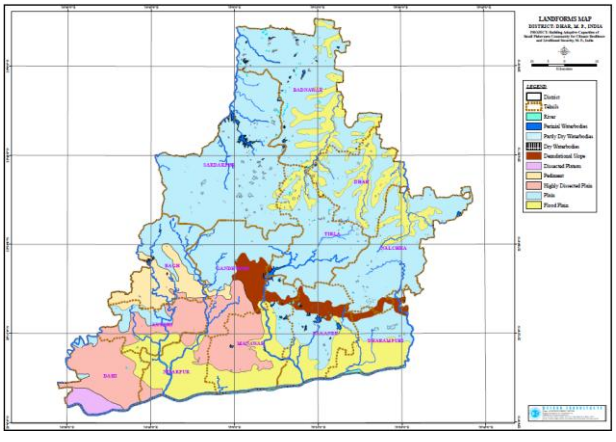


Figure 22 Landforms

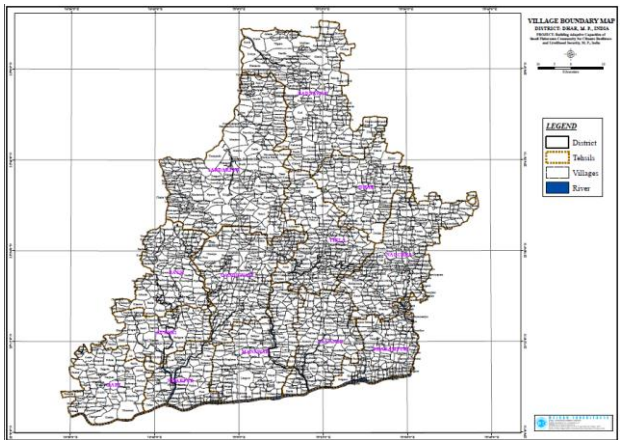


Figure 23 Village Boundary

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.

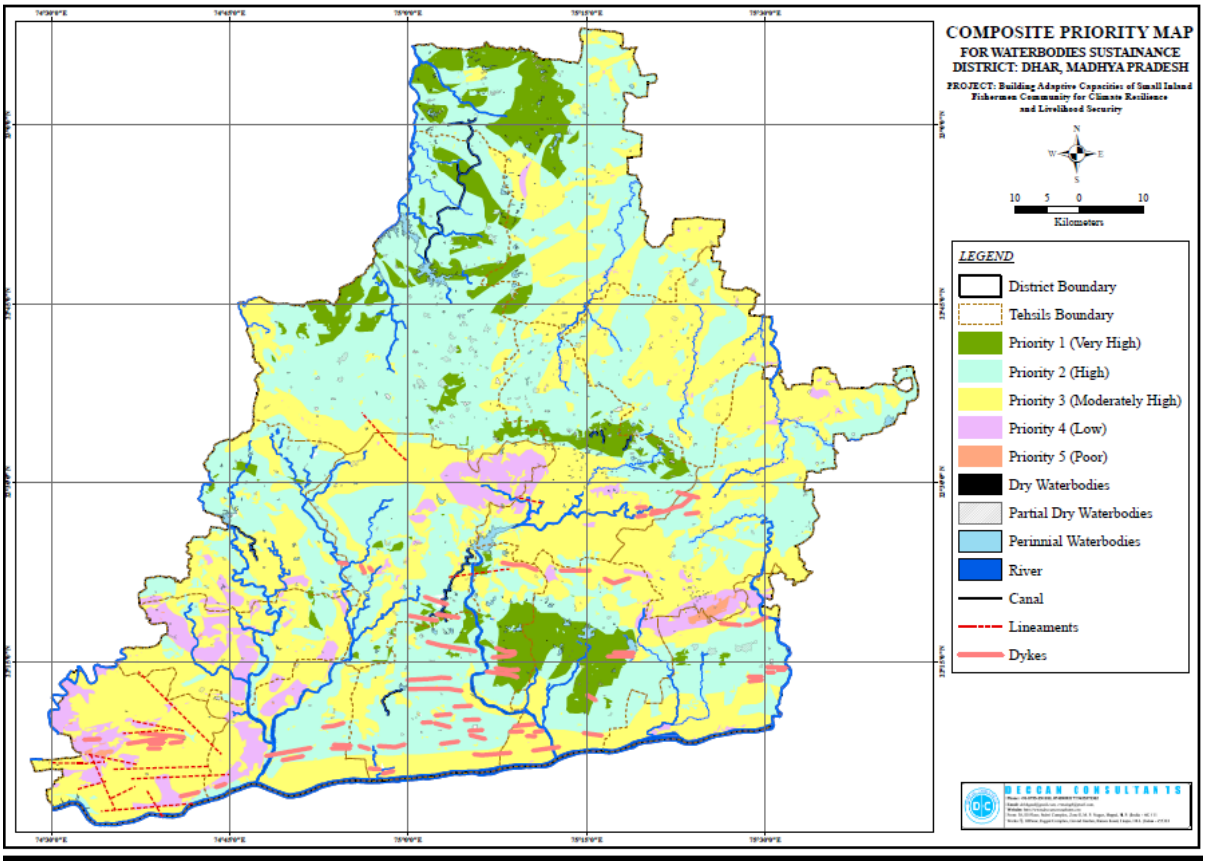


Figure 14 Composite Priority Map

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 FishFarmers**from Gram Panchayat. The sites will be then finalized after the Gram Sabha have recommended the name of the fish farmer 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 be 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 aquaculture.

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.

Dhar: Protocol for Prioritising Rural Ponds for Fisheries

The protocol that led to identification of ponds that are most suitable for fisheries was carried out as follows:

Step 1: Mapping of all the water bodies of the district. This led to identification of **899** ponds.

Step 2: Identifying water bodies that are less than 10 ha in area. Hydrology and water body maps were used for this identification. Ponds with less than10 ha were **520**.

Step 3: Of the identified water bodies in Step 2, the water bodies with less than 10 ha were further sub divided to identify the water bodies that fall within the targeted agro climatic zone. Water body and tehsil and village boundary maps were used and based on the boundary of the Jhabua Hills Agro climatic zone, **153** ponds were shortlisted.

Step 4: Developing a weighted priority that will categorise the identified ponds into different priorities that could be used for the ground truthing exercise. The weighted priority was based on: drainage density; ground water potential; structural formations, geology and lithology, land forms as well as slope and soil map of the area. The weights are assigned to each of these factors with respect to suitability for fisheries. For example, drainage density was categorised as very low, low, moderate, high and very high. High and very high drainage density indicates high slopes and possibilities of poor ground water. For the purpose of fisheries, these were given low priority and areas with low and very low drainage density were given higher priority. For slopes the entire land was categorised as nearly level (< 10%), moderate (10-20%), and strong (20-80%). Accordingly, sites with nearly level to moderate were given high priority for selection of potential sites for fisheries.

Ponds were classified in to five priorities with P1 being most suited for fisheries:
P1= 12; P2= 87; P3= 42; P4= 9; P5= 3.

Step 5: The project listed **99 ponds** (P1 and P2) from which **20 ponds will be covered by the project**. This selection will be based on locating ponds that form a cluster so that these could be managed and monitored effectively by the project team. The project will ensure that clustering will not lead any adverse environmental consequence and that the selection will be based on an even geographic spread in different Gram Panchayats.

Step 6: To ensure access and equity amongst and within the shortlisted ponds each of the ponds sites/villages will be visited to assess Access and Equity. This assessment will include appraisal of Physical, Social and Economic access to the pond and to the commons within the catchment area of the pond. The assessment will be undertaken through a consultative process using Participatory Rural Appraisal (PRA) tools that will:
(a) map services- education, health, water, energy and housing and sanitation within the village;
(b) assess barriers created by the existing pond and whether the project activities will deny access or create additional barriers to these services (for vulnerable groups, women and persons with disability); and
(c) assess whether the project can remove these barriers during the course of project implementation.
The pond sites/ villages where the barriers cannot be removed and where the access will be denied or made difficult will be eliminated from the list of shortlisted sites for project intervention.

Step 7: The actual selection will be based presence of Bhil and Bhilala community and willingness of the community to undertake fisheries in these ponds. To be equitable between these two tribal groups the selection process will ensure that the ponds finally selected for project intervention bear the same proportion of fish farmer beneficiaries from these two tribal groups as are present in the selected cluster.

Activity 1.2 Modified Pond design specifically for fisheries developed and implemented on selected 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[21] developed for the project recommends the following design considerations 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
- 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

[21] See **Annexure 5**Technical Plan

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.
- De-silting and deepening ponds to increase their water capacity will in turn add to their capacity for use.

The project targets modifying 60 ponds (@ 20 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). Given the size of existing ponds less than 10 ha in the districts, the project estimates that on an average, one selected pond will be up to 4 hectares. Thus in all, 240 ha of ponds for fisheries will be covered by the project.

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 close to each pond
- 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.

Activity 1.3 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 the fish farmers. The major insurance product under implementation covers accident, life insurance, agriculture crop insurance etc.

During the implementation of a pilot project supported by GIZ[22], a weather based fisherfolk insurance scheme was brought out by one of the major private sector insurance companies in India

[22] GIZ project titled Climate Proofing Fish Farming under Meenakshi sub scheme of MGNREGS was implemented as pilot in Dhar district. The products were developed through intensive consultation between the fish farmers, insurance company and the intervening ngo. Similar processes are recommended for development and modification of insurance products in the proposed project.

(ICICI Lombard Ltd.). The product for small fish farmers compensated the fish farmer 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 fish farmer 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 a low premium and enables the fish farmers 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 fish farmers the project proposes to facilitate them to become members of existing/new fisherfolkcooperatives. 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 fish farmers. 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 fish farmers and individual fish farmers in terms of services, incentives and issues of capacity building.

Component 2: Building Resilience through adaptation of climate resilient technology

Activity 2.1 Catchment Treatment of Ponds selected for intervention to provide climate resilience to small pond fisheries

The available catchment would be treated by plantation and soil conservation measures (vegetative and/or mechanical) and run-off check structures (e.g. farm bunding, loose boulder structures etc). A catchment treatment plan for each of the 60 ponds will be prepared through extensive community consultative processes. Suitable drought tolerant and nutritivespecies that support local village livestock and controlled grazing measures will be selected as part of the plan. The plan so prepared will seek the approval of the Gram Sabha so that it forms part of the Village Development Plan.

The catchment treatment plan will be submitted to the Project Steering Committee for their concurrence. The project estimates that on an average for each 1 ha of pond, there will be 12 ha of catchment on an average. That is, for 60 ponds with an average size of 4 ha, the project will cover 2,880 ha of catchment area. 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 thereby reducing water retention capacity. This will be reduced with plantations functioning 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 thereby 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 to the poor, children, and differently abled and has necessary protections to be an inclusive intervention. India has good experience, support services and resources available for catchment planning and rehabilitation. The project will use these services and resources and has already made contact with the relevant Environment and Forestry Department agencies in MP. Women will tend to gain with increased fuel and fodder in the catchment area of the pond consequent to implementation of the catchment treatment plan at each of the pond sites. This will not only decrease drudgery for women but will also create potential for income generating opportunities e.g. sale of grass for fodder.

Activity 2.2: 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[23]. 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) Greening the pond's surrounding area based on local geographical and environmental conditions to regulate the pond water temperature

(b) Provision of shade over a part of the tank: In addition to the vegetative plantation around the pond to provide shade to the pond on a long term basis, the following additional measures will also be undertaken:

(i) Shading by developing hide outs

Low density bamboo mats and other locally available material (e.g. palm leaves) will be used to create shade over pond and in water to create cooler hide outs for fish during summer months. The mats and their support structures will be developed by the fish farmers with technical support from the project.

(ii) Deeper portions in pond

[23]FAO Corporate Document Repository, Fisheries and Aquaculture Department

The design of the pond will not be flat at the bottom. The centre of the pond will have deeper portions with maximum depth at the centre ranging from 2 to 4 m depending on the storage area of the pond. The deeper portions will be excavated during de-silting process. These deeper portions will be cooler enabling the fish to move towards these portions during the summer months.

(c) Use of traditional and low cost techniques of creating water turbulence to circulate water across different thermal layers will also be used for regulating temperature.

Activity 2.3: 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 away from agricultural fields so getting an 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 at periodic intervals. 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) Dissolved Oxygen Level

Apart from monitoring of the water quality at periodic intervals, 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 during 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 2.4: Composite fish culture practices with combination of intensive, semi intensive and extensive culture practices based on fish farmers capacity

The existing fish species recommendation of the Fisheries department for the project districts comprises *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
Catlacatla	Plankton Feeder	Surface Feeder	Survival in less water level	Local market demand and one harvest cycle
Labeorohita (Local name: Rohu)	Omnivorous	Column Feeder	Survival in medium water level	Local market demand and one harvest cycle
Cirrhinusmrigala (Local name: Mrigal)	Detritivorous	Bottom Feeder	Survival in medium – deep water level	Local market demand and one harvest cycle
Cyprinuscarpio (Common Carp)	Detritivorous	Bottom Feeder	Survival in medium – deep water level	Local market demand and one harvest cycle

The common carp and *Labeorohita* (Rohu) are featured prominently in capture and aquaculture fisheries on the Indian subcontinent and are well adapted to increases in temperature, and show increased tolerance to elevated temperature following acclimatization to water temperature of 30^0C and 35^0C. The common carp is more thermally tolerant than the *Labeorohita* (Chatterjee et al, 2004). *Catlacatla* is hardy; natural temperature range 18-30^0C; 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, as arethe earlier discussed species. They are bottom dwellers and breed twice a year. They 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 the 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[24].

The poly-culture fish culture practice will be specifically customized to the need of the fish farmer. The proposed fish culture strategies proposed under the Technical Plan[25] is as follows:

- Fish farmers that have the capacity to make investments on inputs will be encouraged to adopt intensive culture as these fish farmers can improve on their production through rational investments in inputs
- Fish farmers 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 nursery and fish seed rearing units. If the water holding capacity of the ponds is longer or if there is analternative source of water then these ponds will be developed for fast growing fingerlings and production of common carp seed in the months of July-Aug and Feb-March.

Type of Culture	Species	Stocking Ratio	Stocking density (per ha)
Intensive	Indian Major Carp and Common Carp (CC)	Catla:Rohu:Mrigal:CommonCarp 30:20:10:40	10,000
Semi - intensive	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
Extensive	IMC and Common carp	30 : 20: 10: 40	8,000

Activity 2.5: 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

[24]Mahatma Gandhi National Rural Employment Guarantee Scheme
[25] See **Annexure 5**Technical Plan

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 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 financiallyviable.

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[26].

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 climate resilience through enhancement of adaptive capacity

Activity 3.1: Productivity of 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 fish farmers 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 fish farmer to be better prepared when projected climatic factors become real at a future date.

[26] See **Annexure 5**Technical Plan

Capacity building of fish farmers forresponsible fishing and adaptive means of fish farming will be taken up in the three project districts. The capacity building will be on[27]:

- **Development as Climate Resilient Fish Farmer**
  - Responsible Fishing
  - Factors of Climate Change
  - Impact of Climate Change
  - Alternative Strategies for responding to Climate Change
- **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 Fish Farmers as Climate Champions**
  - Forging partnerships with other stakeholders
  - Networking skills with other practicing fish farmers 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 already been undertaken that forms the basis for making technological and market intervention for the small pond fish farmer[28]. 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 fish farmers, 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 fish farmers will be developed so that they are able to develop fish culture on sustainable practices.

Activity 3.3: Fish farmers prepare business plan based on local market and existing value chain

[27] See **Annexure 7**Capacity Building Strategy
[28] See **Annexure 6**Business Development and Market Analysis

Business development and market analysis[29] exercise has developed model business plans for fisheries in the project districts. Based on these models, the business plan for each of the selected fish farmers will be developed and the project will provide handholding support and mentor them to implement the business plan developed for them. A total of 60 business plans will be produced.

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

The Gram Panchayat is the local government level institution closesttosmall pond fish farmers that affect their enabling environment to be able to develop and implement adaptive strategies. The project will provide training to members of Gram Panchayats on Climate Change and Livelihood Security[30].

Activity 3.5: Insurance coverage provided for risk minimisation of 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 fishfarmers.Bundling of insurance products with saving and credit products of financial institutions and their customisation for the small fish farmers 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 fishermen practicing small pond aquaculture will be informed and consulted on the development of the product and the fish farmers will be encouraged to form their own opinion on the feasibility and viability of the product based on their own risk assessment of fisheries.

Insurance companies have developed different insurance products that are under review by the Insurance Regulatory and Development Authority of India. These products cover the risks against summer kill, pollution, poisoning, malicious acts by third party (including poaching), explosion/implosion, floods inundation and earthquakes amongst others. The acts that are excluded from coverage include rough handling by the insured, negligence, errors and improper management, overcrowding, losses caused by predators or weed fish, and chemical status of soil and water not associated with climate change. The existing insurance product that has already been launched is a weather based derivative but provides protection against rainfall variability only.

Component 4: Knowledge Generation and Management

Activity 4.1: District Steering Committee Meetings

The project aims at establishment of a District Steering Committee (DSC) in each of the three districts comprising members from government and the project team that will regularly review the

[29] See **Annexure 6**Business Development and Market Analysis
[30] *ibid*

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 (TAG) will comprise agroup 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.

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 (SSC) 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 evidencegenerated 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 (CCO) will comprise practitioners (traditional fishers, beneficiary fish farmers, 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.

The Climate Change Observatory will essentially contribute the following during the life of the project:

(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.

The Climate Champions that will be developed by the project will be linked through the CCO to the similar initiative of the state government. The latter are developing Climate Champions that will spread awareness on the issues related to climate change in villages. The Climate Champions developed by the project will complement the governmental effort in that they will have the specific knowledge of how climatic factors are affecting conduct of aquaculture and what are the possible adaptive measures that can be taken up by fishers in the region. Secondly, the Climate Champion developed by the state government will be linked with the CCO that will provide institutional and resource sustainability to CCO beyond the project period.

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 fish farmers and other, members of the community associated with the project. The purpose of the exercise will be to:

- Create space for the target fish farmers 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 lesions 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 done to provide evidence for the development of knowledge products in the project. The project will develop the process guidelines 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 sessions 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 will be for the middle management and grass roots functionaries of the organisation. The aim of 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 the 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 change and adaptation.

Activity 4.11 Knowledge Products

The project will prepare two types of knowledge products, based on experience: one set of knowledge products will be training manuals and tool kits for practitioners. The second set 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 plans for fisheries, hatchery and nursery that incorporates components of climate adaptation in its analysis. The training manual planned by the project is for fish farmers 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 / organisations that will help create better living conditions for the marginalised fisherfolkcommunity.

Vulnerable groups expected to be benefit from this project include:

Tribal fish farmers: 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, aredependent on fish farming. The proposed project districts are predominantly inhabited by scheduled tribes and the project will be implemented with these ethnic groups.

The proposed project areas are listed in Schedule V of the Constitution of India. The provisions of the constitution provide protection to the tribal communities and accord them the first right and priority in the use of natural resources. The constitutional provisions have been incorporated in the Madhya Pradesh Panchayat Raj and Gram Swaraj Act 1993. The project will work within the legal framework provided and targets tribal fish farmers as the primary beneficiary of the project.

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. Additionally, the traditional fish farmers are engaged in the supply of equipment and material required for the conduct of fish farming, e.g. supply and repair of nets, repair of boat, etc. In addition the traditional fishermen seek employment as labour during harvesting of fish from the pond.The fisher folk will be covered by the project to forge linkages with the tribal fish farmers 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. Women are employed in making/repairingfish nets, harvesting of fish, post-harvest processing, retail marketing and trade in fish. There are two pathways through which women will benefit directly: one, by them being part of project intervention. This will be ensured by making the capacity building exercise inclusive of women, by includingwomen as members of fish farmers' livelihood groups or as members of cooperative societies. Secondly, women will have increased access to fuel and fodder in the catchment area of the pond consequent upon implementation of catchment treatment plan at each of the pond sites. This will not only decrease drudgery for women but will also create potential for income generating opportunities e.g. sale of grass for fodder.

It is a common observation that in the fish market, women sell fish to the retail consumers. Orienting women, especially women sellers belonging to scheduled tribe community, on the terms of trade and practices of fish market and empowering them with the information about prices in

the neighbouring marketare expected to benefit them greatly. Through this activity, the project will develop the capacities of these women to act as smart and market savvy fish sellers.

Fish Businesses: People associated with fish related business activities would benefit due to an increase in scale of harvest, regularity offish 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 ata 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 a lowincome level. Dependency on preserved fish will declineand fresh fish would be available to the local rural consumers.

Benefit Areas	Key benefits	Baseline scenario
Social	Small and marginal farmers face stagnant farm productivity and they regularly look foralternative 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 insearch 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 fish farmers will be developed as productive aquaculturistsas well as climate resilient fish farmers	Tribal fish farmers learn fish practices from their peers and do not have access to credible sources of training and capacity building
	Fish farmer groups will emerge and be strengthened as credible institutions that will undertake regular fisheries in the region	Fish farmer groups among tribal communities are non functional and do not have credibility with financial institutions
Economic	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. Additionally fodder for livestock will also be made available as a result of catchment treatment through increased vegetative cover.	Poor insurance coverage and credit access to meet the required capital and recurring expenses. Grazing only and lack of climate change tolerant species of feed for village animals
	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 fish farmer as they learn to employ labour and resource to achieve optimum levels of production through responsible fishing practices	Fishing at low levels of productivity
	Linkages with banks and financial institutions improved and fish farmers are able to access credit individually and as a group	Poor access to financial institutions and credit
Environmental	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. Controlled grazing regime in catchment area.	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 components 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
Component 1: Adaptive measures to address rainfall variability			
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	
Component 2: Building Resilience through adaptation of climate resilient technology			
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. Additional fodder for livestock	Minimise run-off, decreased soil erosion, in-situ moisture conservation and vegetative coverage
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 supply of fingerlings, minimised transportation cost as the infrastructure is near tank cluster	Development of species under local conditions
Component 3:Building climate resilience through enhancement of adaptive capacity			
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
	Both women and men among the tribal fish farmers 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
Component 4: Knowledge Generation and Management			
Multi-stakeholder participation in project processes	Adaptation policies and plans recognise the social imperatives of the small pond aquaculture e.g. the need for consensus at the village level	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 aquaculture	Programmes for economic development of small fish farmers 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 aquaculture 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.

Cost effectiveness: The cost effectiveness of the project based on the sub components of the project is given in the following table.

Current addressing mechanism	How is it addressed by the project	Cost effectiveness
Sub component: Selection of ponds for small-scale fisheries		
There are no existing guidelines for identification of ponds specifically for fisheries. Ponds are constructed for irrigation or *nistari* purposes. The fish farmer who satisfies the eligibility criteria is given lease for fisheries and supported by the Department of Fisheries. Withdrawal of support for ponds or giving up on fisheries by the fisher folk is high as the water retention for fisheries in pond is inconsistent due to inappropriate	Identification of areas most suited for fisheries within the district will be undertaken through a geo hydrological survey that will be followed ground truthing of the data. This exercise will determine suitability of areas for fisheries; assess the catchment area of pond; provide inputs for design based on the geology of the area.	The identification and planning exercise is introducing climate resilient factors in to planning for fisheries in the district. This will make investments by the department sustainable, reduce failure and reduce the drop out rate of fish farmers in the district. Greater efficiency of expenditure will be achieved. The protocol developed by the project, and included in an updated manual, will be demonstrated for adoption in the mainstream planning processes. Such an

Current addressing mechanism	How is it addressed by the project	Cost effectiveness
design (fn reference to fisheries), unsuitable location. Department of Fisheries does not have guidelines for constructing ponds on Panchayat land (less than 10 hac). They have schemes that provide support to construction of pond on private land only. The eligibility criteria of the scheme do not have parameters related to geo hydrology of the area nor an assessment of the catchment area and its treatment.	Processes of social consultation before finalisation of site for support by the project.	approach will have wide application in all inland fishing districts and states of the nation.
Sub Component: Modification of selected ponds developed and implemented		
The current scheme for existing ponds is for repair and renovation of the pond. The components included are repair of embankment, clearing vegetation from pond, and installation of wire mesh. Removal of silt, deepening of pond, and issues of leakages and seepage are not addressed by these schemes. There is no provision for modification of design or renovation to address climate change factors.	Project will customise rehabilitation plans for each of the selected ponds. The rehabilitation will ensure that there is 3 m of water available for fisheries by the fish farmer. De-silting, deepening, construction of key trench and compaction, repair of inlet and outlet of the pond and installation of wire mesh will be undertaken by the project.	Enable fish farmers to practice productive and commercial fisheries throughout the year. The rehabilitation plans will be placed in the mainstream planning and implementation processes for adoption as adaptive measures for small-scale fisheries in the state. The cost items in each pond will provide the baseline figures for the government to develop guidelines for modifying ponds for climate resilience.
Sub component: Modification of Insurance products		
Existing insurance are for life and against accidents for the fish farmers. The insurance products that protect the fish farmers against the loss of income are few. The existing weather based insurance product protects against rainfall only.	Project will work with insurance companies to develop weather based insurance derivatives that compensate the fish farmer against loss of income on account of temperature as well.	The project will contribute todeveloping of comprehensive insurance products that will offer choices to the fish farmers for protection against loss of income on account of weather based losses. Fish farmers undertaking fisheries as supplementary income source will find the security of insurance as a viable way to reduce the risk of the investment. The process will deepen the financial inclusion of the vulnerable group and make their livelihood climate resilient.
Sub component: Catchment treatment		

Current addressing mechanism	How is it addressed by the project	Cost effectiveness
There are no catchment treatment plans for ponds less than 10 hac constructed on common land. Most ponds face high silt load coming from the catchment that affects its water` retention capacity. In cases where agriculture is practised the quality of water is adversely affected for fisheries due to usage of chemical fertilisers and pesticides by the farmers in the catchment area.	Development of customised catchment treatment plan that will include soil and moisture conservation measures as well as vegetative measures to minimise flow of silt load in to pond. Additionally a consultative plan will be developed with farmers in the catchment to prevent polluted water flowing in the pond. Productivity of common land in the catchment will be increased through plantations and grasses that will provide fuel and fodder to the village community.	Pond based catchment treatment plans will enhance the productive life of the pond and will prove beneficial for the fish farmers. The catchment treatment plan will be demonstrated as an integrated eco service based model for pond construction and rehabilitation that enhances accessibility to eco-services for different stakeholders in the village. Catchment treatment plans will be developed as climate resilient adaptive measures for small-scale fisheries in the state.
Sub component: Temperature regulating best management practices		
Penetration of technological options like oxygen tablets and solar aerators is non-existent in the project area. There is no understanding of the water quality and its impact of productivity of pond for fisheries.	Project will inform, educate and train the fish farmers and the members of the community on the technologies and best management practices to regulate pond temperature.	Fish farmers gain access to technologies and adopt them to regulate temperature of their pond and reduce mortality rate of fish. Use of solar powered aerators will instil the practice of using renewable sources that will further enhance the penetration of technology in remote areas.
Sub component: Poly culture fish culture		
Tribal fish farmers are not conducting hatchery or nursery or seed rearing units. They are totally dependent on outside suppliers for fish seed, fingerling and are often cheated on quality, quantity and price. Fish farmers at best practice two layers of fish and are not familiar with poly culture fish culture.	Training and establishing fish seed rearing units, nurseries and hatcheries in the districts will make the fingerling accessible and available to lager group of fish farmer. Fish farmers will be trained in the nurturing of and harvesting of poly culture fish culture practices.	Wider portfolio of fish species will make the small-scale fish farming climate resilient and enable the fish farmer to optimise their income through sale of different fish species.
Sub component: Capacity building of fish farmer on climate resilient fish farming		
Present training of fish farmer is mostly on skills related to fish culture.	Components of climate change and its impact on fisheries, responsible fisheries, market behaviour of fish, and development of business plan for fish culture by each of the selected fish farmers will be conducted under the project.	Long-term contribution of the project will be a cadre of trained and experienced fish farmers that have the wherewithal of adapting to climate change. The cadre will also function as climate champions making other stakeholders aware on the climate change factors and the process of developing adaptive strategies.

Current addressing mechanism	How is it addressed by the project	Cost effectiveness
Sub component: Institutional processes for multi-stakeholder learning and documentation of knowledge generated		
There are no interdepartmental committees at the district and state level that are addressing the issue of climate change. Neither are the departments in the process of developing adaptive measures to climate change. Panchayat representatives at the district, block and village level have not been oriented in climate change factors and their possible role in facilitating different stakeholders to develop adaptive strategies. There are no field experiences that could be used for advocating for change or development of policies for adaptation in the small-scale fisheries sector.	Project will train the Panchayat representatives in climate change and the mechanism of developing adaptive strategies. They will also be exposed to different adaptive measures that have been developed and implemented. Climate Change Observatory at the district level will create an opportunity for the fish farmers and the Panchayat representatives to discuss and develop understanding of the climatic factors and the possible adaptation strategies that can be developed. Project will form and facilitate meetings of inter disciplinary committees at the district and state level to provide them inputs on the project processes and impacts. These will serve as on-line discussion cum learning forums. Project will conduct systematic action and reflection exercises, systematisation processes, and process documentation to document learning of the fish farmers during the course of project implementation.	Contribution of the project on the discourse of adaptation strategies to climate change based on field experiences at all levels- sub district, district and state level. Documents available for generating debates and discussion among stakeholders on the issue of adaptation in the climate change scenario.
Sub component: Learning from project disseminated		
There are no stakeholder engagements on adaptation strategies in fresh water aquaculture as a result of climate change.	Project will hold state and national level workshops to engage with a wider range of stakeholders and experiences in the country. Civil society leaders will be oriented and trained in the climate resilient practices adopted under the project so that the same can be disseminated in their respective areas.	Long term contribution of the project in developing persons trained and oriented in issues related to climate change. Opportunity to government stakeholders to review their existing policies and practices in the light of climate change factors.
Sub component: Development of knowledge products		

Current addressing mechanism	How is it addressed by the project	Cost effectiveness
Lack of material for practitioners and trainers on climate resilient fish farming.	Project will develop training manual, and practitioner's guide on adaptation strategies on small-scale fish farming, development of business plans, and good management practices for climate resilient fish farming.	Long term contribution of the project` in the on-going development of experiential knowledge for adaptation and small-scale fish farming.

Quantification of Cost effectiveness

Annexure 11 documents the *Bhatiyari: Technical and Financial Feasibility* as a case study of one of the ponds that were selected through the process of geo-hydrological survey. The case study illustrates the type of investment that is required for the rehabilitation of the pond to be suitable for commercial fisheries and for treatment of the catchment area:acombinationof measures that will provide added climate change resilience under the project.

The cost of farming four species of fish along with other operational cost has been included and the pond requires an investment of INR 1,424,242. The capital cost is inclusive of the catchment treatment as well as costs to be incurred for renovation and modification of pond to suit fisheries throughout the year. The cost has been compared with NABARD's "standard unit cost model" (called below the *standard model*) to establish a pond for the same area as at Bhatiyari (2.3 ha). It needs to be pointed out that standard model cost does **not** include catchment treatment cost and other costs for trenching and compacting for arresting leakages and seepages. The standard model would not include the measures that are required at each pond site to address climate change vulnerability. While the standard model is cheaper than the project cost, and therefore appears financially more attractive in the analysis, although*it is riskier and less cost effective* in the context of addressing climate change.

The income under the standard model is calculated on the basis of 85% survival and the size of fish harvested at 1.1 kg for sale. In the case of Bhatiyari under the project survival has been estimated more conservatively at 80% and the fish is harvested at 1 kg for sale. The price at Bhatiyari is the minimum price at which fish has been sold in the previous year.

The comparative cost between the standard model and the project, the cost/benefit results, financial viability and some preliminary estimates of the impacts of climate change risksof the Bhatiyari pond is given below:

Particulars (all costs units of INR 100,000)	**Standard** Model cost	**Project Cost inclusive** of catchment treatment cost
Capital Cost	3.67	12.05
Working capital	3.48	2.18
Total cost	7.16	14.24
Gross Income	11.29	11.04

NPC Cost	36.33	33.95
NPV Benefit	44.69	45.28
NPV	83.61	11.32
BCR	**1.23**	**1.33**
IRR	**18%**	**11%**
Break Even Point	0.47	1.36
Pay Back Period	2nd year	2nd year

Impact of Adaptation

Adaptation investments and its impact on pond and fisheries will be as follows:

Adaptation Investment	**Adaptation Impact**	
	Direct Primary Impact	**Direct Secondary Impact**
(a) Deepening/ de-silting of pond (b) Trenching and compaction to arrest seepage and leakages (c) Inlet-outlet protection (d) Soil and Moisture Conservation works in catchment (e) Increased vegetative cover in catchment	• Increased water depth sustained	• Introduction of bottom layer of fishdwellers
	• Increased duration of water retention in pond	• Harvesting of fish for a longer duration
		• Pond does not dry completely and bottom dwelling fish are always in stock

At the **fish farmer level** the impact of the adaptation investment will be in terms of (a) yield of fish from pond; (b) profitability from fish as an income generating option; and (c) creation of safety nets for the fish farmer. These impacts have been quantified in the following table in terms of how the standard model for composite fish culture will undergo the required modifications to adapt to climate change.

Existing Standard Model		**Model After Adaptation**		**Impact**
Practice	***Return***	***Practice***	***Returns***	
Yield				
@ 85% survival on seed of 5,000 per ha	4,675 kg per ha	@ 80% survival on seed of 10,000 per ha as the pond depth has increased by 1 ha m	8,000 kg per ha	Increase in productivity by 3,325 kg per ha
Profitability				
Fish stock of Rohu:Catla:Mrigal in the ratio of 40:30:30	Price Rs 55 per kg	Fish Stock of Rohu:Catla:Mrigal:Common Carp in the ratio of 30:20:10:40 as there is local demand for Common Carp and it can be harvested and sold for a longer duration	Price Rs 60 per kg	Increase in average price of catch by Rs 5 per kg
Gross Income per ha in INR 100,000	2.57	Gross Income per ha in INR 100,000	4.78	Increase in Gross Income by 2.21 per ha
Safety Net				

Fish stocking ratio has less proportion of bottom dwellers	During summer Pond will not have enough fish to develop as brood stock	Fish stocking ratio has higher proportion of bottom dwellers	Brood stock of bottom dwellers available that breeds during monsoon	Safety net for the fish farmer embedded in the design

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	12th Five year plan	Planning Commission, Govt. of India	1. Maintenance of surface water bodies 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
2	National Water Mission	Ministry of Water Resources, Govt. of India	1. Designing incentive structures to promote water neutral or water positive technologies 2. Integrated water resource management helping to conserve water 3. Optimise water use by increasing water use efficiency by 20% 4. Enhancing storage, both above and below ground, special effort to increase water storage capacity
3	National Mission on Strategic Knowledge for Climate Change	Cross cuts all the Ministries & Department	1. Identifying challenges of and response to climate change 2. Research on socio-economic impacts of climate change, including impact on health and livelihoods 3. Development of innovative technologies for adaptation and mitigation 4. Research to support policy and implementation
4	Madhya Pradesh State Action Plan on Climate Change	Housing and Environment	1. Conservation of fish bio-diversity 2. Study of impacts of climate change on inland fisheries

SN	Central/State Government Policy	Responsible Agency	Project Component Consistent with the Policy
		Department, Govt. of Madhya Pradesh	3. Develop agro-climatic zone wise plan for fisheries 4. Strengthening the existing system of fish management in the State 5. Capacity building to integrate climate change risk in planning
5	Madhya Pradesh State Fishery Policy, 2008	Department of Fisheries, Govt. of Madhya Pradesh	1. Loans to fish farmers 2. JanshreeBimaYojana for all fishermen(Insurance) 3. Use of the latest techniques in fishing to improve production

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 monitor the adherence to the technical standards during its periodic field visits.

SN	Activity	Applicable Standards	Application to Project by
	Component 1		
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
	Component 2		
3	Catchment Treatment	Standards of watershed development programme and standards of Forest Department.	Implementing agency along with expert. Support of Forestry Department
4	Pond Temperature Regulation	Specification of Fisheries Dept.	Dept. of Fisheries, Govt. of MP along with Implementing Agency

SN	Activity	Applicable Standards	Application to Project by
5	Promotion of selected fish species	Specification of Fisheries Dept.	By implementing agency with technical expert
6	Oxygenation	Specification of Fisheries Dept.	Dept. of Fisheries, Govt. of MP along with Implementing Agency
7	Water quality management	Specification of Fisheries Dept.	Dept. of Fisheries, Govt. of MP along with Implementing Agency
8	Establishment of seed hatcheries / nurseries	Specification of Fisheries Dept.	Dept. of Fisheries, Govt. of MP
	Component 3		
9	Training of fish farmer	Specification of Fisheries Dept.	Implementing Agency
10	Project linkage	Convergence Guidelines of Govt. Institutional framework for fisheries sector	Dept. of Fisheries, Govt. of MP along with Housing and Environment Department
11	Insurance Coverage	Specification of Fisheries Dept.	Dept. of Fisheries, Govt. of MP along with Implementing Agency
	Component 4		
12	Key Stakeholder participation	Convergence Guidelines of Govt. Institutional framework	Department of Panchayat and Rural Development and Implementing Agency
13	Generation of evidence based learning	Approved national standard, Climate Change Action Plan suggested benefits	EPCO and Implementing Agency
14	Dissemination of learning	Government protocols for participation in learning sharing events	Department of Rural Development and Department of Fisheries and Implementing Agency
15	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:

SN	Project	Objectives	Complementarities	Geographical Coverage	Agency
1	Mahatma Gandhi National Rural Employment Guarantee Scheme(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	RashtriyaKrishi VikasYojana (National Agriculture Development Programme)	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 strength food security, generate employment opportunities, improving the socio economic status of fish farmers 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	Construction of Nurseries / hatcheries Capital cost for construction of battery of cages Input cost Establishment of infrastructure like	All Districts, based on feasibility	Dept. of Fisheries and Ministry of Agriculture

SN	Project	Objectives	Complementarities	Geographical Coverage	Agency
		aquaculture development through integrated approach for protein supplement	cold storage, ice plant, insulated truck, marketing/retail outlets		
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 Meenakshi Sub Scheme of MGNREGS with the support of GIZ

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

Small farmers in Madhya Pradesh's Dhar district traditionally depend on rain-fed agriculture for their livelihoods. 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 project led to change in the recommended fish species to include additional species of common carp in the sub scheme; introduction of weather based insurance product that was subscribed by fish farmers; and acceptance of the modified pond design within the recommended designs under the sub scheme.

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

Ref: Project completion report Climate ProofingFish Farming under Meenakshi sub scheme of MGNREGS; Nov 2011 to June 2013 at INR 2166600

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 an 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 pond fish farmers inthe 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 SteeringCommittee 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 comparisons (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 Fish Farmers on Climate Resilient Fish Rearing Practices
(d) Awareness material on climate change and fisheries
(e) Good Management Practice for Climate Resilient Small Scale Fisheries

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.[31]The stakeholders identified and consulted include the following:

Community Level	**Government Departments**

[31] See **Annexure 4**Stakeholder Analysis and Management

• Village Community • Fish Farmers (Men and Women) • Traditional Fishers (Men and Women) • Labour (Men and Women) • Gram Sabha • Gram Panchayat • Self Help Group (Fish Farmers) • Fish Farmer's Cooperative Society	• Department of Fisheries • Madhya Pradesh Fisheries Federation • Department of Farmer Welfare and Agriculture Development • Department of Panchayat and Rural Development • Directorate of Panchayat • Department of Forest • Department of Revenue • Department of MineralResources • Department of Cooperation • Department of Water Resources • EPCO • CIFA
Commercial Enterprises • Commercial Banks • Seed Suppliers • Feed Suppliers • Suppliers of Fish Net • Fish Traders	**Civil Society Organisations** • Local NGOs • Media • Academic Institutions

Details on stakeholders' consultations are indicated below, whereas the stakeholder analysis and management details are presented in the Annexure 4. In addition, NABARD, as part of its due diligenceduring project appraisal, visited MP on 12-13 November 2014 including a visit to a proposed project site in Dhar district.

Stakeholder Consultation for the Preparation of Proposal

Stakeholder consulted	Process of Consultation	Description	Key findings
Traditional Fisher Community			
(a) Fisher Community at Alirajpur (12 May 2014) (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)	- Observation in the local Fish Market on weekly market day - Focus Group Discussion with traditional fishers and sellers in the fish market	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. 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.	- Different fish species and their demand in the local market including trend of prices across season - Fish buying behavior of the local customers; different types of fish sellers and pricing strategies adopted by them in the market - Fish market infrastructure, support structures and services available to traditional fishers - Long term changes in the availability of fish in the local markets - Assessment of climatic change and its impact on fisheries - Role of women in fish trade and assessment of existing skill levels amongst women - Associated market for fisheries (e.g. fish net) and role of women in these products - Access to government schemes and programmes - Linkages between local fishers (tribal community) and fish sellers (traditional fishers) - Local demand for fish seed and opportunity for fish nursery and hatchery - Assessment of climatic change and its impact on fisheries
Small Farmer Fish Farmers			
(a) Fish Farmer Group at Alirajpur (6, 7 and 11 May 2014) (b) Fish Farmer Group at Rama/ Para (Jhabua) (8 and 13 May 2014)	- Focus Group Discussion with Fish Farmer Group - Individual interaction with Gram Panchayat representatives	- Through consultation with representatives of Fisheries department and civil society organizations local scheduled tribe fish farmers	- Process of leasing pond for fishing rights (legal and administrative procedures) - Group formation and distribution of responsibilities among group members

Stakeholder consulted	Process of Consultation	Description	Key findings
(c) Fish Farmer Group GulabPura (8 May 2014), Jhabua (d) Fish Farmer Group at Narvali, Jhabua (6 May 2014) (e) Fish Hatchery at Maud Sagar (6 May 2014)		were selected that were identified as undertaking regular 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 find for ponds, appropriateness of design of pond for fisheries, understanding of factors for climate and their role in enabling users to develop adaptation strategies	- Fish rearing practices and source of information and learning about fisheries - Access to government schemes and programmes - 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 fish farmers - access to information, training and knowledge related to climate change, adaptation strategies - skills and knowledge related to fish hatchery and nursery
Private Entrepreneur			
Private Hatchery and Nursery (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
Fish Traders (a) Indore (11 May and 5 June 2014)	- Individual interactions with traders	- Traders who on a regular basis engage in trading in	- Fish market and demand pattern of fish locally - Volumes of fish consumption locally and cyclical trends in fish

Stakeholder consulted	Process of Consultation	Description	Key findings
(b) Khalghat (11 May 2014) (c) Dahod (2 June 2014) (d) Meghnagar (5 May 2014) (e) Alirajpur (3 June 2014) (f) Jhabua (3 June 2014) (g) Dhar (6 June 2014)		fish purchasing it locally or from outside the district	- Terms of trade of fish market - Different players in the fish market and their negotiating abilities - Extent of fish trade and its linkages with markets outside the district - Infrastructure for fish markets - Support services for fish trade in the local markets
Civil Society Organisation			
(a) GraminVikas Trust, Jhabua (15 and 27 April 2014) (b) KhedutKisanMajdoorSangahtan, Alirajpur (11 May 2014)	- Peer Consultation through individual interaction	- Civil society experience for promoting fisheries in the region	- Inter-community dynamics between traditional fisherpersons and small and marginal farmer as fish farmers - Gram Sabha meetings and their role in fisheries development - Interest of small and marginal farmers towards fisheries - Role of women in different operations of fisheries - Civil Society understanding of factors of climate change, their impact on fisheries, and adaptation strategies - Opportunities for integrated agriculture and aqua culture practices - Support structures and services for fish farmers for marketing, financial services and infrastructure support
Panchayat Institutions			
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	- Guidelines for construction of ponds for fisheries - Parameters that are taken in to account while planning for fisheries in the district - Present plans for promotion of fisheries in the district

Stakeholder consulted	Process of Consultation	Description	Key findings
		the Zila Panchayat were contacted and information was generated through individual interaction	- Present level of understanding about climate change and its impact, particularly on fisheries - Basic information on development parameters related to the district - Poverty and development planning in the district - Role of women in fisheries and specific schemes targeting women involved in different operations of fisheries
Government Departments- District Level			
Department of Fisheries (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 fish farmers - Inter community dynamics between traditional fishers and local (scheduled tribe) fish farmers - 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

Stakeholder consulted	Process of Consultation	Description	Key findings
			- Coordination mechanism with other departments and stakeholders - Role of women in fisheries and government programmes for enhancing their role and productivity
Department of Water Resources (a) Dhar (5 May 2014) (b) Jhabua (6 to 7 May 2014) (c) Alirajpur (12 May 2014)	- Individual interaction	- Divisional Officers in the district were contacted and information related to water resources was collected from them	- Development of water resources in the district - Design parameters and guidelines for design of reservoirs and ponds specific to fisheries - Identification of priority areas for fisheries in the district - Water statistics of the district
Department of Revenue (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
Department of Farmers Welfare and Agriculture Development (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	- Plans for agriculture development of the district - Emergency plan for agriculture including plans for intervention for fisheries in cases of natural disasters - Training for small and marginal farmers and promotion of IAA in the district - Coordination mechanisms with Fisheries Department
Government Departments- State Level			
Directorate of Panchayat (19 May 2014)	- Individual interaction	- Information related to role of Panchayats and their powers in development of fisheries - Specific provisions related to Schedule V areas on fisheries in the state	- Legal provisions that enable Panchayats to intervene for development of fisheries in the state - Orders and circulars to implement the legal provisions - Orders for implementation of powers of Gram Sabha in scheduled areas in the state - Incorporation of specific legal provisions for the implementation of State Fisheries policy

Stakeholder consulted	Process of Consultation	Description	Key findings
Department of Fisheries (3, 19 May 2014)	- Individual interaction	- State Policy for Fisheries - Data and trend of fisheries in the state - Assessment of impact of climate change on fisheries and preparedness to address climate change factors	- State policy for fisheries and challenges and constraints in its implementation - Gaps in state policy - Structure of the department and distribution of roles and responsibilities within the department - State plan of action for climate change for fisheries in the state
Department of Rural Development (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
Madhya Pradesh Fish Federation (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 fish farmers - Role of Federation in promoting women in the fishery sector
Environment Pollution Control Agency (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
Central Institute for Freshwater Aquaculture (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

Stakeholder consulted	Process of Consultation	Description	Key findings
			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
Indian Meteorological Department (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
Institute of Soil Science (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
Indian Council of Agriculture Research (CIAE) **(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
Department of Fisheries (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
Traditional Fisher folk (Regular interaction during the pilot phase during2012 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 littleor 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 hasstipulated tied fund provisions for different components. Provisioning of additional funds into 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 the sites of the ponds for fisheries and modification in the design of the farm ponds so that the water retention capacity is improved substantially. This is expected to providea prolonged fish-rearing period that will lead to a better fish harvest. The insurance product proposed to be developed would address climate risks associated with the fish production system on a sustainable basis.

Component 2: Building resilience through adaptation of climate resilient technology

Baseline Scenario

Experience gained during one and half years of direct association with in-land fisheries shows that required adaptive measures to climate variability aredeficient in many ways and in most parts of the State. Even in commercial firms 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 fingerings 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-widths 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 the temperature of the pond; and introduction of fish species that is suited to a 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) catchment treatment of the pond so that the silt and organic load of the pond is decreased and the ponds are able to maintain water depth for fish rearing (b) greening of the immediate vicinity of the pond to regulate micro temperature especially during hot summer months; (c) 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 fish farmer it will be customized to the need of the fish farmer 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 climate resilience through enhancement of adaptive capacity

Baseline Scenario

As most of the fish farmers 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 funds 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

Under this proposed component the capacity building needs of the fisheries community will betaken 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 quitetraditional in nature and of less importance for climate responsive adaptive practices. Existing manuals are not suited for modern fish ponds. As a result, the fish farming methods, adaptedare 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 and science-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 documented and adopted by fishery extension systems in rain-fed areas.
7. A convergence model for integrating programs of poverty alleviations/ rural development, fisheries development, and financial institutions, also documented.
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, developed with appropriate feedback and interaction with government.

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 itslife. The sustainability parameters of the project are many folds and interlinked 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 fish farmers 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 regulatethe 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 fish farmers 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 fish farmers 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 fish farmers 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 fish farmers 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
Compliance with the Law	• The project complies with Environment (Protection) Act, 1986 and Forest Conservation Act, 1980. • 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 Sub-national Government.	None
Access and Equity	• 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. • The project will undertake an assessment of the Access and Equity on the shortlisted sites before finalisation of the sites for project intervention. This assessment will be a consultative exercise with the communities to find physical, social and	None

	economic barriers to access and whether the project will create additional barriers or deny access to the vulnerable groups, women and persons with disability. • The beneficiary group of the final selection of the pond will be in the same proportion as the proportion of Bhils and Bhilalas in the population of the selected cluster. • The project has the component of regular water monitoring. In case the quality of water will get affected mitigation measures will be undertaken. • The project will design ponds for small and marginal landholders as much as it will for other landholders. • The proportion of benefits that will flow to each category of landholder will be determined in consultation with the Project Steering Group.	
Marginalized and Vulnerable Groups	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. The proposed project area is listed in the Schedule V of the constitution of India that accords priority to tribal communities in the use of natural resources. Legally the tribal communities are protected and have the first right over use of ponds for fisheries. The traditional fishers concentrate on conducting fisheries in rivers and/or in other components of the value chain, e.g. making and repair of nets, trading in fish, etc. The tribal fish farmers will benefit as direct beneficiaries of the project and the traditional fishers will benefit indirectly with growth in fisheries in the region and with increase in production of fish. The Technical Assessment and Baseline and Project Benefit Assessment include identification of impact on marginalised groups.	None
Human Rights	The project does not foresee any violation of human rights	None
Gender Equity and Women's Empowerment	Project would ensure participation by women fully and equitably, receiving comparable socio-economic benefits and those they do not suffer adverse effects. 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) Women will also gain in terms of reduced drudgery on account of increased availability of fodder and fuel as a result of implementation of catchment treatment plans in all the ponds selected under the project.	None
Core Labour Rights	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
Indigenous Peoples	Not applicable to this project	None
Involuntary Resettlement	The project will be working with the existing pond sites only. The project does not propose to increase the size of the pond. In such a case, the project will not displace any community and hence likelihood of involuntary resettlement/relocation may not arise.	None

	The criteria for selection of pond will include the fact that in case there is any possibility or likelihood of involuntary resettlement due to project activities that particular pond site will not be selected. This factor will be included in one of the factors for ESI screening safeguards.	
Protection of Natural Habitats	Project does not affect any of the natural habitats. Some ponds may serve as drinking water sources for domestic animals, e.g cows, buffaloes, and goats, or for wild animals. The factor of access to drinking water for animals will be an important consideration in the on-site pond assessment and if the pond is a natural habitat for these animals it will not be covered by the project. The assessment of the catchment will be undertaken through a walk through the area. The walk through will seek to identify and record any natural habitat for animals or birds. In cases there are such habitats the catchment treatment will be undertaken in the manner that these habitats are not affected or the selection of pond will be reviewed if the habitat would not be protected from catchment treatment works.	None
Conservation of Biological Diversity	The fish species proposed to be promoted under the project are native and endemic to the area. The vegetation, including trees and grasses, that will be promoted for the catchment treatment will be local and endemic to the area. The selection of specific plant species will be undertaken in consultation with the local population and based on the recommendations of the Forest Department for the district. The project would not cause any impact on bio-diversity values.	None
Climate Change	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
Pollution Prevention and Resource Efficiency	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. 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. The waste generated during construction (e.g. cement bags) will be disposed off through a safe disposal mechanism. The used bags and any plastic material generated due to any of activity of the project will be collected and disposed off through the solid waste disposal mechanism of the nearby town and will not be allowed to litter in the village and the countryside. The project will undertake an assessment of the impact of the use of machinery and heavy vehicles during the construction activity on the pond and the catchment infrastructure. The assessment will form part of the ESI screening process and the project will ensure that the quality of machines and vehicles used does not lead to spread of oil or other such pollutants to the pond or in the catchment area of the pond.	None

	The project will make arrangement to transport workers and not allow establishment of camp sites on the construction sites.	
Public Health	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 following actions will be instituted: (a) 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. (b) The local Public Health Centre will be informed of the project activities along with the list of villages where the project will be implemented. The corresponding para health workers the Multi Purpose Health Worker (MPW) and the Auxiliary Nurse and Midwife (ANM) and the Accredited Social Health Activist (ASHA) from the community will be informed and regularly contacted by the project. There will be regular visit of these health functionaries to the pond sites to ensure that there are no risks of water borne vector diseases for the village (c) The project will prepare informative pamphlets on water borne vectors and the possible preventive measures that will be available with all the fish farmers and the Panchayat representatives in the village.	None to low
Physical and Cultural Heritage	The project will not be excavating new ponds. It will work with existing pond sites only. In such cases there is no likelihood of encroaching on physical and cultural heritage sites and structures. Hence there will be no adverse impact on cultural heritage related issues is identified.	None
Lands and Soil Conservation	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. The project will **not** be excavating a new pond. It will however excavate silt due to deepening of pond. The silt will be distributed among the farmers in the catchment area so that they can use to enhance the fertility of their lands. The process of distribution will be through a participatory and consultative process with the farmers in the catchment area. In no case will the soil excavated will be disposed off in gulley and other water courses. The soil and moisture conservation works envisaged in the project, namely, field bund, trenching, gulley plugging, loose boulder check dams, will be based mostly on *in situ* conservation works. In specific cases where there is need to transport earth or other such material for catchment treatment the provisions of the Land Revenue Code and the Forest Conservation will be strictly adhered to. Earthwork in ponds or in the catchment area will not be undertaken during the rainy season. Most of these works will be undertaken after the agriculture operations are over and there is easy access to land and the pond site.	None

Child Labour: The division of labour in tribal households follow their kinship pattern. The adults in the hamlet, both men and women, take up work as a unit. That is in agriculture they exchange labour in each other's fields; as agriculture labours they work as a group dividing the work amongst them and in non-agriculture labour, the members of the kin take work as a group. This practice enables them to distribute labour amongst themselves and the wages are shared based on the work performed.

Normally the elder children would take care of the younger siblings when the adult members of the family are engaged in labour. Even in such cases if the elders are present in the house then they take the primary responsibility of looking after younger children.

Children, if not in school, are engaged in tending animals and in undertaking miscellaneous household chores. Child labour among the tribal households is common in families that migrate in search of work where children, that can earn or gain employment, accompany the adult members. Smaller children are left with the non-migrating members of the family.

The project team that visited existing sites where fisheries is being conducted by tribal households and found out that *children are not being employed in any of the operations related to fisheries*. In fact contribution of children in any of the activities related to fisheries- production, harvesting or sale was not visible in the region. On the other hand, the households have made use of supplementary income generated from fisheries in making investments for education of the child. Since the tribal group values the labour of girls (practice of bride price prevails amongst them), the additional income has also been used equally for the boy and the girl child.

The project will eliminate the possibility of engagement of child labour in any activity related to fisheries directly or in any other activity in any other form of paid or unpaid labourby inserting the protective clause in the MoU that it will sign with the fish farmer and their group. The factor of prohibition of child labour at pond sites will also be resolved in the Gram Sabha meetings when the name of the person for fishing lease will be finalised.The aspect of child labour will be subject to periodic review at all pond sites and will form part of the monitoring report that will be submitted by the project.

As discussed above, few environmental and social risks have been identified during the preliminary screening in the project/sub-project and a detailed environmental and social screening is proposed during the implementation stage. In view of this, the project is categorized as **"Category B"**. To ensure that the project conforms to the AFP's Environmental and Social Policy (approved in November 2013) a Methodology for Environment and Social Impact Assessment and Environment and Social Management Plan for Sub Projects have been developed. The Project will treat each of the pond-cum-catchment sites as a sub project. This implies there will be 60 sub projects and each sub project will undergo ESI Screening and develop a ESMP. Safeguards and Screening procedures too have been incorporated in the Methodology. The Methodology is attached as an accompanying document with the proposalas Appendix I.

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.

The following grievance redressal mechanism would be created as part of implementation mechanism.

1. Grievance Mechanism for Village Level Stakeholders

1.1 All pond sites will have display board stating the name of the project and names of NIE and Executing Agency. The names of contact persons and their mobile numbers will also be displayed on these boards.

1.2 The meeting of the Gram Sabha that will finalise the catchment treatment plan will comprise of pro active disclosure from the project of the grievance mechanism that exists in the project. To maintain consistency across villages a pamphlet related to the project comprising of the grievance mechanism will be printed and distributed in the Gram Sabha meetings. A copy of the pamphlet will be kept in the office of the Gram Panchayat so that it can be accessed during the course of project implementation.

1.3 Law provides that each Gram Sabha will mandatorily have four meetings in a year. The senior members of the Field Management Team will develop their field plan in such a way that they attend at least one meeting of the Gram Sabha during the year. The project at these meetings will pro actively disclose the activities undertaken in the village and provide a public opportunity to air grievance to the senior functionaries.

1.4 All grievances received either orally or in written form will be recorded in the Complaint Register maintained in the district office. Each such complaint will be identified by a complaint number and will be followed up and the resolution of the grievance will also be recorded. A consolidated statement of complaints received and resolved will be reported in the Project Steering Committee meetings.

1.5 Contact details of NIE Co-ordinator and Contact Person of NABARD would be made available to stakeholders at the community level at all places. These will be displayed through prominent display of at the project site and the same information will be communicated in the Gram Sabha and will be available with the members of the Gram Panchayat.

1.6 Information related to grievance mechanism will be provided in the language that is easily understood by the members of the village community.

2. Grievance Mechanism for District Level Stakeholders

2.1 Senior Technical person in charge of the district will be responsible to receive and act on complaints. The contact details of the person will be made available during the launch workshop to all the stakeholders. In addition the contact detail of the Project Coordinator will also be stated in the project related brochures that will be given to allthe stakeholders in the district.

2.2 The details of the complaints received and action taken will be placed before the Project Steering Committee on a regular basis. It will be the responsibility of the Project Coordinator to comply with these processes.

2.3 The complaint and grievance mechanism of the NIE and AF will be part of the information on grievance mechanism that will form part of the project brochure.

2.4 The information will be provided in language that is widely understood.

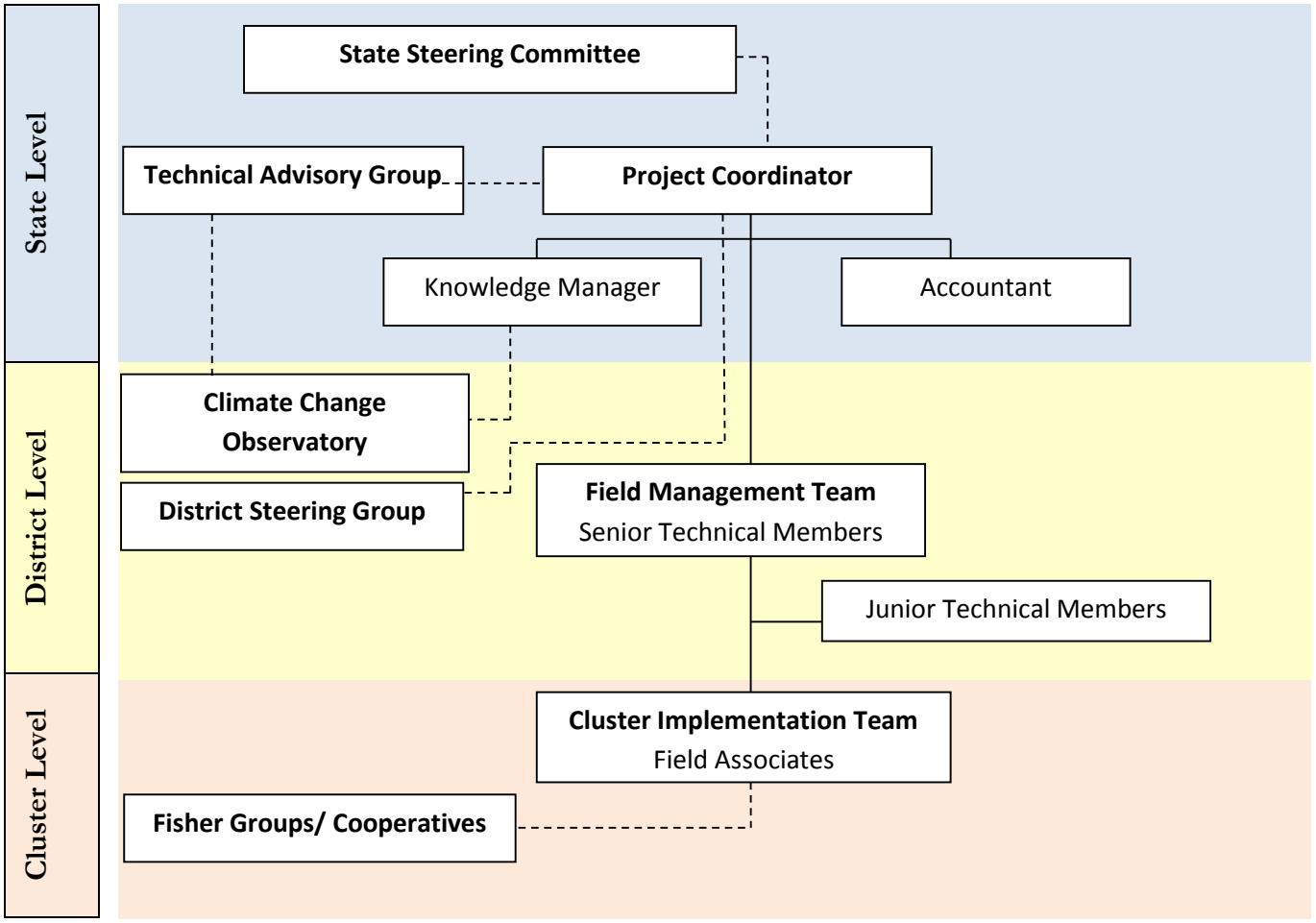
PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation.

Operationally, the project has two distinct objectives: **one**, to develop the fish farmer as an efficient fish farmer 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 fish farmer 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 fish farmers so as to provide inputs to them to enable them to develop as efficient fish farmers **and** as climate resilient fish farmers 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 fish farmers 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
State Steering Committee	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. NABARD as NIE at the state level will be the Convener of the State Steering Committee.	• Facilitate involvement of government departments in the implementation process of the project at the state and district level • Provide guidance and direction to the project activities to enable it to achieve its objectives • Monitor the progress of the project against the agreed time lines • 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
Technical Advisory Group	Experts with qualification and Experience in: • Fisheries • Climate Change and development of Adaptation Strategies • Agriculture/Civil Engineering • Geo Hydrology • Rural Marketing • Institution Development 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.	• Provide technical inputs to the team members and fish farmers in the field. • Assess relevance and impact of the climate adaptive strategies • Make recommendation to the Project Team on technical matters to incorporate the same in the implementation plan
Project Team[32]	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	• Overall responsibility of the implementation of the project • Engage with external stakeholders to achieve project objectives

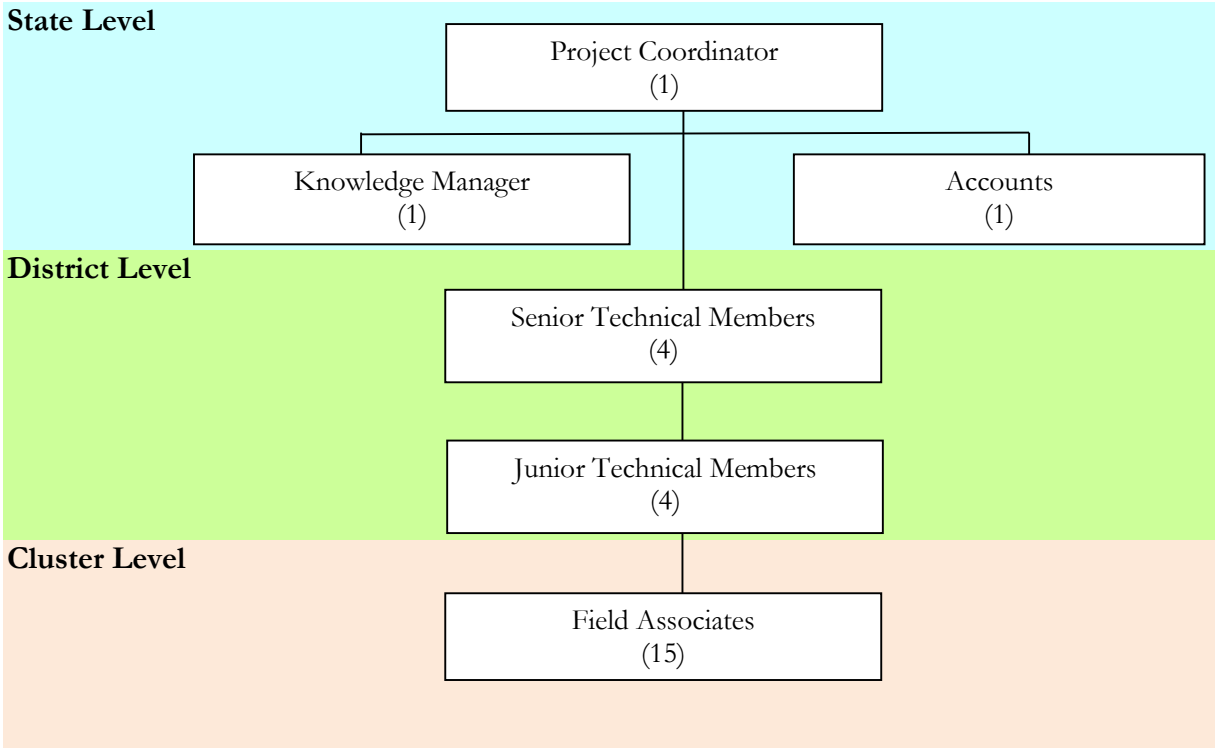
[32] For Terms of reference for the Project Team members see **Annexure 8**Human Resource Plan

	Members and placed at the district level; and (iii) the Cluster Implementation Team comprising of Field Associates located at the district level.	• Responsible to the NIE and for fulfilling monitoring and evaluation activities under the project
District Steering Committee	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.The Lead Bank Manager of the district will also be the ex officio nominee to the DSC. The Project Coordinator will be the Convener of the District Steering Committee.	• Facilitate project implementation at the district level • Facilitate coordination between different departments for the smooth implementation of activities at the project level • Monitor the project activities and assess the benefit an impacts accruing to the project beneficiary • Provide guidance and direction to the project for the implementation of project • Assess the usefulness of climate adaptive strategies for the region
Climate Change Observatory	Invited members from Community of Practitioners; Department of Fisheries at the district level; Panchayat representatives; Experts on Fisheries; representatives of Insurance Companies and Financial Institutions.	• 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. • 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.
Fish Farmers Group/Organisation	Fish Farmer group will comprise of the fish farmers who are directly involved in the fishing activity. The group can be informal livelihood groups; or Self Help Groups; or Fish Farmer's Cooperative Societies. These groups may already exist or may be formed under the project.	• Participate in the project activities at the pond, cluster and district level • Work for the strengthening of activities related to fisheries and adoption of climate resilient strategies

		• Participate in capacity building events and exposure visits for the fish farmers • Adopt responsible fishing practices in the pond for which they have leasing rights • Strengthen the organisation base of the Fish Farmer Group to provide institutional sustainability

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 fish farmer 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
Operational Risk		
Water from pond drawn for irrigation that adversely affects the ability of the fish farmer 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 Fish Farmer Group
Elite Capture leasing rights of the pond and corner project benefits	Low	Criteria of small an marginal farmer as target group on community land will be non-negotiable; *benami* (proxy owners) membership will be discouraged; fish farmers that actually carry out fishing will be made members of the Fish Farmer Group
Greater emphasis on development of fisheries than on development of adaptive capacities/ strategies by the fish farmers	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 fish farmers	Low	Development of adaptive strategies as part of consultative process with the small pond fish farmers; intensive handholding process; training and exposure to fish farmers; 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 Fish Farmers Groups; community consultation processes
Non availability of fish seed on time by the fish farmer	Moderate	Project will establish one hatchery in each of the three districts that will have the capacity to supply fish seed to the fish farmers supported by the project; training of fish farmers on production and nurturing of fish seed
Environmental		
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 fish farmers; 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 fish farmers
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;
Political		
Political interference in the selection of site and to provide political patronage to the selected fish farmers	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
Financial		
Damage or loss of equipment given to the fish farmer e.g. mechanical aerators	Moderate	Fish Farmers 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 fish farmer 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 fish farmer group prior to handing over of the assets
Institutional		
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
Fish Farmer 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 has 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 fish farmers have struck agreements with households living near the pond to ensure security of the pond. The fish farmers have in fact formed a common livelihood group of fish farmers 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 chemicals on their farm which flow in to the pond and affect the quality of water that creates adverse conditions for conduct of fisheries. Catchment treatment plan will entail construction of soil and moisture conservation works and use of vegetative cover to act as wind breakers and temperature regulators. With increased availability of vegetative waste as natural compost there will be decreased reliance and need for chemical fertilisers by farmers in the catchment area. The proposed adoption of catchment treatment to decrease silt load will positively impact 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 fishfarmers 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 fish farmers 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. The project area is part of Schedule V area where PESA is applicable (see foot note 15). This act enables the community to adopt their customary 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.*

As indicated at Page 88, the project is categorized as **"Category B"**.

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
- Possibility of involuntary resettlement due to project activities `

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:

ESP Principles	**Addressed within the Project**
Access and Equity	Transparency in selection of beneficiary and proactive dissemination of project activities will establish equal opportunity to all households to participate in the process of selection of beneficiaries for the project. Project interventions in each pond and with each fish farmer 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. 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. 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. The collectives of fish farmers (self help group; livelihood group; or cooperative) will be assessed in terms of the accessibility of membership and equity in sharing of benefits by all members. In case there are any exclusionary clauses the bye laws will be appropriately modified to ensure that the membership to the group is 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.
Marginalised and Vulnerable Groups	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. The target beneficiaries of the project's intervention will be small and marginal farmers. 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.
Gender Equity and Women's Empowerment	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. 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. Fish Farmers collective will have mandated representation of women. If the existing collective does not have membership of women it will be encouraged to modify its membership which will be a non-negotiable provision for the project for finalization of sites. Women will not be merely taken as symbolic or token members. They will be actively involved in project and 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. Equal wages for equal work principle will ensure women are paid the same wage as men to establish principle of gender equity. Lease of ponds on common land will be in the joint name of men and women.

	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.
Core Labour Rights	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. 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. 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 and around the pond. Forced labour or any form of bonded labour will be prohibited on pond sites covered under the project. 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-fish farmer household. The above mentioned conditions will be applicable in cases whether the project is working with a fish farmer or the collective of fish farmers irrespective of the fact whether they work themselves or they employ labour at pond sites or other work associated with fisheries. 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.
Involuntary Settlement	Part II point K had assessed that there is no likelihood of involuntary settlement because of project activities. 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. However in case there is any likelihood of involuntary resettlement the project will drop the site and select an alternative pond site. The selection and finalization of site protocol includes the element of disputes and conflicts at proposed sites. The project will **not** 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.
Protection of Natural Habitats	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 **not** be selected. The protocol will not only take in to account the existing natural habitats but also potential habitats that will need protection and will **not** select these sites for project's intervention. The list of protected areas and habitats will be procured from the Department of Forest, Department of Archeology, and Revenue Department. The project will inform itself of the management plans of protected areas and will adhere to these plans in the implementation of project activities.
Conservation of Biological Diversity	Fish species introduced under poly culture fish regime will be native and endemic to the area. The vegetative species for catchment treatment will be based on selection of locally adapted species so that it is locally adapted and strengthens the local bio diversity of the area.
Pollution Prevention and Resource Efficiency	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 fish farmers are aware of appropriate seed density that has to be introduced in the ponds at the beginning of fishing season. 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. The employment of heavy vehicles or equipment during the construction phase will ensure use of pollution certified vehicles that do not lead to emission of pollutants to the pond or the catchment area and construction will not lead to establishment of camps at the construction site. Catchment treatment of the ponds will lead to construction of soil and moisture conservation structures and increase the vegetative cover through plantation of trees and grasses that will contribute towards increase in soil fertility. These measures will decrease the need for and demand for fertilizers in the catchment. 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. 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.
Public Health	Regular monitoring of water quality of ponds will be undertaken. Any deviation in these parameters will be reported to Public Health and

	Engineering department so that preventive measures could be undertaken. 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.

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 very 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 fish farmers selected for intervention by the project will be undertaken. The survey will also include survey of package of practices adopted by fish farmers 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
MONITORING			
Inception Workshop	• Project Coordinator • Project Team	2250	Within two months of the project start
Performance Monitoring	• Project Coordinator • Technical Advisory Group • State Steering Committee	-	Quarterly
Efficiency Reporting	• Project Coordinator	-	Six Monthly
Project Completion Report	• Project Coordinator • Project Team	-	End of Project

Audit	• External Auditor	999	Yearly
EVALUATION			
Project Benefit Assessment	• External Consultant	2400	2 reports
End term Evaluation	• External Consultant	7,500	Completion of project
Total		**13,149**	

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

Note AR= Action Reflection; BA= Benefit Assessment; DSC= District Steering Committee; FF= Fish Farmer; GS= Gram Sabha; PD= Process Document; PDoc= Photo documentation; PT= Progress Tracking SSC= State Steering Committee; S&MF= Small and Marginal Farmer; SR= Systematisation Report

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
Overall Objective Climate Change Adaptation in the inland fishery sector for secured livelihoods of small and marginal farmers	% FF adapting climate resilient fish rearing practices developed by the project	none at present	all FF covered by the project adopt climate resilient fish rearing practices	- BA report - Correspondence with state government - Minutes of SSC	
	% FF subscribing to weather based insurance products	One weather based insurance product negligible with subscription	all FF targeted by the project subscribe to one of the insurance product		
	% of income of small and marginal farmers and FF from fisheries	20% of income of small and marginal farmers from fisheries	40% of income of small and marginal farmers will be from fisheries		
	Selection protocol and design of ponds tested by the project and adopted by Government for small pond fisheries	Govt guidelines for pond design are not based on climate change parameters	Govt guidelines include climate change parameter for designing ponds for fisheries		
	State Government resolves to formulate a separate policy for small FF that is based on climate adaptive strategies	State Policy for Fisheries have no separate provision for small-scale fisheries	Recognition of and specific provisions for small-scale fisheries in state policy		
Component 1 Adaptive Measures to address Rainfall Variability					
Outcome 1 Increasing water retention capacity of the tanks as an adaptive measure to	% ponds with water retention for more than 10 months	to be determined during project implementation	100% ponds with water retention for more than 10 months	- End line survey - SR - AR Report - Case studies of change	**Assumption:** GS permits modifications and implementation of catchment treatment plans.
	% ponds with depth of water at least 1.5 m during dry months	to be determined during project implementation	80% ponds with water depth up to 1.5 m during dry months		

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
address rainfall variability by modifying technical specification of the tanks	% ponds where silt load has been decreased	to be determined during project implementation	80% ponds where silt load has been decreased		**Assumption:** FF willing to make private investment on maintenance of ponds. **Risk:** Increased water retention creates pressure on alternative use of water thereby decreasing the availability of water for fisheries.
	% ponds where there has been no loss of fish because of flooding throughout the year	to be determined during project implementation	100% ponds have protective features for flooding and insurance cover against loss of fish		
	% ponds where Private/ Panchayat investment on maintenance of ponds to increase water retention capacity	No investment on ponds either on Panchayat/private land for maintenance	100% ponds have resources for ensuring investment for maintenance of ponds for fisheries		
Outputs 1.1 Ponds identified according to geo-hydrological protocol for fisheries	% Ponds suitable for small-scale commercial fisheries	to be determined during project implementation	100% ponds are being used for small-scale commercial fisheries	- End line survey - SR - PD Report - PT Report	**Assumption:** Sufficient numbers of sites identified in clusters for fisheries based on geo hydrological protocol.
Outputs 1.2 Modified pond design developed and implemented on selected ponds	% Ponds suitable for small-scale commercial fisheries	to be determined during project implementation	100% ponds are being used for small-scale commercial fisheries	- End line survey - SR - PD Report - PT Report	**Risk:** Conflict in GS in allotment of pond
Output 1.3 Small-scale FFs linked to financial support systems to access resources for pond maintenance	% small-scale FF have access to resources for pond maintenance	to be determined during project implementation	100% small-scale FF have access to resources for pond maintenance	- AR Report - SR - PTR	**Assumption:** Private insurance companies pro actively develop insurance products for small-scale FF **Risk:** Maintenance fund is diverted for other purposes
Component 2 Building resilience through adaptation of climate resilient technology					
Outcome 2 Diversification of fish species and temperature regulation	% ponds where water temperature is regulated and controlled during summer	None by design	100% ponds where water temperature is regulated	- End line survey - SR - AR Report - Case Studies	**Assumption:** FF willing to enhance the commercial viability of the pond for fisheries.

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
of ponds as adaptive measures to warmer climatic regime	% FFs adopting poly culture fish farming	small-scale FFs practice 2 layered fisheries only	100% small-scale FF adopt at least 3 layered fish culture	- Record of water temperature of pond from water quality surveillance - Case study of hatcheries - Record of BOD from water quality surveillance	**Assumption:** FF willing to undertake fish seed production through hatchery, fish rearing and nursery **Risk:** 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
	% FF adopting recommended fish stocking rate	all small-scale FF resort to high density stocking	100% small-scale FF adopt recommended fish stocking		
	% hatcheries running successfully	no fish hatcheries among small-scale FFs	1 hatchery in each district running successfully		
	% ponds with decrease in fish mortality due to decrease in BOD	to be determined during project implementation	100% ponds report decrease in fish mortality due to decrease in BOD		
Output 2.1 Catchment treatment plan for each pond prepared and implemented	% ponds catchment treatment plan prepared	Not prepared	60 catchment treatment plans prepared and implemented	- PT Report - PD report - End Line Survey - SR - PDoc	**Assumption:** Catchment and pond are in the same GS enabling quick approval of treatment plans. Communities are open to controlled livestock grazing practices **Risk:** Dispute in catchment leading to non implementation of plan
	% ponds silt load decrease	to be determined during project implementation	80% ponds silt load decreases		
Output 2.2 Pond temperature regulating best management practices and greening the pond surrounds	% FF adopt best management practices for regulating pond temperature	FF do not use any practice to control temperature of the pond	100% FF adopt best management practice for regulating pond temperature	- PT Report - PD report - End Line Survey - SR - PDoc	**Assumption:** Sufficient space available near pond to implement best management practice for regulating the temperature of pond
	% FF adopting technology to decrease likelihood of oxygen deficiency	FF not using any technological input to decrease likelihood of oxygen deficiency	two-third FF adopt technology to decrease likelihood of oxygen deficiency		
Output 2.3	% FF trained in ploy culture fish rearing practices	No small-scale FF trained in poly culture fish culture	100% FF trained in ploy culture fish rearing practice	- PT Report - PD Report	**Assumption:** FF have regular access to local

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
Fish Farmers trained in poly-culture fish culture and making fish seed for composite fish culture available to small-scale aquaculturist	% FF have access to different species of fish seed for their recommended fish culture	to be determined during project implementation	100% FF have access to composite fish seeds	- PDoc - AR Report - SR	fish market to harvest different species of fish and sell them in the local markets **Risk:** Delay in availability of fish seed of different species to the FF
Component 3 Building climate resilience through enhancement of adaptive capacity					
Outcome 3 Making small pond fisheries climate adaptation resilient through productivity enhancement by capacity building and institutional linkages	% FFs adopting responsible fisheries practices	to be determined during project implementation	100% FF adopt responsible fisheries practices	- Base Line and End Line Survey - Training Reports - SR - AR Reports - Case Studies - Group formation documents - Minutes of group meetings - Receipt of premium paid to insurance companies	**Assumption:** There is no change in the ownership of the pond or transfer of leasing rights to another group during the course of project implementation **Risk:** There are extreme weather events that leads to loss of significant fish stock with the FFs that acts as negative factor for adoption of adaptive strategies by FFs
	% Increase in productivity	to be determined during project implementation	At least 25% increase in productivity		
	% FF participated in the development of fisheries business plan	FF do not develop business plans	100% FF have developed business plans		
	% FF develop partnerships and linkages with other players in the market	FF do not have formal linkages	100% FF develop formal linkages with other players		
	% FF members of formal groups formed	to be determined during project implementation	100% FF members of formal groups		
	% FF pay for premium for insurance	FF do not have access to weather based insurance product	100% FF pay premium for weather based insurance product		
	% GP formed plans to reflect climate change factors	No GP have prepared plans that reflect climate change factors	At least 50% of GPs attending training incorporate climate change factors in their plans		
Output 3.1 Capacity building of FFs on climate resilient fishing	% FF trained in climate resilient training	No FF trained in climate resilient fishing	100% FF complete all modules of Climate Resilient Fishing	- PT Report - Training report - PDoc	**Assumption:** The ownership and leasing rights of the pond continue with the same FF during the course of the project

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
					Risk: Households not giving enough space and opportunity to women to participate in training programme **Risk:** Household migrate as better income earning opportunity is made available to them
Output 3.2 FF trained on market analysis of fish and prepare their business plans	% FF complete their training on market analysis and business plan	to be determined during project implementation	100% FF complete their training on market analysis and business plan	- Training Report - PT Report - Copy of bye laws of the group - PD Report	**Assumption:** FFs retain their ownership and leasing rights over pond during the course of project implementation **Risk:** Increase in rate of inflation leading to spike in prices of inputs and transportation costs making business plans redundant
Output 3.3 Panchayat representatives trained in climate change factors	% GP representatives trained in climate change factors	No training to GP representatives on Climate Change	50% of GP representatives trained in Climate Change	- Training Report - PT Report - PD Report - PDoc	**Assumption:** Local Government supports training of Panchayat representatives on Climate Change
Output 3.4 FFs made aware on the weather based insurance product for fish culture	% FFs understanding the terms and conditions of insurance product	No FF has been trained in the terms and conditions of insurance product	100% FFs attend awareness and training on weather based insurance products	- PT Report	**Assumption:** Insurance Companies participate in the training and orientation programmes for Fishers **Assumption:** Fishers generate enough surplus income from fisheries that they pay insurance premium regularly to protect their source of income
Component 4 Knowledge Generation and Management					

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
Outcome 4 Preparing and disseminating evidence based resilient climate change adaptation strategies for inland fisheries for small pond FFs	Institutional processes for stakeholder involvement identifying areas for learning and policy development	No processes exist at present	Steering Committees and Technical Advisory Group active and recommend areas for generating evidence	- Meeting Reports - PD Report - Learning Documents - Policy briefs written and submitted to Government and other stakeholders - Training material developed by the project	**Assumption:** Fisheries are given more importance in enhancing income, livelihood security and nutritional security of tribal communities. **Assumption:** State is willing to implement State Action Plan for Climate Change. **Risk:** Senior government officials do not participate in sharing and learning initiatives
	% stakeholders covered through training and dissemination events on adaptation strategies for climate change	None at present	2 training and 2 workshops conducted		
	Adaptive strategies for fisheries articulated and developed	Adaptive strategies does not exist	Adaptive strategy for small-scale fisheries articulated and presented to different stakeholders		
Output 4.1 Institutional Processes for multi-stakeholder learning are established and activated	Membership of Institutions	No institution	Key stakeholders represented in institutions	- Minutes of the meetings - PD Report	**Assumption:** Stakeholders are willing to give time for the meetings and priority to meeting of the committee/group **Risk:** Organisational representative changed due to transfer leading to decrease in emphasis to the institutional process of the project
	No of meetings	No meetings	Meetings held as per schedule		
	Presence of stakeholders at meetings	No meetings	Two thirds of stakeholders present at all meetings		
Output 4.2 Evidence based learning documents prepared for dissemination	No of learning documents prepared	No learning document exist	3 Process Reports; 6 AR reports; 3 Systematisation reports and 3 Policy Briefs prepared	- Reports and Briefs - PD Report - Evaluation Report	**Assumption:** FFs able to retain their focus on climate adaptability than on development of fisheries per se **Risk:** Key stakeholders not giving priority in

Project Description	Measurable Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
					participating for learning exercises
Output 4.3 Learning from Project Disseminated	No of stakeholders covered for dissemination of project learning	No coverage	At least 20 different types of key stakeholders covered	- Training Reports - Workshop Reports - PD Report - Evaluation Report	**Assumption:** CSOs are interested in intervening in small scale fisheries sector **Assumption:** Climate adaptation is a priority agenda for state and national government **Risk:** Non institutional stakeholders (FFs, women, small traders in fish) are marginalised and are not adequately represented in the events
	No of dissemination events organised	No events	2 training of CSOs and 2 workshops conducted		
Output 4.4 Knowledge Products developed printed	No of document to facilitate training	No document exist	1 Manual and 2 toolkits	- Document reports - Training Manual and toolkits	**Assumption:** External stakeholders will share their experiences related to the project
	No of document to showcase good practices	No document exist	- 1 Good Practice document		
	No of documents available in Hindi	No document exist	All knowledge products in Hindi		

Output Wise Direct Beneficiaries of the project

Outputs	No of direct beneficiaries
Outputs 1.1 Ponds identified according to geo-hydrological protocol for fisheries [The project will cover 60 ponds in the selected agro-climatic zone. The aim will be to cover 20 ponds in each of these districts. The average size of the pond will be 4 ha. Number of persons benefitting (as owners and/or as persons getting employment will be 4 persons per 1 ha of pond size. The total number of beneficiaries will be 60x4x4]	• 960 households
Output 1.2 Modified pond design developed and implemented on selected ponds	• 960 households
Output 1.3 Small-scale fish farmers linked to financial support systems to access resources for pond maintenance	• 960 households
Output 2.1 Catchment treatment plan for each pond prepared and implemented [The ratio of catchment to pond size is 12 ha for every 1 ha of pond size. Thus in all there will be 60x4x12= 2880 ha of catchment that will be treated. 70% of the catchment is likely to be on private lands. That is, 2016 ha of private lands will be treated. The average size of holding in the project area is 2 ha. Thus 2016/2 households will directly benefit from catchment treatment. Additional benefit by way of treatment of common lands cannot be quantified at the moment]	• 1,008 households
Output 2.2 Pond temperature regulating best management practices and greening of pond surrounds	• 960 households
Output 2.3 Fish Farmers trained in poly-culture fish culture and making fish seed for composite fish culture available to small-scale fishers [In addition to 60 pond the project will also establish 3 seed rearing, nurseries, hatcheries units in each of the districts. Each of these units will benefit at least 4 households. Thus total number of households benefitted will be 9x4]	• 36 households
Output 3.1 Capacity building of Fish Farmers on climate resilient fishing [3 Fish Farmers at each pond site will be trained, that is 60 x 3]	• 180 fish farmers
Output 3.2 Fish Farmers trained on market analysis of fish and prepare their business plans [3 Fish Farmers at each pond site will be trained, that is 60 x 3]	• 180 fish farmers
Output 3.3 Panchayat representatives trained in climate change factors	• 300 Panchayat representatives
Output 3.4 Fish Farmers made aware on the weather based insurance product for fish culture [3 Fish Farmers at each pond site will be trained, that is 60 x 3]	• 180 fish farmers
Output 4.1 Institutional Processes for multi-stakeholder learning are established and activated	• No direct beneficiary
Output 4.2 Evidence based learning documents prepared for dissemination [3 Fish Farmers from each pond site will be associated in the Systematisation exercise and Action Reflection process]	• 180 households
Output 4.3 Learning from Project Disseminated	• 40 civil society members trained

Output 4.4 Knowledge Products developed printed	• District and State officials and policy makers; users of revised manual for fisheries ponds, users of technical information and other outputs for future project design and up-scaling for wider climate change impacts.

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	% Fish Farmers adapting climate resilient fish rearing practices developed by the project	**Outcome 3:** Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.2. Modification in behavior of targeted population
	% Fish Farmers using subscribing to weather based insurance products	**Outcome 3:** 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%	**Outcome 6:** 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	**Output 7:** Improved integration of climate resilience strategies into country development plans	7.2. No. or targeted development strategies with incorporated climate change priorities enforced

Project Objective	Project Objective Indicator	Fund Outcome	Fund Outcome Indicator
	State Government resolves to formulate a separate policy for small fish farmers that is based on climate adaptive strategies	**Output 7:** Improved integration of climate resilience strategies into country development plans	7. Climate change priorities are integrated into national development strategy
Outcome 1 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	**Output 4:** 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	**Output 4:** 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 silt load has been decreased	**Output 4:** 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	**Output 5:** 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	**Outcome 2:** 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
Outcome 2 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	**Output 4:** 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)

Project Objective	Project Objective Indicator	Fund Outcome	Fund Outcome Indicator
	- % fish farmers adopting poly culture fish farming	**Output 4:** 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	**Output 4:** 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	**Output 4:** 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 decrease in fish mortality due to decrease in BOD	**Output 4:** 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)
Outcome 3 Making small pond fisheries climate adaptation resilient through productivity enhancement by capacity building and institutional linkages	- % Fish Farmers adopting responsible fisheries practices	**Output 4:** 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	**Outcome 6:** 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
	- % Fish Farmers participated in the development of fisheries business plan	**Outcome 3:** 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 Objective	Project Objective Indicator	Fund Outcome	Fund Outcome Indicator
	- % Fish Farmers develop partnerships and linkages with other players in the market	**Outcome 3:** 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
	- % Fish Farmers members of formal groups formed -	**Outcome 3:** 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
	- % Fish Farmers pay for premium for insurance	**Outcome 3:** 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
	- % Panchayats formed plans to reflect climate change factors	**Output 2.1**: 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
Outcome 4 Preparing and disseminating evidence based resilient climate change adaptation strategies for inland fisheries for small pond fish farming	- Institutional processes for stakeholder involvement identifying areas for learning and policy development	**Outcome 3:** 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	**Output 2.1**: 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	**Output 7:** 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 Indicators	
Date of Report	18 September 2014
Project Title	BUILDING ADAPTIVE CAPACITIES OF SMALL INLAND AQUACULTURE FOR CLIMATE RESILIENCE AND LIVELIHOOD SECURITY, MADHYA PRADESH, INDIA
Country	INDIA
Implementing Agency	NABARD
Project Duration	3 years

	Baseline	Target at Approval	Adjusted target first year of implementation	Actual at completion
"Number of Beneficiaries"				
Direct beneficiaries supported by the project	0	2004		
Female direct beneficiaries	0	661		
Youth direct beneficiaries	0	501		
Indirect beneficiaries supported by the project		3,340		
Female indirect beneficiaries	0	1102		
Youth indirect beneficiaries	0	835		
"Assets Produced, Developed, Improved, or Strengthened"				
Sector (identify)	None	RURAL DEVELOPMENT (FISHERIES)		
Targeted Asset				
1) Health & Social Infrastructure Climate Index Based Insurance Product for Fisheries	1	3		
2) Physical asset (a) Nurseries-Produced (b) Hatcheries-Produced **(c)** Ponds-Strengthened (climate proofed)	0 0 0	3 3 60		

	Baseline	Target at Approval	Adjusted target first year of implementation	Actual at completion
Changes in Asset (a) Water Retention more than 10 months (no of ponds) (b) Water Depth up to 1.5 m during dry months (no of ponds)	0 0	60 60		
"Increased income, or avoided decrease in income"				
Income Source	Fisheries	Fisheries Hatchery Nursery Fish Seed Rearing		
Income level *(USD)/per month* (a) Fisheries (b) Hatchery (c) Nursery **(d)** Seed Rearing	 40 0 0 0	 130 100 60 30		
Number of households	300	996		

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
1	**COMPONENT 1**						
Output 1.1	Ponds identified according to geo-hydrological protocol for fisheries						**10000**
1.1	Hydro-geological assessment and Modification of Design	Blocks	2	District	3	3333	10000
Output 1.2	Modified Pond design developed and implemented on existing ponds						**669000**
1.2	Modification of ponds (average size 4 ha per pond)	Tanks/dist.	20	District	3	223000	669000
Output 1.3	Small-scale fish farmers linked to financial support systems to access resources for pond maintenance						**3000**
1.3	Modification of Insurance product	Product	2	District	3	1000	3000
	Sub-Total						**682000**
2	**COMPONENT 2**						
Output 2.1	Catchment treatment plan for each pond prepared and implemented						**479520**
2.1	Catchment Treatment (48 ha for average 4 ha of pond)	hectare/dist.	960	District	3	159840	479520
Output 2.2	Pond temperature regulating best management practices and greening the pond surrounds						**32500**
2.2	Oxygenation (solar aerators and oxygen tablets- all ponds)	Units	3	District	3	7500	22500
2.3	Water Quality Measurement & Maintenance	Units	20	District	3	3337	10000
Output 2.3	Fish Farmers trained in poly-culture fish culture and making seed for composite culture available for small-scale aquaculturist						**107800**
2.4	Poly culture Fingerling Support (Part support)	Ponds/dist. for 3 years	20	District	3	12500	37500
2.5	Feeding -Micro-nutrient etc. (Part support)	Units/dist.	20	District	3	5000	15000
2.6	Construction of Hatchery units-CIFA technology	Units	1	District	3	8333	25000
2.7	Nursery Unit(0.1 ha)	Units	1	District	3	5883	17650
2.8	Seed Rearing Unit (0.1 ha)	Units	1	District	3	3800	11400

SN	BUDGET HEADS	Unit	QT.	Unit	QT.	Unit Cost	Total Amount
2.9	Transportation of Fingerlings	Units/dist.	20	District	3	417	1250
	Sub-Total						**619820**
3	**COMPONENT 3**						
Output 3.1	Capacity Building of fish farmers on climateresilience fishing						**15000**
3.1	Training and Capacity Building including exposure visits	Units	5	District	3	5000	15000
Output 3.2	Fish farmers trained on market analysis of fish and prepare their business plans						**51500**
3.2	Marketing and Infrastructure Support	Units		District	3	14167	42500
3.3	Business Plan Prepared	Units/dist.	20	District	3	3000	9000
Output 3.3	Panchayat representatives trained in climate change factors						**15000**
3.4	Training of Panchayat representatives	Units	5	District	3	5000	15000
Output 3.4	Fish farmers made aware of the weather based insurance products for fish culture						**5580**
3.5	Linkages with Financial Services (banking/federation/financial institutions)	Units	20	District	3	1000	3000
3.6	Insurance Coverage (premium for average 4 ha of pond part)	Units/dist.	20	Dist.	3	865	2580
	Sub-Total						**87080**
4	**Component 4**						
Output 4.1	Institutional processes for multi-stakeholder learning are established and activated						**48625**
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	14330
4.4	Meeting of Climate Change Observatory	no of meeting	6	District	3	4765	14295
Output 4.2	Evidence based learning documents prepared for dissemination						**27740**
4.5	Action-Reflection Meetings	no of meeting	9	District	3	1223	3665
4.6	Systematisation	no of doc per year	1	Year	3	3108	9325

SN	BUDGET HEADS	Unit	QT.	Unit	QT.	Unit Cost	Total Amount
4.7	Process Documentation	no of docper year	1	Year	3	2917	8750
4.8	Development of Policy Briefs	no of Policy Briefs per year	1	Year	3	2000	6000
Output 4.3	Learning from project disseminated						**15475**
4.9	Training of Civil Society Organisation	no of training	2	State	1	3867	3865
4.10	State Level Workshop	no of workshop	1	State	1	3933	3930
4.11	National Level Workshop	no of workshop	1	State	1	7683	7680
Output 4.4	Knowledge products developed and printed						**27155**
4.12	Awareness (Leaflets/pamphlets)	Document	4	Year	3	1667	5000
4.13	Toolkit for Practitioners: Developing Adaptation Strategies in Natural Resource Management with Specific Reference to Fisheries	Document	1	State	1	5333	5330
4.14	Training Manual for Fish Farmers on Climate Resilient Fish Rearing Practices	Document	1	State	1	5333	5330
4.15	Toolkit for Preparation of Business Plans for Small-Scale Fishery, Hatchery and Nursery	Document	1	State	1	5333	5330
4.16	Good Management Practices for Climate Resilient Small-Scale Fisheries	Document	1	State	1	6167	6165
	Sub Total						**118,995**
	TOTAL						**15,07,895**
E	Project / Programme Execution Cost	9.50%					1,43,192
F	**Total Project / Programme Cost**						**16,51,087**
G	Project/Programme Cycle Management	8.50%					1,39,413
	Amount of Financing Requested						**17,90,500**

BUDGET NOTES: COST BREAKUPS

1.1 Hydro-geological assessment	Digital hydrological assessment in districts for short listing of at least two blocks for project intervention. 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

<table>
<tr><td>1.2Modification of pond/tank</td><td>The pond modification cost is estimated at US$ 11150 per pond the details are given below:
(a) Pond modification requires de-siltation/excavation repair/provision of inlet, outlet, wire mesh and seepage treatment.
(b) For 4 ha average pond size working area will be up to 0.64 ha and de-siltation will be up to 1.23 m depth
<table>
<tr><th>Description</th><th>Unit</th><th>LxBxH</th><th>Vol</th><th>Rate</th><th>Amount</th></tr>
<tr><td>Excavation/De-siltation
All types of soil inc disposal of excavated stuff up to 50 m lead and av. lift up to 1.5 m incl dressing and levelling of pits and disposed stuff</td><td>M</td><td>80x80x1.23</td><td>7872</td><td>1.34</td><td>10548</td></tr>
<tr><td>Construction of key trench and compaction before earthen embankment for leakage/seepage treatment (1m width, 100 m length for 1 ha pond with a height of 1 to 1.5 m depth)</td><td>M</td><td>200x1x1.5</td><td>300</td><td>0.8</td><td>240</td></tr>
<tr><td>Inlet
22 cm thick dry stone pitching with individual stone of 22 cm depth and minimum size 0.014</td><td>Sq m</td><td>20x2</td><td>40</td><td>3.7</td><td>149</td></tr>
<tr><td>Outlet
22 cm thick dry stone pitching with individual stone of 22 cm depth and minimum size 0.014</td><td>Sq m</td><td>20x2</td><td>40</td><td>3.7</td><td>149</td></tr>
<tr><td>Wire Mesh</td><td></td><td></td><td></td><td>83.3</td><td>83</td></tr>
<tr><td>Total</td><td></td><td></td><td></td><td></td><td>11169</td></tr>
</table></td></tr>
<tr><td>1.3Modification of Insurance product</td><td>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>
<tr><td>Details</td><td>Honorariu m</td><td>months</td><td>Total Amount US$</td></tr>
<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>
</table></td></tr>
<tr><td>2.1 Catchment Treatment</td><td>Per pond catchment area treatment 48 ha per pond that is 960 ha per district. The unit rate will be US$166.5 per ha which works out to 960x166.5= US$159840 per district.</td></tr>
<tr><td>2.2 Oxygenation (solar aerators and oxygen tablets – all ponds)</td><td>3 Solar aerators per district and oxygen tablets for all ponds. @ US$ 2500 per unit i.e. total cost = 2500*3*3 = US$ 22500</td></tr>
</table>

<table>
<tr><td>2.3 Water Quality Measurement & Maintenance</td><td>One testing unit for one pond for four tests in a year. Per unit cost US$ 166.66. Total cost for 20 units per district. Total cost for 3 districts = 20*3*166.66 = US$ 10000</td></tr>
<tr><td>2.4 Poly Culture Fingerling Support (part support)</td><td>Part support for fingerling purchase for poly culture. 7500 fingerlings per pond @ US$ 0.083 per fingerling. That is 7500x0.083x20= 12500 per district</td></tr>
<tr><td>2.5 Feeding -Micro-nutrient etc. (Part support)</td><td>Support for one year. Feed support required 3 times per year @ US$250 per pond. Total cost = 250*20*3= US$15000</td></tr>
<tr><td>2.6 Construction of Hatchery units-CIFA technology</td><td>Per district one hatchery @ US$ 8333.34. three such hatcheries. Based on technology provided by Central Institute for Freshwater Aquaculture (CIFA), Bhubaneswar, Odisha, India.</td></tr>
<tr><td>2.7 Nursery Unit(0.1 ha)</td><td>US$ 2941.67per nursery @ 2 nursery per hatchery : 500 sq m water spread area. Total 6 nurseries.</td></tr>
<tr><td>2.8 Seed Rearing Unit (0.1 ha)</td><td>One seed rearing unit per district. @ US$ 3800 per unit. Total 3 such units.</td></tr>
<tr><td>2.9 Transportation of Fingerlings</td><td>US$ 417 per district for one year</td></tr>
<tr><td>3.1 Training and Capacity Building including exposure visits</td><td>Five trainings per district @ US$ 1000 per training fish farmers including inter-fish farmer exposure visit within the project area. The training will be based on the capacity building strategy given in Annexure 7.</td></tr>
<tr><td>3.2 Marketing and Infrastructure Support</td><td>Small support in terms of making the infrastructure more suitable for fisheries is required based on actual needs of the fish farmers. These may include 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>
<tr><th>Particulars</th><th>Number</th><th>Rate US$</th><th>Total US$</th></tr>
<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>Total</td><td></td><td></td><td>14167</td></tr>
</table></td></tr>
<tr><td>3.3 Business Plan Prepared</td><td>The assessments provide inputs to the fish farmers in enabling them to develop their respective business plans and make the best possible use of the market opportunities. Business plans for all the 60 pondwill be developed through training of respective fish farmers. @ 3000 US$ per district.</td></tr>
<tr><td>3.4 Training of Panchayat representatives</td><td>Panchayat representatives from each of the project districts will be trained in factors of climate change and their role in addressing these factors. 100 Panchayat representatives from each of the project districts that will include representatives from the village level, block and district level Panchayats will be trained.It is estimated that there will be five training per district and in all 15 training within the project area.US$1000 per district per training has been budgeted for these trainings, thus US$15000 have been budgeted for this activity.</td></tr>
</table>

<table>
<tr><td>3.5 Linkages with Financial Services (banking/ federation/ financial institutions)</td><td>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 for short term needs. It would also be used for preparation of banking plan and credit linkages with financial institutions. @ US$ 1000 per district</td></tr>
<tr><td>3.6 Insurance Coverage (premium part)</td><td>Part support for Insurance Premium for one year @ US$ 21.67 per ha. Premium for 2 ha x 21.67 x 20= US$866.8 or 865 approx</td></tr>
<tr><td>4.1 Meetings of District Steering Committee (DSC)</td><td>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 $105 and for 54 meeting it will be $5670.</td></tr>
<tr><td>4.2 Meeting of Technical Advisory Group (TAG)</td><td>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.</td></tr>
<tr><td>4.3 Action-Reflection Meetings</td><td>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.</td></tr>
<tr><td>4.4 Process Documentation (PD)</td><td>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.</td></tr>
<tr><td>4.5 Meeting of State Steering Committee (SSC)</td><td>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.</td></tr>
<tr><td>4.6 Meeting of Climate Change Observatory (CCO)</td><td>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 $14295.</td></tr>
<tr><td>4.7 Systematisation</td><td>Three systematization exercises will be conducted. The exercise will be facilitated by an external facilitator. The cost for one systematization exercise will be as follows
<table>
<tr><th></th><th>Expenditure items</th><th>Unit</th><th>Rate US$</th><th>No</th><th>Total US$</th></tr>
<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>
</table></td></tr>
<tr><td>4.8 Development of Policy Briefs</td><td>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.</td></tr>
</table>

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$ 97for training for 3 days.
4.10 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.
4.11 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.
4.12 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.
4.13 Toolkit for Practitioners: Developing Adaptation Strategies in Natural Resource Management with Specific Reference to Fisheries	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.
4.14 Training Manual for Fish Farmers 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.
4.15 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.
4.16 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.

Table: Project Execution Cost:

Expenditure	Staff	Unit	No	Rate US$	No of months	Years	Total US$
Honorarium	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
						subtotal	**104220**
Travel	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
						subtotal	**15047**
Administration	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
						subtotal	**10800**
M&E	Benefit assessment	per village	60	40	1	1	2400
	End Line	per document	1	7500	1	1	7500
	Inception	per participant	50	45	1	1	2250
	Audit	per audit	3	333	1	1	999
						subtotal	**13149**
Total							**143192**

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	41,000
Information, Reporting, Knowledge Management	43,413
Performance Management - Progress Monitoring- Field Monitoring	30,000
Programme Support - Technical and Other to EE	25,000
Total	**139,413**

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

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

Instalment No.	Percentage	Amount ($)	Year	Milestone
First Instalment	25%	447,620	June 2015	1. Completion of inception workshop 2. Geo-hydrological assessment 3. Site finalisation and 4. Farmer mobilisation 5. Completion of baseline 6. Monitoring, Evaluation & Learning framework 7. Finalisation of site specific maps 8. Start of tank modification in 15% sites

Instalment No.	Percentage	Amount ($)	Year	Milestone
				9. Setting of one hatchery, one nursery and one seed rearing unit 10. Implementation of catchment treatment plans- 10% sites 11. first project performance report submitted (one year from inception workshop)
Second Instalment	25%	447,620	Jun 2016	1. Tank modification and Catchment treatment 40% additional tanks 2. Start of work of hatchery units 3. Start of operation in 10% tanks
Third Instalment	25%	447,620	Jun 2017	1. Functioning of hatchery unit 2. Functioning of Nursery and fish rearing unit 3. Completion of work and functioning in remaining 50% tanks including catchment treatment 4. Adaptation benefit assessment in tanks 5. Completion of mid-term review
Fourth Instalment	25%	447,640	Jun 2018	1. Adaptation benefit assessment in 100% tanks 2. Adaptation benefit assessment-all tanks 3. Development of Knowledge Products 4. Conduct of National Workshops and Training of CSOs

Details	Upon Agreement signature - 1st instalment	Second Installment	Third Installment	Fourth Installment	Total
Scheduled Date	Jun 1, 2015	Jun 1 2016	Jun 1 2017	Jun 2018	
Project Funds	412,770	412,770	412,770	412,777	1,651,087
Implementing Entity Fee	34,850	34,850	34,850	34,863	139,413
Total	**447,620**	**447,620**	**447,620**	**447,640**	**1,790,500**

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:*

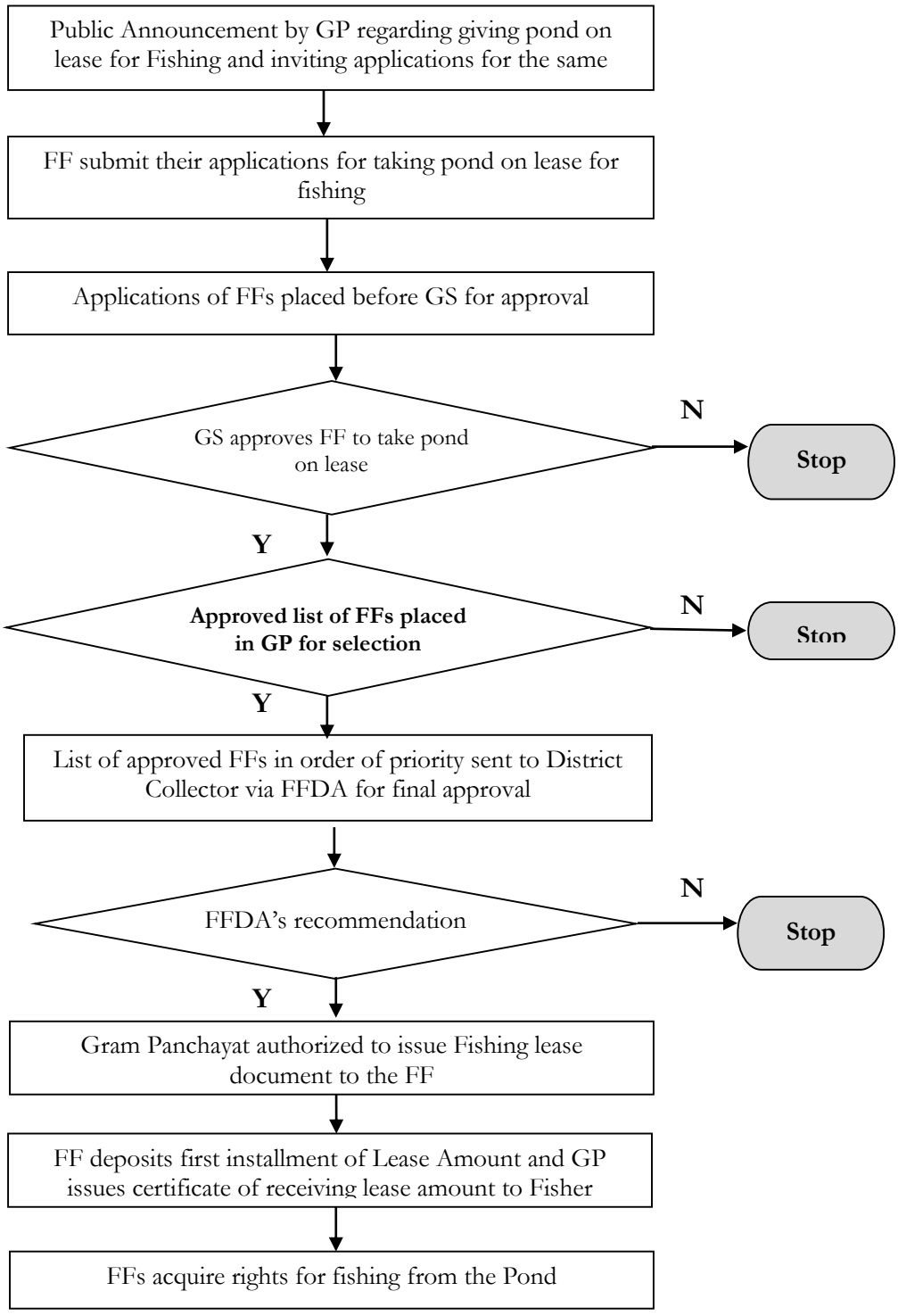
Ravi Shankar Prasad, IAS, Joint Secretary, Ministry of Environment and Forest (MoEF), Government of India	Date:

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, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
 *(Dr. B. G. Mukhopadhyay)* *Chief General Manager* *NABARD, Head Office, Mumbai* *(Implementing Entity Co-ordinator)*	
Date: *January, 29, 2015*	Tel. and email: Phone (Direct): +91 (022) 26530007 Fax (022) 2653 0009, Mobile: +91 9769690750 fsdd@nabard.org climate.change@nabard.org benu8896@yahoo.co.in
Project Contact Person: Mr. V. Mashar, Dy. General Manager, NABARD, Head Office, Mumbai	
Tel. and Email: +91 22 2653 9632, +91 9769863397 p.radhakrishnan@nabard.org, climate.change@nabard.org	

LIST OF ANNEXURES

Annexure 1: Process Leasing of Pond by Fish Farmer from Gram Panchayat



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

Annexure 2 Policy Guidelines

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	**Individual Beneficiary** Traditional Fisher/ Scheduled Tribe/ Scheduled Caste/ Other Backward Classes/ Below Poverty Line
1 to5 ha	*First Preference*: **Registered Fish Farmer Cooperative/Self Help Group/ Group constituted for the purpose of Fisheries** (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) *Second Preference*:

	Individual Beneficiary 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
5 to 10 ha	**Registered Fish Farmers Cooperative** The order of priority for the Fish Farmers cooperative will be as follows: Traditional Fisher/ Scheduled Tribe/ Scheduled Caste/ Other Backward Classes/ Below Poverty Line

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 Leas 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
Note: 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 allotee 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 Fish Culture in Madhya Pradesh

Name of the Act	Purpose of the Act	Provisions of the Act that affect Fish Farmers/ Fisheries		
		Regulatory Provisions	**Prohibitive Provisions**	**Enabling Provisions**
Madhya Pradesh Fisheries Act, 1948 including the Madhya Pradesh Fisheries (Amendment) Act, 1981	for the protection, conservation and development of Fisheries in MP	• erection and use of fixed engine • construction of weirs, dams and bunds • dimension, size of mesh, kind of nets, and mode of using them • method of catching fish • grant of license for fishing • season during which killing, catching and sale of fishing • size/ weight below which no fish will be sold	• use of explosives, gun, bow, arrow, chemical or any other substance to cause water pollution or harmful for fish for catching/ destroying fish	
Madhya Pradesh Riverine Fisheries Rules 1972	rules to regulate fishing in rivers and rivulets under the MP Fisheries Act 1948	• fishing in specified waters • periods during which fishing will be suspended • creation and use of fixed engines • construction of weirs, dams and bunds on specified waters	• licensee cannot employ another person unless he is using the drag net • catch of fish species below 30 cms prohibited	• priority in giving license to societies and federations • types of nets and hooks/ lines that can be used by fish hunters
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			• Fishermen's Cooperative societies can raise loans and receive subsidies for purchase of fishing apparatus, preparing boat and conveyance for

Name of the Act	Purpose of the Act	Provisions of the Act that affect Fish Farmers/ 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
Madhya Pradesh Panchayat Raj and Gram Swaraj Act, 1993 and Madhya Pradesh Panchayat (Transfer of Immovable Property) Rules 1994	act to effectively involve Panchayats in local administration and development activities			• 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 • Panchayats empowered to lease immovable property that falls within its jurisdiction for a period of 3 years • Ponds and water bodies less than 10 hac transferred in to the jurisdiction of GPs • Rules lay down the process of leasing out immovable property of GPs • Gram Sabhas have the powers and function to lease out minor water bodies situated within its territorial jurisdiction

Name of the Act	Purpose of the Act	Provisions of the Act that affect Fish Farmers/ Fisheries		
		Regulatory Provisions	**Prohibitive Provisions**	**Enabling Provisions**
Panchayat Extension Schedule Area Act, 1996 (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			• Planning and management of minor water bodies entrusted to Panchayats in schedule areas • 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
The Biological Diversity Act, 2002 and Madhya Pradesh Biodiversity Rules 2004	act to conserve biological diversity and sustainable use of its components			• Commercial utilization of biological resource exempts conventional breeding and traditional practices • 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

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
Village Community 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 fish farmers without the consent of the village community it gives rise to serious disputes that does not allow the fish farmer 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 **neutral** 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.	**Action**: *Extensive Community consultation before finalizing the site and the fish farmer for the project.*
	(b) Production	The fish farmers 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 **positive** towards the fact that the fish farmers are undertaking fish culture which implies increase in availability of fish but may be **negative** towards the fish farmer if there access to the pond is restricted.	**Action:** *Fish Farmers adopt the strategy of co-opting the households living around the pond as members of the fish farmer group. This leads to building their direct stakes in to the pond and reduces the incidence of poaching.*
Fish Farmer Fish Farmer(s) who are residents of the village and are themselves engaged as individual or	(a) Lease and access to Pond on community land	This group of fish farmers will be the direct beneficiaries of the project and the project will target its intervention to this group of fish farmers. The fish farmers will **support** the project activities as they tend to directly gain from the project.	**Action:***Project will identify fish farmer(s) who are working/ interested to work themselves to undertake fish culture.*

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
as group, in undertaking the process of fish culture themselves.	(b) Pond Maintenance	Fish Farmers with leasing rights undertake minor cleaning of the pond that does not entail any cash expenditure. The Fish Farmers will **support** maintenance of the pond.	**Action:** *Inform and train the fish farmers in the processes related to pond maintenance and how they can apply to Gram Panchayat for maintenance of the pond.*
	(c) Fish Feed	Fish Farmer collects feed from within the household waste and from the households with cattle. Fish Farmers will **support** this activity as it will led to gaining of weight by the fish and it getting ready for the market at an early date.	**Action:** *train fish farmers on preparing fish feed from household and animal waste.*
	(d) Production	Fish Farmers 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 fish farmers group in such a way that the members of the group take it upon themselves to protect the pond from poaching.	**Action:** *Fish farmer 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.*
	(e) Harvesting	Fish Farmers 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 fish farmers and the fish farmers with leasing rights are paid on the quantity of catch for each harvest.	**Action:** *Fish Farmers 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.*

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	Fish Farmers sell their catch in the local market on fixed days and to the fish stalls that operate on all days of the week. Fish Farmers 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. Fish Farmers 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.	**Action:** *Increased access to storage facility and training the fish farmers to enter in to trade agreement with regular fish sellers so that they are able to optimize their price throughout the year.*
Absentee Fish Farmers Fish Farmer(s) 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 labour for harvesting fish and is the sole beneficiary of the profit.	(a) Lease and access to Pond on community land	The Fish Farmer and the contractor will **oppose** the project or try to subvert the project processes to corner benefit for themselves.	**Action:***Project will **not** work with such absentee fish farmer(s) and contractors.*

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
Traditional Fisher 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 fish farmers. The traditional fishers often have a greater variety of fish species than the fisher who sells limited variety of fish species.	(a) Marketing and Sale	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 *haat* to *haat* (local markets) and sell their fish. 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.	**Action:** *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.*
Labour	(a) Production	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 casual labour and is paid on a daily basis on a negotiated rate between the fish farmer and the labour.	**Action:** *the composition of the fish farmer 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.*

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) Harvesting	There is two type of labour available for harvesting of fish: **one** is the labour available from the village that works as casual labour, and the **second**, 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.	**Action:** *the fish farmers will be trained in responsible fishing and based on their assessment they will be handheld to employ labour for harvesting.*
Gram Sabha Gram Sabha is the formal body that approves the proposal of fish farmers 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 **support** the process of selection of the fish farmer for leasing rights.	**Action**: *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.*
Gram Panchayat Gram Panchayat is a body of elected representatives that operate within the framework of state act on Panchayati Raj	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 **support** 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.	**Action:** *Approved list of fish farmers from the Gram Sabha will be placed before the Gram Panchayat for finalization and onward transmission to the district.*
	(a) Pond Maintenance	Gram Panchayat has the mandate to undertake maintenance of the pond so that there are no losses to the fish farmers that have been granted leasing rights over the pond. The Gram Panchayat will be **neutral** towards pond maintenance as it does not gain any benefit from it.	**Action:** *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.*
Self Help Group(FFs) Self Help Group of fish farmers can provide credit for purchase of fish seed, fish feed and/or for	Credit during input stage	SHG will **support** 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.	**Action:** *the fish farmers 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.*

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
fishing tools and equipment.			
FishFarmerCooperative Society: Fish Farmer cooperative societies are promoted by government and are a legal necessity if the fish farmer group aims at leasing larger ponds.The benefit of government programme to such societies is preferred option for the department.	Credit at input stage	Fish Farmer 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	**Action:** *Fish Farmer 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.*

2. Institutional Stakeholders

Aim and Objectives of the Institution	Programmes and Schemes for Fish Farmers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
Department of Fisheries			
Aim: Fisheries development and conservation in the state **Allocated Work:** • development of water bodies and rivers for fisheries • establishment and of regional centres for production and distribution of fish seeds • protection, promotion and development of fish culture and methods of fish harvesting methods • development and strengthening of Fish Cooperatives • implementation of welfare schemes for fishers • development of fish market and legislation relate o fisheries • conservation and protection of other water creature	• Promotion of Fisheries through under Tribal sub plan and Special component plan for scheduled caste • Production of fish seeds on water bodies allocated to the department • Promotion of Fisheries on Irrigation ponds/ reservoirs av size 200 hac • Training of Fish Farmers including study tours • Subsidy to Fish Farmers Cooperative • Establishment of Aquarium and conducting research of fisheries • Implementation of Fish Farmers Credit Card Scheme • Fishermen welfare scheme (personal accident insurance; model village development plan; and savings cum relief plan)	**State:** Principal Secretary Director Managing Director • Training • Planning & Budgeting • Fisheries • Co-operatives • FFDA • Regional Manager • Engineer **Division (6)** Joint/Deputy Director **Regional (7)** Regional Manager **District (48)** Deputy/Assistant Director • Astt Fisheries Officer • Fisheries Inspector	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. 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 and support the implementation of the project.
Recommended strategy			

Aim and Objectives of the Institution	Programmes and Schemes for Fish Farmers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
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. At the district level the involvement of the department will enable the project to smoothen operational issues related to getting of lease for the fish farmer(s), technical inputs related to fish seeds, equipment and in formation of fish farmer 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.			
Madhya Pradesh Fish Federation			
Aim: Function as an apex body of Fish Cooperatives in the state **Objectives**	• Linking primary fish cooperatives with the federation • Fisheries, production of fish seed, marketing and sale of fish, distribution of wages to labour, linking fish farmers to welfare schemes, • Regulates use of nets so that fish that are in small in size are not caught and productivity of the reservoir is maintained	**State** 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. **Regional** The Federation has divided the state in to six regions. Each of the regions is headed by a Regional Manager who is placed at reservoirs of large dams respectively.	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.
Recommended Strategy 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.			
Department of Farmer Welfare and Agriculture Development			
Aim: Increase in agriculture production and productivity, land and water management,	• National Watershed Area Development scheme for treating of watershed area for soil erosion and for soil and water conservation	**State** Directorate of FWAD headed by Director with support of Subject Matter Specialists **Division** Headed by Joint Director	The Department of FWAD does not have stakes in the proposed project. It does not have control over the ponds constructed under schemes of

Aim and Objectives of the Institution	Programmes and Schemes for Fish Farmers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
promotion of small irrigation schemes, promotion of innovative agriculture technology	• RADP Land conservation programme for construction of small ponds, contour trenching, and revival of old ponds • Construction of minor irrigation ponds and percolation ponds up to 40 hac • Climate based insurance scheme	**District** Headed by Deputy Director and support of subject matter specialist **Block** Senior Agriculture Development Extension Officer support from ADO	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.
Recommended Strategy 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 a Special Invitee member to the project's Steering Committee for meetings that have the agenda related to climate based insurance. 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 existing programmes for watershed development so that their catchment treatment plans can be dovetailed with the proposed project's activities.			
Department of Panchayat and Rural Development			
Aim Implementation of schemes and programmes for rural development through active involvement of Panchayat institutions **Objectives** • implementation of programmes and schemes for rural development • identification of BPL families	• area and infrastructure development schemes and programmes including watershed development, housing and rural roads • Self employment programmes and schemes livelihood development programmes • wage employment programmes and schemes including MGNREGS • environmental sanitation and mid day meals programmes	**State** Development Commissioner heads the department **Division** Deputy Commissioner Development **District** Zila Panchayat Chief Executive Officer heads the district unit o the department **Block** Janpad Chief Executive Officer heads the block unit of the department **Gram Panchayat**	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 be promoted as sustainable livelihood activity; and third, the adaptation strategy for fisheries

Aim and Objectives of the Institution	Programmes and Schemes for Fish Farmers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
		Panchayat Secretary is the nodal person for the implementation of schemes of the department of rural development	will enable it to make changes in the operational guidelines off the sub scheme and explore similar processes for other climate dependent livelihoods.
Recommended Strategy 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. 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.			
Directorate of Panchayat			
Aim implementation of Panchayat Act in the state **Objective** • elections of Panchayat representatives • training of Panchayat representatives • development of rules and recommendation for Finance Commission for devolution of funds to Panchayats	• implementation of rules that enable the fish farmer to get lease from Gram Panchayat	**State** Secretary Panchayat Commissioner Panchayat **District** Zila Panchayat Chief Executive Officer **Block** Janpad Panchayat Chief Executive Officer **Panchayat** Gram Panchayat Secretary	Directorate of Panchayat does not have direct stakes in the implementation of the project. It however plays a critical role in ensuring that the fish farmers are able to secure their lease over the pond within the jurisdiction of the Gram Panchayat.
Recommended Strategy 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.			

Aim and Objectives of the Institution	Programmes and Schemes for Fish Farmers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
Department of Forest			
Aim Protect and conserve forest resource through sustainable forest management **Objectives:** • maintain and enhance forest productivity and biodiversity for ecosystem health • conserve soil and water resources for ecological and environmental stability • meet the requirements of forest produce particularly those dependent on forest • socio economic development of villages in and around forest areas	• small ponds less than 1 hac can be constructed on forest land on the recommendation of the Gram Sabha • department is implementing CDM and REDD+ projects in selected areas of the state for carbon sequestration	**State** Headed by Principal Secretary and Principal Chief Conservator of Forest **Circle (16)** Chief Conservator Forest **Division (62)** Divisional Forest Officer heads the division in forest area. **Range (473)** Ranger is in charge of a range. **Beat (8286)** Each beat is headed by a Beat Guard	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. 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). 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.
Recommended Strategy 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.			

Aim and Objectives of the Institution	Programmes and Schemes for Fish Farmers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
Department of Revenue			
Aim Implementation of land revenue code, maintenance of land records and collection of land revenue **Objectives** • land records and transfer of land use • record of rain and temperature • provision of disaster relief • land reforms • administration of nistar in villages	• No programmes for fisheries or fish farmers	**State** Principal Secretary **Division (10)** Commissioner **District (51)** District Collector **Tehsil (272)** Tehsildar **Village (11622)** Patwari	The department does not have direct stakes in fisheries or fish farmers. Indirectly it is involved as it has endorsed that the proposed site falls within the jurisdiction and control of Gram Panchayat. The administration of nistar is the responsibility of the department where the pond site will be or is proposed to be located.
Recommended Strategy 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.			
Department of Mineral Resources			
Aim: survey, exploration and exploitation of all minerals and administration of Mines and Minerals (Development and Regulation) Act **Objectives:**	• No programmes for fish farmers or fisheries	**State** Principal Secretary and Director, Directorate of Geology and Mining **Region (4)** Regional Officers for the region **District (48)** District Officers	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 area that is being explored for mining purposes.

Aim and Objectives of the Institution	Programmes and Schemes for Fish Farmers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
• search and explorations of minerals in the state • increase revenue through production of minerals and scientific development • promotion of mineral based industries			
Recommended Strategy 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.			
Department of Cooperation			
Aim Using cooperation as the mechanism for organizing the weaker sections to ensure their social and economic development **Objectives** • provide guidance and technical support • assist backward sections and women to gain economic enhancement and social equality	• Registration of cooperative societies • Audit and inspection of the cooperative societies • Elections to cooperative societies • Enabling provisions for the fish farmers cooperatives to receive loans and subsidy • 3125 fish farmer cooperatives registered in the state with the department	**State** Principal Secretary Commissioner Cooperative and Registrar Cooperative Societies **Division** Joint Commissioner and Registrar **District** 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.
Recommended Strategy The project needs to engage with the department at the district level in case any of the beneficiary (or beneficiary group) intends to form Fish Farmer's Cooperative Society. A process of consultation with the department can take on a need basis.			
Department of Water Resources			
Aim Creation and maintenance of irrigation potential	• Responsible for framing of State Water Policy • Catchment treatment plans of irrigation projects	**State** Principal Secretary and Engineer-in-Chief **Circle** Superintended Engineer	The involvement of the department is in terms of formulation of water policy for the state. As such the

Aim and Objectives of the Institution	Programmes and Schemes for Fish Farmers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
through construction of water resources projects **Objectives** • protect the rights of the state in sharing of water for interstate river basins • calamity management in the form of construction and maintenance of flood control works • maintenance and regulation of major, medium and minor irrigation projects		**Division (137)** Executive Engineer **Sub Division (587)** Assistant Engineers	department does not have stakes in the process of implementation, benefits or the target beneficiary of the project.
Recommended Strategy The project can engage with the department at the state level during its advocacy initiatives. The department can be a Special Invitee member to the Steering Group for meetings with specific agenda that have implications for state Water Policy.			
Environmental and Pollution Control Agency			
Established by Department of Housing and Environment as an autonomous unit **Aim** Assist and advice the state government on environment related matters **Objectives** • situation analysis report on the state of environment along with relevant data base	• State Knowledge Management Centre on Climate Change as EPCO has been designated as the state nodal agency for addressing climate change issues • Prepared State Action Plan on Climate Change	**State** **Governing Council** Under the Ministry of Housing and Environment **Director General** as the head of EPCO with **Executive Director** as full time executive head	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. EPCO is an ardent supporter of the project and will support the project in identifying policy level issues and also in creating opportunities of taking them forward in the state.

Aim and Objectives of the Institution	Programmes and Schemes for Fish Farmers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
• study of specific environmental problems and exploring feasible solutions • environment research and coordination of environment related activities			
Recommended Strategy Project should have regular and active engagement with EPCO. The agency should be made a permanent member of the Steering Group.			
Central Institute of Freshwater Aquaculture			
Aim Development of sustainable and diversified freshwater aquaculture practices for enhanced productivity, quality, water use efficiency and farm income **Objectives** • conduct basic, strategic and applied research in freshwater aquaculture • enhance production efficiencies through biotechnological tools • study diversification of aquaculture practices • Training and consultancy services •	• training of fish farmers • technology development and technological products for fish farmers • handholding and mentoring support to fish farmers	**Bhubaneshwar** Director	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. 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.

Aim and Objectives of the Institution	Programmes and Schemes for Fish Farmers/ Fishery development/ Climate change	Institutional Structure	Stakes in the Proposed project
Recommended Strategies Project should have active engagement with CIFA. The Institute should be made a permanent member of the Steering Committee at the state level.			
National Fisheries Development Board			
Aim Realize the untapped potential of fisheries sector in inland and marine capture, culture, processing and marketing of fish **Objectives** • increasing fish production in the country • provide employment by extending assistance for implementation of activities under the fisheries sector • platform for public private partnership in fisheries	• Reservoirs for fisheries development • Intensive aquaculture in ponds and tanks • Hygienic development of wholesale and retail markets • Training of fishermen and fish farmers	**Hyderabad** 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.
Recommended Strategies 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
Commercial Banks The commercial banks that also include the	Credit	Commercial banks are by and large **neutral** towards the project as they do not have the experience of providing funding for fishing on a small scale. Most funding from banks falls within the	**Action:** *engaging with commercial banks at the local level through the Lead Bank Manager of the district to make them*

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 fish farmers and hence the bankers do not view fisheries as a profitable venture for their purpose.	*informed and aware of the bankability of small pond fisheries.*
Government Fish Seed supplier Government has its own hatchery and fish farm from which it supplies fish seed to the fish farmers and their groups	Fish seed	Fish seed supplier will **support** 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.	**Action:** *engage with the seed supplier on ensuring timely supply of the preferred species by the fish farmers.* *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.*
Private Fish Seed Supplier Private fish seed suppliers exist in Dhar district.	Fish Seed	Fish seed supplier will **support** the project as it implies increased market for its fish seed. Fish Farmers 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.	**Action:** *engage with seed supplier to gain timely and quality seed of the preferred species by the fish farmer.* *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.*
Feed Supplier (Government) Fish feed suppliers by government is subsidized and is available to fish farmer groups.	Fish Feed	Government fish feed supplier will **support** the project as it will imply increased market for its product. Regular contact with the government fish feed supplier will enable the fish farmer to take advantage of the introduction of feed to their pond in time.	**Action:** *engage with the feed supplier to get quality feed for the fish farmer.*
Supplier of Fish Net 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 **support** the project as it implies increased demand for their product.	**Action:** *engage with net producers and suppliers in getting quality nets to the fish farmers.*

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
Boat supplier 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 **support** the implementation of the project.	**Action:** *engage with boat makers and suppliers to get quality product for the fish farmers.*
Fish Trader 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 fish farmers in local market. In fact these traders can provide a wider market for the fish farmers.	**Action:** Fish Farmers 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
NGOs 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 fish farmers 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.	**Action:** *The project should engage with local NGOs so that they can be informed and sensitized on the issues related to fish farmers and fisheries. Workshops with the local ngos should be planned as part of upscaling strategy of the project.*
Academic Institutions This includes institutions engaged in studies &research related activities in government or non	All stages of value chain	Academic institutions from the project districts have neither identified nor explored identified the issue of fish farmers, 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 **neutral** towards the project.	**Action:***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.*

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
government sector including KVKs.			
Media 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.	**Action:** media visit to the project area and their interaction with the fish farmers 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	**Private:** Sundrail, Dhar, Hoshagabad& Bhopal **Govt:** DoFisheries, Jhabua	Mostly common resources	Department of Fisheries
Jhabua	900	Max- 45 Min- 12	200	**Private:** Sundrail, Dhar, **Govt:** DoFisheries, Jhabua	Mostly common resources	Department of Fisheries
Alirajpur	900	Max- 45 Min- 12	200	**Private:** Sundrail, Dhar, **Govt:** 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, fish farmers groups, SHGs), and fish marketing to local *haats*.

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 finds or any scheme o 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 fish farmers 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 fibberglass 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. This 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

Activities	Milestones	Deliverables	Monitoring Indicators
• Evolving water bodies and fisheries characterization tools and methods & field testing including mapping tools • Multi stakeholder inception workshop • Scouting for innovations from formal and informal sources and compilation • Selection of tanks for detailed intervention	• Formalising relation with CIFA • Development of field tested research methodology • Inception workshop	• Project inception report with details of field tested protocols for characterization of in land fisheries in small water bodies. • Proceedings of inception workshop	• No of site selected • No of village selected • Monthly progress report • Inception report • No of tanks selected

7 to 12 month

Activities	Milestones	Deliverables	Monitoring Indicators
• Developing location specific technical interventions through an interface of fisherfolk communities and researchers. • Setting up data generation systems including field measurements. • Community level situational analysis, orientation and capacity building programs- including exposure to best practices and innovative technologies. • Establishing fish-nursery systems	• Completion of base characterization of fisheries • Detailed plan of action in selected water bodies covering institutional and technical aspects. • A draft technical manual incorporating appropriate practices for fisheries in rainfed water bodies duly synthesizing indigenous knowledge with scientific analysis.	• Baseline characterization report • Detailed participatory action plan for the selected water bodies including establishment of support systems like nurseries. • The selected water bodies set up in all respects to initiate action-research.	• Base line survey report • Training need analysis report • No of trainings conducted • One hatchery in each of the three districts established

Activities	Milestones	Deliverables	Monitoring Indicators
linked to cluster of water bodies. • Setting up at least one pilot hatchery • Assessment of establishing low cost hatchery			

13 to 18 month

Activities	Milestones	Deliverables	Monitoring Indicators
• Piloting of suggested technical and management interventions as per the plan – i.e. implementation of action research. • Compilation, verification and analysis of data • Organising field days on action reflection learning sessions with the fisherfolk in the blocks. • Selection of site for hatchery and detailed survey for feasibility	• Completion of one cycle of implementation. • Locally accustomed Seed production and seed rearing practices are adopted by community • Mid-term Reflection workshop with scientists and community • Establishment of local fish-marketing networks	• Report on the analysis of first year's experiences with o lessons learnt and research gaps o Modified research plan for 2nd implementation • Report on analysis of experiences in pilot phase • Proceedings of the reflection workshop	• Visit to CIFA is completed • Community learning process is set up and functioning • Survey for establishing hatchery is completed

19 to 24 month

Activities	Milestones	Deliverables	Monitoring Indicators
• Participatory assessment (along with scientists and community learning	• Finalized manual for fish farmers in rainfed area	• Report on 'Technological and Institutional Options' published	• Draft impact report is published

Activities	Milestones	Deliverables	Monitoring Indicators
forum) and synthesis of lessons learnt • Preparation of 'Technological and Institutional Options' manual for practitioners	• Preparation of last season action-research implementation plan • Draft Impact assessment report	• Draft impact assessment report	

25 to 30 month

Activities	Milestones	Deliverables	Monitoring Indicators
• Refinement of research plan • Strengthening community organization towards sustainability.	• Analysis of collected data and sharing • Smaller policy-consultations to synthesize the emerging experiences into a policy brief.	• Lessons learnt report • Draft policy and technical brief publication	• Lesson learnt report

31 to 36 month

Activities	Milestones	Deliverables	Monitoring Indicators
• Exploring scope for scaling up the technical and institutional innovations in the districts • Sharing learning of low cost hatchery • National level dissemination efforts – through consultation meeting	• National level Learning sharing workshop on climate resilient inland fisheries in water bodies in rainfed areas with key players • Final impact assessment report • Sharing of Climate resilient technologies and policy recommendation	• Proceedings of national workshop • Final technical-institutional and Policy Framework for strengthening inland fisheries.	• No of workshop • Final report is published

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 othercommunities either in private water bodies or in water bodies on lease from government.

Commercial fishing is profitable; but fish farmers 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 livelihoodsecurity 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 fish farmers.

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

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	Visit to Fisheries department's hatchery at Maudsagar dam.
				Understand the entire process of Hatchery at there.
5	07-05-14	Borkudia	Alirajpur	Conducted FGD with Fishermen.
				Personal Interviews of fishermen are taken.
6	07-05-14	Bhabhra (CSAzadNagar)	Alirajpur	Fish Market Visit, Discussion with traders and Analysis of market volume.
7	07-05-14	Ranapur	Jhabua	Fish Market Visit, Discussion with traders and Analysis of market volume.
				Discussion with fishing net waivers.
8	08-05-14	Dhamoi Dam	Jhabua	FGD with local fishermen. Visit of dam to see the live process of fishing.
				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.
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	FGD conducted with fishermen. This fisherman catches the fishes from Narmada River.
				Personal Interview of fishermen
17	11-05-14	Kunda Dam	Dhar	FGD Conducted with the members of Fishermen Institution.
				Observed entire live process of fishing.
				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

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 15th 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.

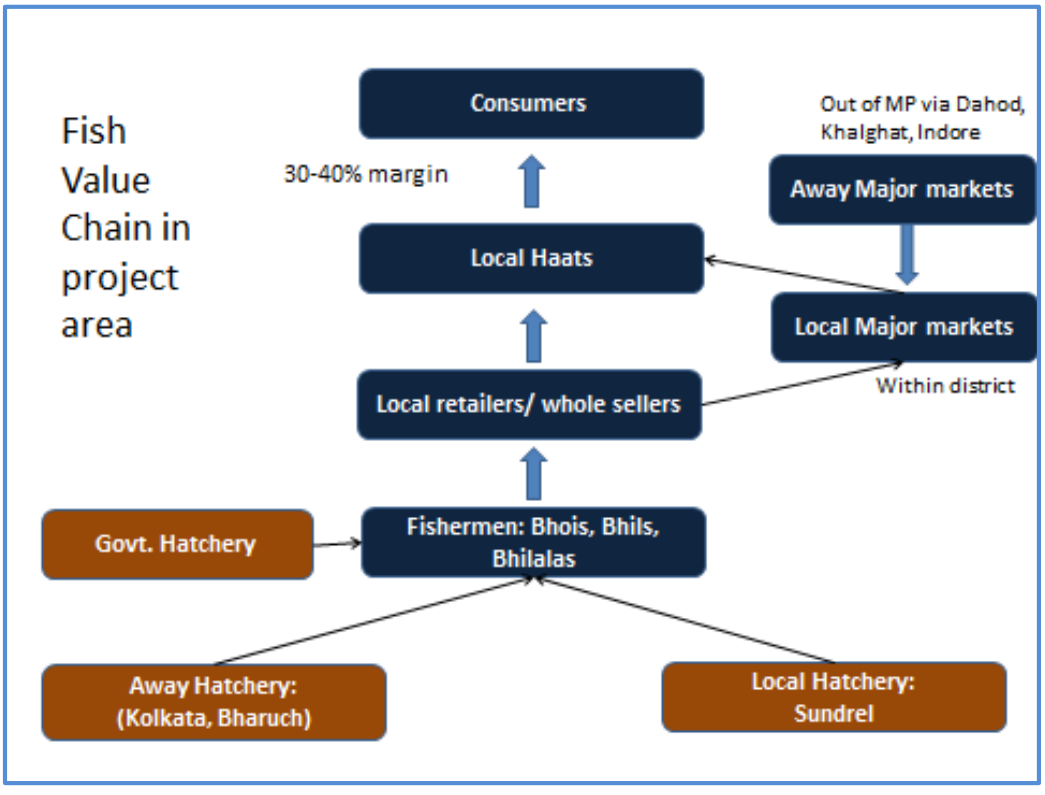
The metabolic rates of organisms and the overall productivity of ecosystems are directly regulated by temperature. Thus, it is quite natural that fishes find it difficult to survive in the face of rising

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

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
Fishing communities	The main communities who are engaged in fishing are: • The tribals**(Bhil, Bhilala)**: 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 fish farmers. • The traditional fishing community **(Bhoi/Kahar)**: 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.
Fishing practice/ models	There are four models of fishing business in the localities where primary research has been conducted: ✓ **Gram Panchayat or Government giving water bodies on lease for fishing to fishing associations:** o 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 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. ✓ **Government owning the big dams and giving fishes on royalty basis:** o One dam is owned by the Government- at Maud Sagar. Fishermen catch fish and pay a royalty to the Government at the following rates: o Fish size more than 1kg: Rs.14/kg o Fish size less than 1kg: Rs.10/kg ✓ **Individual fishing (mainly in rivers):** o They fish individually and sell individually; fish catch reported to be going down because of dam on the upper catchment. ✓ **Private Ponds/ tanks** The study team could not find one; but learnt that it exists
Fishing season	The fishing season is like following: • Mid or late June: Fingerlings are released into the water bodies • Late June- late August: Breeding period (ban on harvesting)

Concept	Description
	• September: Small scale harvesting starts • October- January: Fish harvesting starts peaking • February- May: Intensive fishing
Hatchery	There are two fish hatcheries in the vicinity one owned by Government and one owned by Private. • There is a Government hatchery near Maud sagar dam in Jhabua district; there is a government fish nursery in Dhar district • One private hatchery is at Sundrel in Dhar district The capacity of a hatchery varies according to the local demand; but it is reported that the minimum size should be 1 billion spawns. 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. 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%)
Fish types/ volume	The major varieties of fishes in the locality are: • Rohu • Katla • Common Carp • Silver Carp • Bam • Singhad Some fishes which are imported from markets like Andhra Pradesh and Karnataka are: • Pangus • Mangur
Post-harvest	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.
Markets	• 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

Concept	Description
	• 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) • Fish Farmers 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 fish farmers cover more than weekly market by harvesting the fish daily and selling it in different weekly markets in the region. • 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 kilometres depending on the density of population in the area. The average physical distance between two 'Haats' would be between 10-15 kilometres. However, on a given day, the distance between two 'Haats' would be 25-30 kilometres as the 'Haats' are held on different days of the week. • 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; however, fish flow from local area to bigger markets like Bhopal and Indore are not reported • 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 • 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 More information on markets and prices is given in a separate section later in the report below.

Concept	Description
Picture of two women selling fish in Dhar 'Haat'; a common sight in western Madhya Pradesh	
Problems/ Issues	• 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. • 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 • 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 labourers and are paid meagre amount (Rs.5 per kg) • 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 • 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.
Role of women	• In some pond/tank fishing cases, women have been found to help in dragging the nets • Individual women also engage in fishing • The women also play a major role in selling the fishes in the local market

Concept	Description
	• Women are involved in making of the net. These women belong to the traditional fishing community.
Vulnerability	• Both the tribals and the traditional fishing communities are found to be vulnerable • Only some of the fishermen have capital or information tend to break the vicious cycle of poverty by investing in the business • Women, though play an important role in fishing, are often neglected; their role is not recognized properly.
Related Business options/ plans	✓ **Hatchery:** 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. ✓ **Ornamental fish unit:** 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 overall domestic trade in this field cross ₹1000 lakh and is reportedly growing at the rate of 20 per cent annum. 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. The details of the business and the business plan is given in the annexure

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
	Total	**12200**	**12190**	**985**	**680**	**4935**	**12325**	**10715**	**54030**

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	Dhamnod	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.

VI. CONCLUSION, SUGGESTIONS AND WAY FORWARD

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

Parameters	Suggestions
Size of pond and scale of operation	• 1 ha to 5 ha size; both legally better option and more efficient • 10 to 15 ponds in a cluster of villages should be selected for the project • Scaling up is important and not much risk is there in scaling up; there is enough unsaturated demand in the market at the moment
Fishermen's institution	• Fishermen's institution should play an important role • Fishermen's capacity building in managing fishery as a business and marketing practices would be crucial
Marketing	• Concentrating on local markets and district head quarters • Emphasis needs to be put on better handling and processing the fish from pond to market; women can be entrusted with this work • Better mobility between local markets would help a lot; small vehicles should be planned for
Business opportunities	Given in annexure: • Aquaculture • Hatchery • Ornamental fish

Business Plan: 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 spices 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
- Spawn Collection pond:- Spawn are collected from here.
- Breeder Pond:- Male& female fishes are kept separate in these breeder ponds.
- Nursery Pond (Rearing Pond):- Spawn is kept in these ponds where they grow 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, Mrigal -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:-

Size of the Fish	Name
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, equipmentshapas etc.	30000
	Total	**765000**

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
	Total	**449000**

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

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 fish farmers 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.

Fish Farmer(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 fish farmers 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 fish farmers need to be informed, trained or sensitized. So far no training has been organized for fish farmers on climate change, or its impact on fisheries, or possible adaptive strategies.

(b) Barriers of Awareness, Education and Training

The fish farmers 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 fish farming 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 fish farmers 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 fish farmer. 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 fish farmer. Similarly, the market for sale of fish does not provide storage or chilling facility as a result of which the fish farmer 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 fish farmers; and development of infrastructural capacities for the fish farmers and to develop skills and knowledge within the fish farmers to enter in to trade and business partnerships with other stakeholders in the market.

2.2 Approach ad 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 fish farmers 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 fish farmers 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 includes 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 improves relationship between fish farmers and groups and between fish farmers and other stakeholders. The ability to identify and negotiate terms of business with other stakeholders and strengthen the fishfarmer's 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 fish farmers 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 fish farmers. 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 fish farmers. There will be direct contact between the resource person and the practitioners so that there is minimal transmission loss in learning for the trainee (fish farmer).

(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
Fish Farmer and Project Staff	**Development as Climate Resilient Fish Farmer** • Responsible Fishing • Factors of Climate Change • Impact of Climate Change • Alternative Strategies for responding to Climate Change	- Classroom Training events - Demonstration by experts - Learning by Doing process/ facilitation - Exposure visits
	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	- Classroom training - learning by doing/ facilitation - Action reflection sessions
	Development of Fish Farmers as Climate Champion • Forging partnerships with other stakeholders • Networking skills with other fish farmers and fishing communities • Forums to address impact of climate change	- Classroom training - learning by doing/ facilitation - Making presentations
Members of Steering Committee (State and District level)	**Sensitisation on Climate Change and Livelihood Security** • Factors of Climate Change and impact of fisheries • Government response to climate change in the state and the region	- Participation in Steering Committee meetings - Direct interaction with fish farmers
	Adaptive Strategies for Fish Farmers • Risks and Vulnerabilities arising out of climate change for fish farmers • Adaptive strategies developed and their effectiveness for fish farmers • Policy implications of adaptive strategies	- Participation in Steering Committee meetings - Direct interaction with Fish Farmers - Perusal of Monitoring and Evaluation reports
Panchayat Representatives	**Climate Change and Livelihood Security** • Factors of Climate Change • Impact of Climate Change • Vulnerabilities arising from process of climate change	- Classroom training - Interaction with Fish Farmers

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 Fish Farmer *(Fish Farmers and Project Staff)*												
Climate Adaptive Strategies *(Fish Farmers and Project Staff)*												
Climate Champion Fish Farmers *(Fish Farmers and Project Staff)*												
Sensitisation on Climate Change and Livelihood Security *(Steering Committee)*												
Adaptive Strategies for Fish Farmers *(Steering Committee)*												
Climate Change and Livelihood Security *(Panchayat Representatives)*												

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 fish farmers 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 fish farmers 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 Fish Farmer	Climate Resilient Fish Farmer
Pre construction	• Approval from Gram Sabha • Finalisation from Gram Panchayat • Sanction from Collector/ Department of Fisheries	• Identification of cluster on geo hydrological suitability • Community mobilisation and sharing of information • PLA for finalization of site • Pond design and development of climate resilient plan • Orientation on climate variability and its impact on fisheries
Construction	• Mobilisation of labour and resources for construction	• Implementation of catchment treatment plan
Pre Fishing	• Formation of Fish Farmer Livelihood Group • Development of business plan • Training and orientation in responsible fish farming practices • Input mobilization	• Training and orientation on climate variability and its impact on fisheries • Development of climate adaptation plan • Institutional linkages (credit, insurance etc) • Inputs of fish seed based on climate adaptability
Fish Farming	• Training on responsible fisheries • Package of practice related to responsible fishing	• Training on climate adaptation protocols • Implementation of protocols that are part of climate adaptation plan, e.g. timing for introduction of fish seed, harvesting practices • Introduction of appropriate technologies to enable fish farming to adapt to warmer climatic regimes

Knowledge Management	• Tracking and quantification of benefit received by the project • Evidence of resilience of climate benefit strategy
Learning and Advocacy	• Dissemination of impact and benefit from fisheries • Dissemination of climate adaptation strategy

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 fishfarming 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

- Report to Project Steering Committee on complaints received and resolved.

(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 fish farmers 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 fish farmer groups
- Be the resource person in capacity building activities for the project team and target group of fish farmers for matters related to their subject
- Provide subject matter inputs in the preparation of business plan and climate adaptation plan for the target small pond fish farmers

(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
- Inform district level stakeholders of the grievance mechanism in the project and engage with them on the resolution of project related grievances.

(d) Community engagement

- Undertake community engagement in the project area for sharing project related experiences and learning
- Inform the community level stakeholders on the grievance mechanism within the project and pro actively seek opportunities to seek and address grievances.

(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 fish farmers 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 an 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.

2.4.1 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 fish farmers. The Junior Technical Person will be placed at the district level and will report to the Senior Technical Member.

2.4.2 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 fish farmer groups

- Be the resource person in capacity building activities for the project team and target group of fish farmers for matters related to their subject
- Provide subject matter inputs in the preparation of business plan and climate adaptation plan for the target fish farmers

(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 fish farmers 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 fish farmers 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
- Inform the village community about the grievance mechanism in the project
- Attend Gram Sabha to seek and resolve grievances on a regular basis

(b) Mobilisation

- Mobilisation of the community and fish farmer(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 fish farmers to enable them to become efficient fish farmers and climate resilient fish farmers
- Facilitate learning among the fish farmers that have gone on exposure visit to other project and institutions

(d) Meetings

- Conduct regular meetings of the fish farmer 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
• **Grant funding from government**	• 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 • Process with government involves multiple stakeholders • Long time duration for processing and implementation • Delays, leakages and issues of quality	• Project will pilot pond construction with design that takes in to account the impact of climate change on water retention require for fisheries. • Project will also select ponds where the design will be modified according to the needs and requirements of fisheries to adapt to climate change. • Project will provide grant funding for the construction/modification of the pond.

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
• **Grant funding from government** • **Own source/labour** • **Borrowed from friends/ relatives (Boat)**	• Capital is available in small installments hence delays in implementation • Required amount may not be available hence compromises in size and quality	• Project will pilot pond construction with design that takes in to account the impact of climate change on water retention require for fisheries. • Project will also select ponds where the design will be modified according to the needs and requirements of fisheries to adapt to climate change. • Project will provide grant funding for the construction/modification of the pond.

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
• **Own investment by private operator**	• Require large amounts that is not available with small and marginal farmers • Banks have not identified hatchery units as viable business propositions and do not provide funding for the same	• Experiment with low cost hatchery unit developed by CIFA will be undertaken. The project will provide grant funding for pilot nurseries

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
• **Government grant funding** • **Contribution pooled by members of fish farmer groups** • **Fishermen Credit Card scheme that**	• 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 • 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	• Project will prepare business development plan of each pond and train and orient the fish farmer(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

provides credit at 1% (reported by Apex Bank) to Cooperative Societies only	• Fishermen Credit Card scheme has been a non starter and no example of the card being issued or used was found in proposed districts • None of the fish farming groups (formal or non formal) keep track of their income and expenses as a result of which they are unable to access credit from • Credit to modify or make mid course corrections to adapt to climate change or extreme weather events is not available	• Orientation of banking representatives on business plans developed through the Lead Bank Officer to provide credit on a pilot basis to fish farmer groups • Fish Farmer groups to be facilitated to form cooperative society so that they can increasingly access banking services for savings, credit and for making investments as well • Regular facilitation, handholding and mentoring to fish farmer groups for their institutional strengthening

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
• **Own investment by private operator**	• 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. • Private hatchery has not emerged as a bankable business proposition to be funded by financial institutions	• Development of business plan for hatchery units and training fish farmers to run and operate the unit on business lines • Grant funding will be provided by the project for low cost hatchery units

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
• **Own investment** • **Ploughing back of profits**	• Fish Farmers 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. • Lack of knowledge about the development of machines and other technologies constraints the fish farmers in allocating part of their profits from fisheries for making growth related investments • Financial institutions do not have credit products that allow fish farmers to make growth related investments	• Train, orient and develop the skill of the fish farmer in alternative technological options to adapt to vulnerabilities arising out of climate change. • Project to provide grant funds as pilot for installation and rolling out of adaptive technological options for the fish farmers. • Regular account keeping by the fish farmers group will be facilitated that will allow assessment of surplus and allocation of fund for growth related activities and technologies.

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
• **Own investment** • **Government bearing cost of training and exposure**	• Government has not specifically identified vulnerabilities arising out of climate change for fish farmers. The training programmes are in development of skill and capacities related to business as usual fisheries	• Project to provide grant fund to fish farmers for their capacity enhancement relate to climate change adaptive strategies • Fish Farmers that have gained higher degree of competence will be

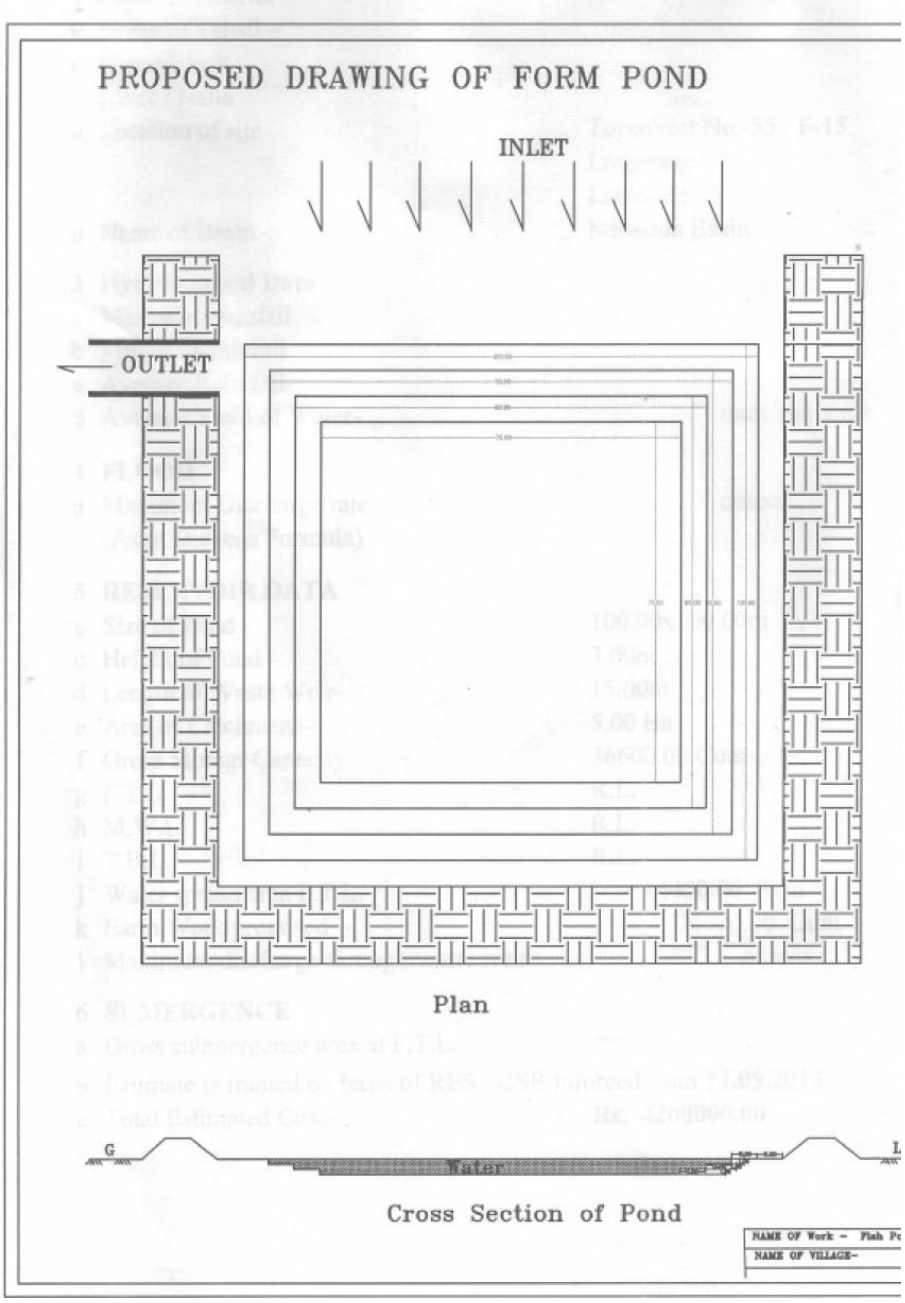
	• No credit or support facility available to fish farmers for undergoing skill enhancement	developed as peer educators so that they can develop themselves as service providers to a larger group of fish farmers on issues related to fisheries and climate change

8. Insurance

- Major source of expenditure is:
    - Premium money for insurance

Present Source of Financial Service	Constraints and Challenges	Proposed Financial Service Plan
• **Present schemes are for life and accident insurance of fish farmers** • **Insurance product that protects loss of business due to disease exists** • **Insurance product based on to weather based insurance to protect against loss of business due to climate change have been launched by private companies**	• Lack of information with the fish farmers on the need for insurance as protection against business • There are no micro insurance schemes in the state (ILO report) • Lack of knowledge among fish farmers on weather based insurance products and their ability to assess different products that will suit their requirement	• Training fish farmers on basic of insurance and weather based insurance products • Fish Farmers to make their own investment on premium to protect against loss due to factors of climate change • Project will engage intensively with the private insurance companies to increase direct interaction between fish farmers and insurance companies with the aim of improvement in the operation of the insurance product

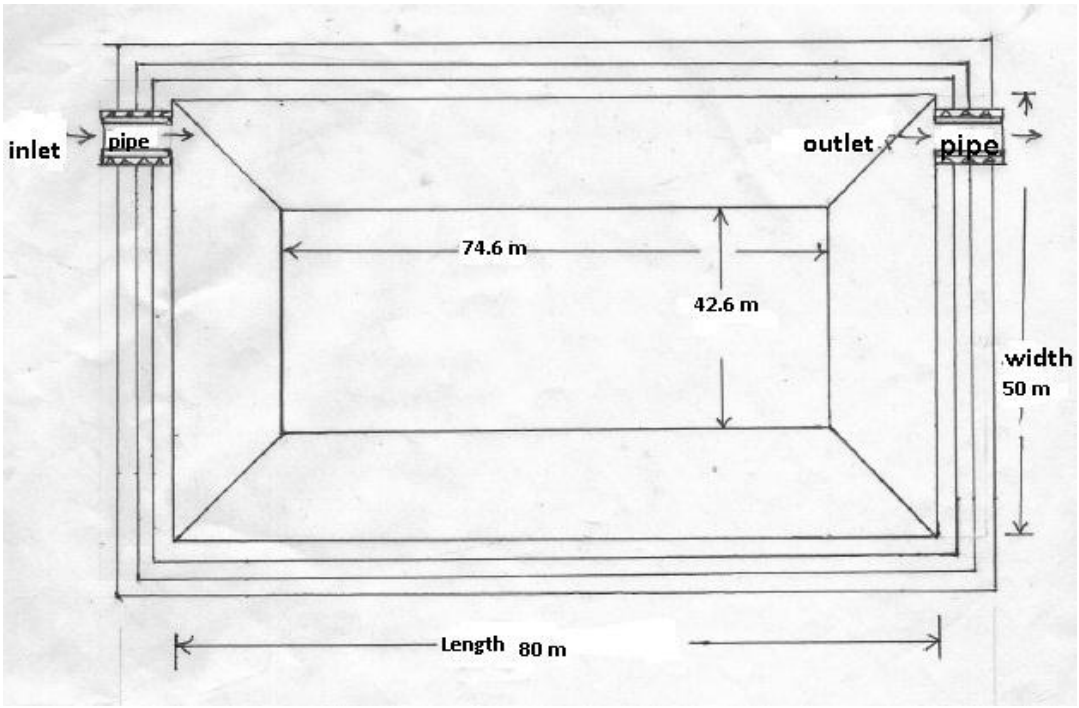
Annexure 10 Pond Design



POND DIMENTON

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


inlet
pipe
outlet
pipe
74.6 m
42.6 m
width
50 m
Length 80 m

Annexure 11 Bhatiyari: Technical and Financial Feasibility

Socio-economic profile

The name of the pond probably derived from stones as the village has a very large stony waste of calcareous limestone formation, and the rocky outcrop constitutes the major portion of the village. Bhatiyari has the revenue status of a village and also the status of a Gram Panchayat. The village has three major hamlets named as Patelpura, Khagpura and Kaneshiyapura located around 1-2 kms away on the Kukshi-Akhada road in Dhar district of MP. The village inhabits Bhil and Bhilala tribes and some households belonging to scheduled caste population.

The pond is used by the households located in the hamlet of Patelpura and all the lands in the catchment belong to the Bhil and Bhilala communities of this hamlet. 20 households own land on the catchment of this pond and their habitation also falls in the catchment area. The major crop of the village in the rainy season is cotton, soybean, maize, and chillies. During winter crop the entire land is put under either wheat or gram. Major irrigation sources for agriculture are 5 bore wells that provide water to 25 ha of land and the remaining 5 ha of land is irrigated by drawing water from the pond.

Location of Pond

The pond is located on longitude and latitude of $74^0$42'25" and $22^0$19'35". It is mapped in topo sheet number 46 –J/11 that is surveyed in 1971 and updated in 2005-06 and published by the Survey of India on 1:50000 scale. The pond is situated North West of the Patelpura hamlet of Bhatiyari village. Bhatiyari pond was identified with **P2 priority** under the protocol for selection of ponds for fisheries ii the district.

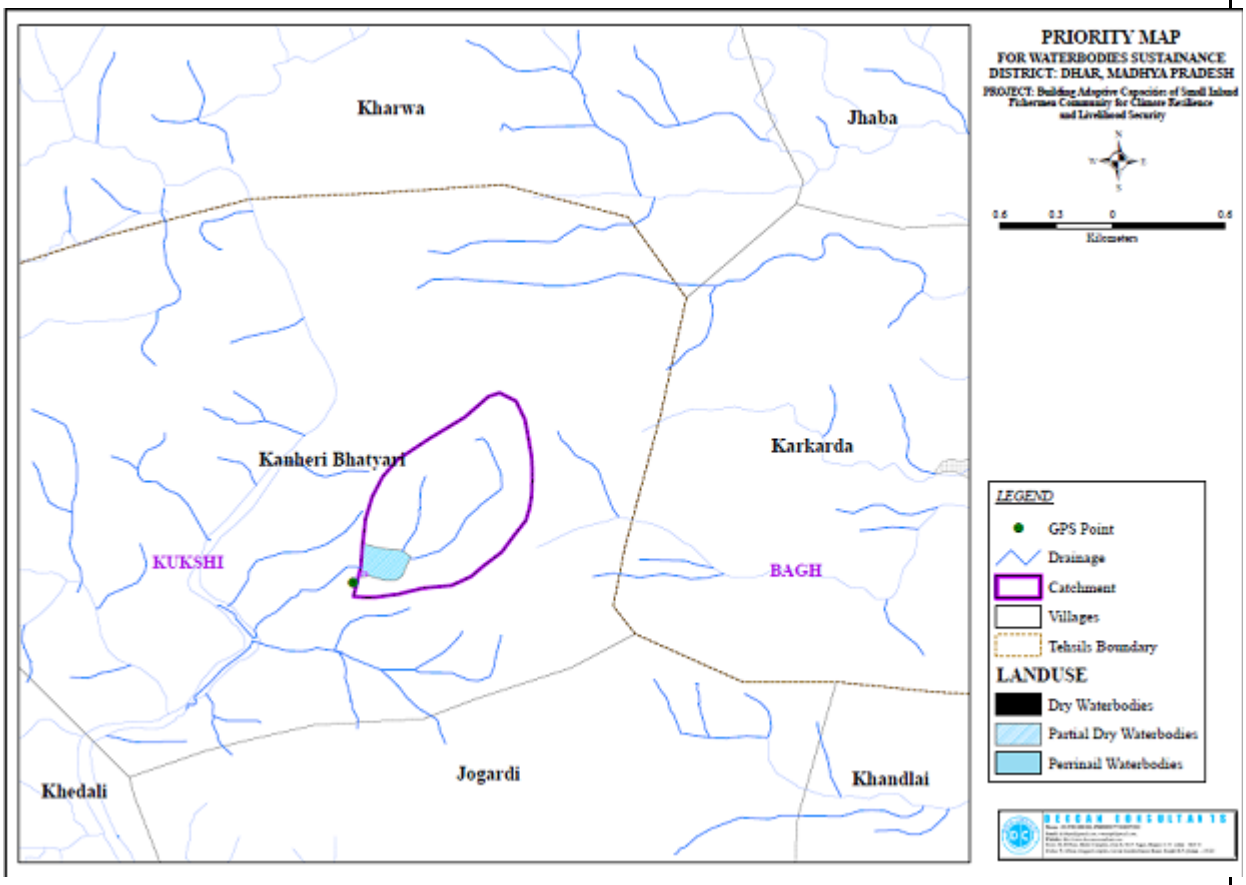
The pond and its entire catchment lie between 300 m and 290 m intervals as per the extrapolation. The top of the catchment and ground level of the pond site has difference of 10 m in their elevation. Two first order streams originated from the catchment drains on the pond. The longer drain is visible and has 2 m width and 1 m depth in the top reaches, its depth decreases as the stream approaches to pond, as the drainage point is highly rocky in nature. The pond site is natural depression embanked from one side make it a 4 sided pond. The second stream is not visible, as it brings runoff mostly from the agriculture fields.

Catchment Characters

The catchment of the pond falls in Ojhar River that finally meets the Narmada River. The soil type is Black stone mixed soil and patches of whitish soil due to the presence of calcareous soils. The slope of the catchment is 15 to 20% and drainage density is 2.96 m/square m.

The entire 45 ha catchment of the pond could be divided into three parts.

First Part: The top of the catchment is formed with common land of the village of around 10 ha. This land has been acquired by a solar power generation plants and presently this is fenced. As a result this part of the catchment is completely protected and the bushes and grasses could be seen with high density. One small percolation pond is also available on this patch and its recharge is available to main pond and tube wells. 4 small ponds are also built by the government with 10mX10m dimensions constructed under Balram scheme. This patch has shallow 2 m ground water table. As such catchment treatment need not be done in the development of this part of the catchment.



Catchment Area and Storage of Bhtiyari Pond- Two first order streams are draining into the pond

Second Part: The middle and top of catchment is part of the habitation and roads having areas around 5 ha. This part of the catchment does not need any kind of treatment.

Third Part: The middle and lower part of the catchment is agriculture land and it occupies an area of around 30 ha. All the lands need to be bunded especially from the water discharge section. This part also has 5 bore wells with 60-70 m deep and water struck on 40-50 m depth. These bore wells runs well till end of Rabi season, however towards the end of the summer they shows sign of exhaustion and drying up. This part of the catchment has good vegetation in the middle part and several long and aged trees of Mango, Tad, and Neem could be observed. However, towards the end no trees are visible.

Pond Character

The pond is built on a natural depression on the calcareous bed rock that allows impounding water without much recharge to the underground formations. It is rectangular in shape and built around 40-50 years back by the revenue department. The pond is under the jurisdiction of Panchayat for its management.

The pond has an earthen embankment that is 110 m long and 10 m in height with 2.5 m top width on average. At present maximum water depth is 3 m in the middle section and 1.5 to 2 m towards the pond sides. The pond is 2 m empty at this stage, which makes the full reservoir level the depth of pond to 5 m. In the year 2005-06,

around 3 m silt was removed from the pond that was applied in the nearby agricultural fields. The storage area of the pond is 2.3 ha.

The waste weir is constructed on the left bank of the pond having 4 m depth and 40 m length and 2 m width. The capacity of the waste weir is sufficient to discharge the water from this catchment as it is almost equal of the inlet stream having cross section of 0.6 m x 2 m.

Waste Weir Section of Bhatiyari Pond

Measurement of Pond Embankment and size

Making Pond Climate Adaptable

The pond ecosystem constitutes of catchment that comprise of common land and agriculture land and pond storage area. The catchment to storage area ratio is around 20 and the runoff water from the agriculture fields are reaching to this pond. The agricultural land is mostly not-bunded. The high catchment-storage ratio clubbed with direct runoff from agriculture field is contributing reduction in the capacity of the pond. To make it climate proof for fishery, the pond needs to be de-silted to ensure adequate water during dry months and catchment treatment to reduce the silt load towards the pond.

(a) Pond Deepening

De-siltation of Bhatiyari Pond (area 2.3 hac)

S.No.	Particular	Calculation	Area or volume	Unit
1	Catchment Area		45	ha
2	Average rainfall		700	mm
3	Available water from Rainfall	1x2	31.5	ha-m
4	Ground Water Recharge	3x10/100	3.15	ha-m
5	Runoff (40%)	3x40/100	12.6	ha-m
6	Evapo transpiration (40%)	3x40/100	12.6	ha-m
7	Soil moisture (10%)	3x10/100	3.15	ha-m
8	Pond storage		2.3	ha
7	Maximum depth		5	M

8	Pond capacity at FRL	2.3x5 m	11.5	ha-m
9	Runoff goes out	5-8	1.1	ha-m
10	Capacity to be increased		1.1	ha-m
11	Desiltation needed (only 40% area of storage)	2.3x0.4x1 (40% of storage area from 1 m depth)	0.92	ha-m
12	Volume of silt		9200	Cubic m

CSR rate for excavation of 9200 cum soft soil=9200x86
Cost of the excavation=**Rs. 791,200** ....*(a)*

The individual beneficiaries of entire village would contribute in terms of transportation and putting the soil in their agriculture field. This cost could be reduced substantially using machines though manual digging would generate an additional employment of around 6000 person days within the village.

(b) Catchment Treatment

(b.1) Calculation of Loose Stone Boulders Check Dams on Streams
Length of larger stream= 1.5 kms out of which 1 km needs treatment. Assuming,100 m intervals 10 such structures to be constructed.
Top Width= 1 m
Upstream slope= 1:1
Downstream slope=1.3
Length= 2 m
Average volume of each structure={(1+5)/2x2x1}=6 cum
Total volume of work for LBCD= 6x10= 60 cum

CSR Item	Particular	Volume	Unit	Rate	Amount in Rs.
1807	Collection of boulders without excavation	3	Cum	88.90	266.70
1902/8	Transportation of boulders from 8 kms distance	3	Cum	133.47	400.41
2311	Labour for pitching	3	Cum	267.70	803.10
					1470.21

Cost for collection and pitching of 3 cum = Rs.1470.21
Contingency (5%) =Rs.73.51
Total cost for 3 cum stone pitching =Rs.1543.73
Cost for 1 cum stone pitching =Rs.514.57
Cost of 10 LBCD **=Rs.30840** ...*(b)*

(b.2) Calculations for Bunding of Agriculture Land
Area to be bunded =30 ha
Average length of bunds per ha = 100 m
Total length for bund of 30 ha = 3000 m

Cost of RMT at current CSR =115 per RMT
Cost of Earthen Bund = Rs 345,000 *...(c)*

(b.3) Waste Weir
30 stone waste weir of 2 cum size = 30x2x514
Cost of Waste weir = Rs 30840 *...(d)*

Technical Feasibility of Bahtiyari Pond (2.3 ha)

S.No.	Activity	Amount (Rs.)
1	Plantation and protection of common lands- Gully plugging through loose stone boulders in longer stream …*(b)*	30,840
2	Field bunding in agricultural fields …*(c)*	345,000
3	Provision of stone waste weirs in 30 fields …*(d)*	30,840
4	Grass seeding on the newly bunded fields @100 per ha and before the gully plugs	3000
5	De-siltation in 40% of the storage area to 1 m depth …*(a)*	791,200
6	Repair of the leakage from the embankment constructing key trench	0
7	Repair of the waste weir and placing a mesh for protection of fishes	5000
	Total	**12,05,880**

Financial Viability
The financial viability of the Bhatiyari Pond based has been assessed in the ensuing paragraphs.

(i) Cost

S.No	Particulars	Unit	Quantum	Rate (Rs)	Total (Rs)
Capital Cost					
1	Site Clearance and Development				12,05,880
2	Net s and Other Implements	Incl in harvesting			
3	**Total (CC)**				**12,05,880**
Operational Cost (Bhatiyari Pond 2.3 hac)					
1	Lime (500 kg per hac)	Kg	1150	5	5750
2	Super Phosphate (250 kg per hac)	Kg	460	12.20	5612
3	Fish Seed (R:C:M:CC-30:20:10:40) 10000 fish seed per ha fingerling size	Fingerling	23000	5	115,000
4	Harvesting & Security (@ 80% survival)	Per kg	18400	5	92,000
5	**Total (OC)**				**218,362**
6	**Total Cost(CC+OC)**				**14,24,242**
Note: Cost for net and implements are included in harvesting. Cost of cow dung for fish feed will not be incurred as this will be made available by the group members.					

(ii) Production and Income

Survival	%	80
Average Size of Harvest	Kg	1
Total Production	Kg	18400
Sale Price at Pond	Rs	60
Gross Income	**Rs**	**11,04,000**

Financial Viability

Cost	**Year**							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Capital Cost	1205880	0	0	0	0	0	0	0
Recurring Cost	218362	218362	218362	218362	218362	218362	218362	218362
Total	**1424242**	**218362**	**218362**	**218362**	**218362**	**218362**	**218362**	**218362**
Income Sale of Fish	552000	1104000	1104000	1104000	1104000	1104000	1104000	1104000
Net Income	-872242	885638	885638	885638	885638	885638	885638	885638
NPV Cost	1637878	25116	25116	25116	25116	25116	25116	25116
NPV Benefits	-741406	752792	752792	752792	752792	752792	752792	752792
NPV	-2379284	501676	501676	501676	501676	501676	501676	501676
BCR	1.33							
IRR	11%							

Appendix I

Methodology for the Development of ESI Screening and ESMP of Sub Projects

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:	TOWARDS ACTION AND LEARNING(TAAL)
Amount of Financing Requested:	US$1,790,500 (in U.S Dollars Equivalent)

Contents

1.0Introduction

1.1 Inland fisheries, in India, is unorganised, scattered over a large geographic area, and is carried out mostly at a small scale in ponds and tanks. Though the fresh water aquaculture has moved from a traditional backyard activity towards a viable commercial practise, in many areas the gap between potential gap in productivity is almost 5 to 7 times. Fisheries offer diverse employment opportunities, self employment on a full time basis or as a part-time or occasional fishers. The value chain of inland fisheries generates ancillary employment both for the supply of material and equipment as well as in processing and trading in the fish markets throughout the country.

1.2 Madhya Pradesh that is located in central part of India and inland fisheries provides a major source of employment in rural areas. Practised in rivers, ponds and reservoirs, the fish culture employs range of culture-cum-capture techniques. Socially, there are traditional caste based fisher communities that have been carrying out commercial fisheries for generations. These communities are listed as scheduled caste in the state. The tribal fishers traditionally have been a fish hunter. It is only recently that this group has learned, and is adopting the practice of fish culture. Poverty is high amongst tribal communities and rural livelihoods opportunities are very limited.

1.3 The climate assessment reports increased uncertainty in prediction of rain, decrease in number of rainy days, increase in intensity of rainfall and extreme rainfall events, and increase in intensity of storms and monsoon depressions. Fish farming is a climate sensitive activity. Fish reproduction and growth are affected by temperature, rainfall and hydrology. Small fish farmers conduct fish culture on small ponds that are susceptible to drying up faster thereby shortening the growing season and adversely affecting production of fish. Intensive rainfall pattern increase the frequency of pond inundation that causes loss of fish stock. Delayed rainfall, delays the introduction of fish seed that shortens the growth period further decreasing the productivity of fish farms. Non climatic factors that include lack of access to market and financial infrastructure and low access to insurance schemes add to their vulnerability in practicing productive fish farming.

2.0 Project Description

2.1 The proposed project is located in three districts of Madhya Pradesh, namely Dhar, Jhabua and Alirajpur. These districts fall within the same agro climatic zone that is identified as the Jhabua Hills. The small farmers in these districts are faced with uncertain rainfall patterns, decrease in pre and post monsoon rainfall, rising temperature, and shifting rainfall patterns and have explored small-scale fish culture as a viable livelihood option.

2.2 The overall purpose of the project is to make the small scale inland fisheries sector of Madhya Pradesh more climate resilient and to enhance the adaptive capacity of fish farmers and their livelihoods. The project aims to achieve this by increasing the water storage capacity in fish ponds, by improving the capacity of the poor and marginalised farmers to engage in climate smart aquaculture

practices, by raising the awareness of climate change and its impacts, and by disseminating adaptation strategies for small pond aquaculture.

2.3 The project will work with 60 existing ponds located in the project districts (20 ponds in each district). These ponds will be selected and finalised through a process of geo-hydrological assessment and in consultation with village communities. The project has been designed to be implemented over a three year period and will be implemented by a field team that will be placed in each of the three districts.

3.0 Project Components

3.1 The project presents four components, namely, the adaptive measures to address rainfall variability; building resilience through adaptation of climate resilient technology; building climate resilience through enhancement of adaptive capacity; and knowledge generation and management.

3.2 Component wise project activities have been designed as follows:

Component	**Activities**
Component 1 Adaptive measures to address rainfall variability	1.1 Protocol for prioritising rural ponds (less than 10 ha) for inland fisheries developed and implemented
	1.2 Modified Pond design specifically for fisheries developed and implemented on selected existing ponds
	1.3 Insurance product developed that provides resources for making modifications to the technical design of the pond after the projected climatic changes take place
Component 2 Building resilience through adaptation of climate resilient technology	2.1Catchment Treatment of Ponds selected for intervention to provide climate resilience to small pond fisheries
	2.2Pond temperature regulating best management practices and greening the pond surrounds
	2.3Best management practices to decrease likelihood of oxygen deficiency along with use of oxygen tablets and solar powered aerators
	2.4 Composite fish culture practices with combination of intensive, semi intensive and extensive culture practices based on fish farmers capacity
	2.5Seed hatcheries (3 units) 2 nurseries (0.1 ha) and 1 seed rearing unit (0.1 ha) per district established
Component 3 Building climate resilience through enhancement of adaptive capacity	3.1Productivity of fish farmers enhanced towards optimal level of production through training and capacity building on climate resilient fish farming

Component	Activities
	3.2 Fish farmers supported through market infrastructure and value chain assessment done
	3.3 Fish farmers prepare business plan based on local market and existing value chain
	3.4Institutional support interventions so as to enable Local Governance Institutions and fish farmers to play the role envisaged in the legal framework of the State
	3.5Insurance coverage provided for risk minimisation of fish farmers of the project
Component 4 Knowledge generation and management	4.1District Steering Committee Meetings
	4.2Technical Advisory Group Meetings
	4.3 State Steering Committee
	4.4 Climate Change Observatory
	4.5 Action Reflection Meetings
	4.6 Systematisation
	4.7 Process Documentation
	4.8 Policy Briefs
	4.9 Training of Civil Society Organisation
	4.10 Learning Workshops
	4.11 Knowledge Products

4.0 Policy and Legal Context for Small Scale Fisheries

4.1 Madhya Pradesh has a Policy for Fisheries that was declared in 2008. The policy deals with the conduct of fisheries in large reservoirs as well as small scale fish farming. The policy lays down the principles on which the rights for fishing will be accorded to different water bodies in the state. The present proposal aims at working with small pond size of less than 10 hectares. According to the State Policy for Fisheries a pond with less than 10 hectare, lie within the territorial jurisdiction of the Gram Panchayat in which it is situated.

4.2 The orders issued in pursuance for the policy for fisheries in small ponds (less than 10 hectares) stipulate that the Gram Panchayats on the recommendations of the Gram Sabha will allocate ponds for fisheries that lie within their territorial jurisdiction. The pond will be given for lease, the period of which will be for 10 years, to the lessee. The lessee has absolute rights over the pond for the conduct of fish farming and these rights are protected by way of lease document that is signed between the Gram Panchayat and the lessee. The proposed project aims to work with small ponds (average size 4 hectares) and hence will be working within the framework of coordination with the Gram Panchayats for ascertaining leasing and other rights for fisheries.

4.3 The State Policy for Fisheries has not yet recognised the impact of climate change on fisheries in general and to the small scale fish farmers in particular. This is a major policy gap and the project will be able to generate data and experience that has the potential to feed in to policy enrichment and incorporation of climate change factors in to state Policy for Fisheries.

4.4 The rights over ponds for fisheries and the catchment area for fisheries are governed by the Land Revenue Code, in case of land belonging to Gram Panchayat, and the Forest Conservation Act in case the land belongs to the Forest Department. The former defines the rights over commons that are available for the village community and the latter lays down the basis on which catchment treatment works will be undertaken on forest land. The proposed project will observe the provisions of both these acts in ensuring access to commons for the members of the village community.

4.5 Two acts that also impact the project activities are the Wildlife Protection Act and the Biodiversity Act. The former prohibits uprooting natural habitats and protection of endangered species and places restrictions on the conduct of livelihood activities in protected area. The latter lays down the process and the procedure through which the bio diversity of a village will be recorded. The state is empowered to restrict the conduct of research or any such activity that poses threat to the bio-diversity of an ecological unit. The project adheres to the provisions of the act as it will not operate in a protected area and has identified Species and Habitats as one of the issues for ESI Screening at the sub-project level (that is village level). The bio-diversity of the area will be protected through a systematic assessment during the preparation of sub project, ESI Screening and through extensive consultations with the village community in the selection of species for plantation in the catchment area.

4.6 Madhya Pradesh Panchayat Raj and Gram Swaraj Act lays down the principles on which the Gram Panchayat will operate. There are specific provisions for areas that are predominantly inhabited by tribal communities and are listed as Schedule V in the constitutions. The three districts proposed by the project are listed in the Schedule V area and hence the special provisions pertaining to Schedule V area will apply for the project.

4.7 The special provisions for Schedule V areas lay down that the Gram Sabha (village assembly) has the power to determine the manner in which and the purpose for which the natural resources of the village will be used. This implies that it is the Gram Sabha that will recommend a pond to be used for fisheries; recommend the names of beneficiary(ies) that will practice fish farming in the pond; and approve the catchment treatment plan for the common land in relation to the pond. These provisions are mandatory and the project has built in the processes of consultations and approvals from the Gram Sabha for the project activities.

5.0 Environment Impacts

The objective of assessing potential environment effects is to identify issues and plan for actions to avoid adverse impacts and enhance environmental benefits from the project. The direct positive environmental effects are on soil, vegetation, and natural habitats. The adverse environmental impacts are on water resources and on quality of water in ponds. The waste generated from the project activities especially the plastic bags in which the material is carried is another environmental nuisance that needs to be addressed by the project. For the human habitation the project does not disrupts any of the services or conduct of livelihood activities. In fact livelihoods will gain with increased availability of fuel and fodder supply for the human settlement. The adverse impact on public health will have to be dealt with by the project so as to minimise risk of vector borne diseases.

The specific environmental effects from the project activities are given in the following paragraphs:

5.1 Species and Habitats

5.1.1 The project will work on existing ponds and in the catchment area of these ponds. The activity entails deepening of the pond and clearance of bushes and other similar vegetation around the pond that inhibit conduct of productive aquaculture. Since aquaculture activities are carried out in these ponds there is low probability of the existence of habitats of water birds and migratory birds as well as other aquatic life. Similarly a large proportion of the catchment area will be already subject to regular human and agriculture activity and there is less likelihood of existence of wildlife habitats and flora and fauna. There are no specific species listed for the region nor any critical habitats have been identified.

5.1.2 The impact on habitats and species as a result of project related activities will be low and localised and will not affect the ecology of the region. On the other hand deepening of the pond and plantation of localised species of trees and grasses in the catchment will enrich the local ecology and both the aquatic and the avian life is expected to flourish.

5.2 Biodiversity

5.2.1 Loss of some aquatic species is inevitable as the project will clear the pond sites and remove aquatic species that harm the conduct of productive aquaculture. However since the ponds sites are small these loss of species will be localised and will not affect the biodiversity of the region. Even the adoption of clustering approach (for the pond sites) will lead to the selection of a limited number of pond sites and catchment areas and hence the impact on biodiversity of the region will be low.

5.2.2 The project will not be introducing any exotic or invasive species either for aquaculture or in the catchment area. This strategy will strengthen and support the existing biodiversity at the micro level. The process of community consultations to identify species for plantation in the catchment will further lend strength for the biodiversity conservation of the area.

5.3 Soil Erosion

5.3.1 The topography of the project area is undulating and in the absence of vegetative cover the rate of soil erosion is high. The rate of erosion is further intensified when there are agriculture operations and other human activity that are carried out in the catchment area as these activities loosen the top soil that is further subjected to erosion. The erosion of soil increases the silt load to the pond increasing the rate of sedimentation and affecting the productive life of the pond to conduct fisheries.

5.3.2 The project aims to undertake measures to arrest soil erosion. These measures include making of field bunds, contour trenching, gully plugging through use of loose boulder small check dams, and plantation of trees and grasses to provide vegetative barriers to the running of water .As the project will adopt in- situ conservation measures the likelihood of soil erosion on account of making of contour trenches and construction of gully plugs using loose boulder check dams is not likely to take place.

5.3.3 The net impact of catchment treatment will be positive as the structureswill arrest further erosion of soil and decrease the rate of silt load to ponds. The positive impact will be further supported through plantation of trees and grasses in the catchment area that will act as soil cover in dissipating the impact of rain as it will fall on groundas well as wind breakers.

5.4 Water Quality

5.4.1 The quality of water will be affected in three ways: one, chemical quality of water on account of use of fertilisers and pesticides by the farmers in the catchment area; two, the decaying organic matter that will increase with greening of pond surroundings; three, physical quality of water as it flows from the catchment to the pond especially during monsoon months.

5.4.2 Though the rate of fertiliser and pesticide use in the project districts is well below the state and national average, yet the fact that the farmers have adopted the practice of use of chemical inputs make the impact on quality of water real. As the catchment treatment plan will be implemented and the farmers will find increased moisture in their farm lands they may be tempted to intensify agriculture through greater use of chemical fertilisers and pesticides. This may increase the impact on quality of water flowing in to pond and adversely impact the quality of water for conduct of fisheries.

5.4.3 Increased plantation in the catchment area and greening of the pond surroundings will increase the volume of decaying terrestrial vegetation that will find its way to the pond. Increased supply of decaying vegetation will increase the nutrient supply in water and promote algae bloom in pond. This in turn will lead to higher demand for oxygen and adversely affect aquatic life.

5.4.4 With the implementation of catchment treatment, the physical quality of water flowing in the pond during monsoon months is likely to be better. This will be on account of decrease in soil erosion, increased filtration and greater in-situ soil conservation and hence the water that flows to pond will lead to decrease in the rate of sedimentation and silt formation in the pond.

5.5 Soil Disposal

5.5.1 The project will work only with existing ponds. This implies that there will not be large- scale displacement of soil on account of excavation and in developing access to the pond site. However there are two project activities that will lead to displacement of soil: one, during deepening of pond that will excavate a large volume of silt; and two, in the implementation of soil and moisture conservation works that will include construction of field bunds, contour trenches and gulley plugs.

5.5.2 The existing practise in the region is to use the de-silted soil on farm lands as it adds to the productivity of land. The farmers aspire to access such soil and often bear the cost of transporting such soil to the lands. The project aims to facilitate farmers in the catchment area to use the soil excavated in the de-silting and pond deepening process on their farm lands.

5.5.3 The catchment treatment plan is based on the principle of *in-situ*soil conservation. The field bunds will be constructed from the existing soil in the fields and will be compacted through plantation of grasses. These works are not likely to displace as whatever soil excavated or displaced will be used locally for construction of structures and does not pose the problem of disposal.

5.6 Water Resource

5.6.1 Ground water will be impacted as the volume of water stored in pond increases. The positive impact will also be on account of increased moisture conservation in the catchment area which will bring in changes in the catchment infiltration. Though the average size of pond is small (4 ha), yet the raised water levels and infiltration will have impact on localised water table upstream and downstream.

5.7 Waste Disposal

5.7.1 The project activities especially related to construction of waste weir will use cement and will generate waste by way of cement bags. Similarly, the transportation of fingerlings is done in plastic bags which will another source of waste that will be the result of project related activities. The transportation of fish to the markets is undertaken either in gunny (jute bags) or in boxes made from thermocol (polystyrene). The nursery saplings for trees are transported in plastic wrappings and grass seed in plastic or jute bags.

5.7.2 Disposal mechanisms for non-degradable waste will be incorporated as part of project activities else the countryside will be littered with plastic and similar other waste posing threat to animals and adding to the plastic heaps in villages.

5.8 Public Health

5.8.1 Increased water retention increases the risk of vector borne disease in the project villages. Since the settlement structure is based on hamlets the occurrence of these diseases will not take epidemic form but the potential that it poses as a threat to public health has been identified.

5.9 Landscape

5.9.1 The project will have a positive impact on the general landscape of the area as it will not only green the pond surroundings but will also increase the vegetative cover of the catchment area and thereby enhancing the aesthetics of the village landscape in general.

5.10 Physical and cultural infrastructure

5.10.1 The tribal community in the project area has traditionally been animistic and have their respective localised scared areas and places of worship. These areas are socially and physically protected and will not be available to the project for catchment treatment works.

6.0 Social Impacts

The social impact Screening has identified potential issues that can dilute any negative impact of project activities and enable development of management strategy to address these issues within the project frame. On the positive side, the project targets the vulnerable groups in terms of primary and secondary beneficiaries and in no way leads to loss of agriculture land or poses restrictions for the access and use of commons or causes displacement of human habitation. The project does not violate any human rights and seeks to provide equal opportunities in access and benefits from the project. The issues that need to be addressed are related to rights of workers that will be engaged by the project and especially creation of facilities that will make access easier for the utilisation of women labour.

6.1 Vulnerable Groups

6.1.1 The social composition of the project area comprises of primarily tribal communities that predominantly belong to the Bhils and the Bhilala tribal groups. The tribal community is vulnerable on account of lack of access to resources, lack of education and on-going poverty and due to the fact that they have not had adequate opportunities to develop into a prosperous farming community. The project will target members of the tribal community as its primary beneficiaries and the community will gain in terms of improving its access and control over natural resources and through gain of skills and knowledge in the conduct of fresh water aquaculture.

6.1.2 The project districts have long known the presence of traditional fishermen communities. These communities have been listed as scheduled castes and they too fall within the marginal and vulnerable groups. However, the project area falls under Schedule V of the constitution that provides special powers to the tribal communities in terms of priority and right of first use of natural resources. The traditional fisher folk are the suppliers of nets, technical knowhow and provide labour during harvesting of fish. In addition they are involved in processing, storage and trading in fish in the local markets. The traditional fishermen communities will gain as secondary beneficiaries as there is local growth in fishing activity in the region.

6.1.3 The project will have a positive social impact on the vulnerable communities in the districts.

6.2 Loss of Agriculture Lands

6.2.1 The project will not be constructing any new ponds. It will work on the existing pond sites. There is no likelihood of loss of agriculture land on account of modification and deepening of pond design.

6.2.2 The catchment treatment plan will include works on agriculture lands as well. These works will be mostly in the nature of constructing field bunds on these lands. The loss of agriculture lands on account of field bunds will be minimal that will be adequately compensated by increased productivity of land due to soil and moisture conservation.

6.3 Access and Use of Commons

6.3.1 Project targets ponds that are situated on Gram Panchayat lands. In addition, the lands in the catchment area will also comprise of common land that is used for grazing of animals, collection of fuel wood, and water for animals and other domestic purposes. These common lands are governed by the provisions of the Madhya Pradesh Panchayat Raj and Gram Swaraj Act 1993. The act empowers the Gram Sabha (village assembly) in determining the use of natural resources (including pond) that are located on Gram Panchayat land.

6.3.2 The project aims at increasing the productivity of the commons: deepening of ponds will increase its water retention capacity increasing its potential for higher levels of production of fish; plantation of trees and other vegetation will increase the availability of fuel wood and fodder for households and animals of the village; and in-situ water conservation will improve the water table and increase the availability of water in shallow wells.

6.3.3 Project will develop catchment treatment plans and allocation of pond for fisheries in consultation and with the consent of the Gram Sabha. This will be a participative exercise that will discuss the issues of access to common post implementation of catchment treatment plan. There is no likelihood of denial of access to and use of rights of commons to the households of the village as a result of project activities.

6.4 Workers Safety

6.4.1 Workers will be engaged for de-silting and deepening of pond; in the construction of waste weir; for the execution of catchment treatment works. Major part of the works will entail manual labour though there may be need to use machineries for excavating pond and for transportation of stones for construction of loose boulder check dam.

6.4.2 The safety issues of workers include injuries from sharp edged stones; safe use of machinereis for excavation; and bites from snakes and scorpions. Protocols for engagement of certified machinery and operators and safety measures for earthwork excavation will be built in within the project processes to prevent risk to worker's safety.

6.5 Access and Equity

6.5.1 The project adopts an approach of geographical clustering for the final selection of pond sites on which the project activities will be implemented. The clustering will imply a spread of targeted ponds over an area so that the same can be managed and monitored within the given resources. Such approaches often tend to focus on road and easy to access sites and do not work in remote locations. The project will not select more than one pond from a village so that it works in at least twenty such villages in each district. The clustering approach is thusequitable for selection of ponds and does not reject any pond only because it is inconvenient to cover or manage.

6.5.2 The project adopts an approach that provides equal access to all the members of the village for the selection of beneficiaries for fish farming; for engagement as labour on pond site and in implementation of catchment treatment plan; for hiring of vehicles for transportation of boulders and other material; and for hiring of machinery for excavation of earth. The project will conduct rigorous and informed consultations and participation of the members of the village assembly. The final decisions of these consultations will be passed as resolutions of the Gram Sabha and will be recorded in the minute register of the Gram Sabha for future references. The project is inclusive and creates equal opportunities for the households of the village to participate in project activities.

6.5.3 The project does not restrict access to basic health services, clean water and sanitation, and education. The activities of the project do not impede access to energy, housing, safe and decent working conditions, and land rights. These rights are recognised by the project and are respected through the processes that it aims to implement as part of project activities.

6.6 Human Rights

6.6.1 The project does not affect the life and liberty of any individual or group. Neither does the project discriminate against any particular community or group or persons on grounds of gender, caste, ethnicity, ability or birth. The project upholds the fulfilment of the human rights of the villages and the target groups that it seeks to work with.

6.6.2 The project does not violate any of the basic human rights that are available to all human beings.

6.7 Labour Rights

6.7.1 The labour rights in the context of the project include: determination of work and adherence to minimum and time payment of wages; hours of work and their timing based on season; rest and worksite facilities; injuries and their compensation; participation in planning; child labour; and grievance redressal system.

6.7.2 The project will work within the framework of the labour laws that are applicable to any site that employs casual labour. The wages will be determined on task allotted and the wage rate will be calculated on the basis of prevailing minimum wage rate for the task. The compensation in case of injury will be based on the prevailing provisions of the law that is applicable to employment of casual

work force. The record of work done for each labour engage will be maintained and the wages will be paid weekly preferably in the bank account of the labourer. The hours of work and the timing of the working hours will be determined in consultation with the labour and the prevailing practices in the area. Resting place with shade, facility for drinking water, pre-determined resting period, presence of and access to first aid box will be available at all working sites in the project.

6.7.3 Engagement of labour and their deployment will be in consultation with the members of the Gram Sabha. Positive discrimination in favour of women will be used to provide fair and equal opportunity to women who seek employment as labour and gain from the wages earned by her.

6.7.4 Project will not engage child labour in any of its activities. The prohibition of child labour will be part of the agreement with the fish farmer beneficiaries and will be a non-negotiable provision of the agreement.

6.7.5 Work sites will display the person (with name, designation and number) to whom the labour and employment related grievances can be addressed. The grievances can be in writing or in oral form in which case they will be recorded by project functionaries.

6.8 Women and Gender Empowerment

6.8.1 Catchment treatment will increase the availability of fuel wood and fodder for the village. Women will gain as it will reduce their drudgery of securing the same from far off areas. Increased availability of fish will be an additional source of nutrition for the family that will improve the nutritional status of women and children of the family.

6.8.2 Women are not directly involved in the production and harvesting of fish. They will lose out in terms of access to alternative sources of income if they are not associated within the value chain of fisheries and are not linked to formal and non-formal institutions that are engaged in fisheries. Project activities create equal opportunities for women to gain in terms of skills, knowledge and experience of conducting aquaculture activities. Directly targeting women for training, information dissemination and membership in groups engaged in fisheries will empower women and create base for gender equity in fish farming.

6.8.3 Women's interests and gender equity will have to be implemented in determination of wages for women. The principle of equal wages for equal work will be rigorously implemented in all project related payments. To provide equal opportunity of women with small children who seek employment in project related works, the practice of MGNREGS of providing for mobile crèche will be adopted by the project. These measures will ensure that women are able to get equal benefit from the project related activities.

6.9 Involuntary Resettlement

6.9.1 The project will work with existing ponds only. The project activity seeks to modify the pond in terms of its depth and de-siltation. The project will not increase the size of the pond. In such cases there will be no displacement and hence involuntary resettlement will not be required.

6.9.2 The catchment treatment plan does not include relocation of any household. It is based on the principle of in-situ conservation and hence will not cause any displacement. Thus the project will not require any involuntary resettlement in the project area.

6.9.3 In case the project is likely to lead to involuntary resettlement of any household, the site will be dropped and an alternative pond site will be selected.

6.10 Irrigation Infrastructure and Practices

6.10.1 The project does not propose to select ponds that are being used for irrigation purposes. In this it avoids a potential area of conflict between the agriculture farmers and fish farmers.

6.10.2 The project will not undertake any work on the irrigation infrastructure as part of the catchment treatment plan. The present irrigation practices in the catchment area will be assessed in terms of their impact on soil erosion and carrying of silt load to the pond. The consultations with farmers will seek to develop such practices that prevent or minimise the silt load to the pond.

6.10.3 The project will not have any impact on irrigation infrastructure.

6.11 Vehicles and Equipment during Construction Activity

6.11.1 The project may have to use heavy vehicles of equipment during the construction phase either at the pond site or in the catchment area of the pond. The impact of these vehicles and equipment on the pond will be assessed during the screening process.

6.11.2 The quality of vehicles and equipment in terms of use of fuel and its emission and leakage will be assessed so that there are no leakages of these chemicals in the water or in the catchment area of the pond..

6.11.3 The workers employed on pond site and the catchment area will be primarily from the village and there is no likelihood of creation of camps at the construction sites. However, in cases where the workers employed under the project are from outside the village the project will make arrangement for transportation of workers to the site and not allow camps to be set up near or around the construction sites.

7.0 Environment and Social Risk Management Plan

7.1 Safeguard and Screening Procedures

7.1.1 Each of the pond sites selected will constitute a sub project within the proposed project. Each of the 60 sub projects will thus undergo a thorough environment and social impact screening procedure.

7.1.2 The project will have three layers of environmental safeguards to the project and the sub projects that will be developed there under:

(a) Adoption of General Environment Policy by the project related to species and natural habitats; bio diversity; physical and cultural infrastructure; and forests as follows:

Policy Issue	**Project Guideline**
Natural Habitat	The Project will not fund a sub project that are located within or that encroach in to any declared or proposed protected area of natural habitat or does not amount to conversion of natural habitat to other purposes.
Forest	The Project will not fund sub projects that encroach in to forest areas or lead to reduced access of the community to the forest areas.
Physical and Cultural Infrastructure	The project will not fund a sub project if it displaces, damages, makes it inoperable or inaccessible any of the resources of infrastructures that are of historical or cultural significance.
Bio-diversity	The Project will not fund sub project that will significantly reduce a particular species from the village.
Involuntary Resettlement	The project will not work at sites that will lead to or give rise to possibility of involuntary resettlement.

(b) Conformation of the sub projects ESMP to the technical guidelines and specifications. These guidelines will be adopted from the Integrated Watershed Management Project[33] for the development of catchment treatment plans and recommendations from the Working Plan of the respective Forest Department for selection of species for plantation in the catchment.

(c) Preparation and Screening of ESI Screening and ESMP prepared for sub projects. The ESI Screening and ESMP will be prepared and presented in the format given in Format 1 and 2 of this document. Each of the ESI Screening and ESMP will undergo a two layered screening process: one, an internal process to ensure that the documents are prepared in conformity to the guidelines. This screening process will score the sub projects on each of the environment and social parameters and based on the recommendations of the Technical Advisory Group the sub projects that fail the score will not be funded. The second screening will be undertaken by the District Steering Committee or a sub-committee nominated for the purpose.

[33] MP government has developed detailed technical guidelines for the implementation of Integrated Watershed Management Project in the state. These guidelines include works that will be undertaken by the project and the same will technical guidelines be adopted for such works.

7.2 Consultations and Public Disclosure

7.2.1 Consultations of key stakeholders will be undertaken as part of the finalisation of the Environment and Social Impact (ESI) Screening and Environment and Social Management Plan (ESMP) of each of the sub projects under the proposed project. This implies that ESI Screening and ESMP of 60 sub projects that will undergo the process of consultation.

7.2.2 The aim of consultations will be to disseminate information about the sub project; verify the identification of potential impacts (ESI) and their proposed mitigation plan (ESMP); verify the significance of the impacts and the mitigation measures; and allow the stakeholders to express their concerns and opinion about the project activities. The consultations will be conducted at three levels: one, at the village level; second, at the district level; and the third at the state level.

Village Level Consultation

7.2.3 The ESI Screening and ESMP of the respective sub projects will be placed in the meeting of the Gram Sabha for comments and approval.

7.2.4 A formal presentation of the ESI Screening and ESMP will be made at the Gram Sabha meeting. The presence of the persons whose land falls in the catchment area and the group of fish farmers will be ensured in these meetings. Given the low levels of literacy the presentation of the ESI Screening and ESMP will be undertaken orally and the comments of the members present will be recorded.

District Consultation

7.2.5 ESI Screening and ESMPs prepared by the project will be circulated to all the members of the District Project Steering Committee and the discussion on the Sub Projects will be a standing item on the agenda of the meeting of the respective District Steering Committees.

State Consultation

7.2.6 A consolidated statement on the ESI Screening and ESMP will be placed in the Technical Advisory Group. The members will be facilitated to undertake field and undertake sample verification of the sub projects prepared under the project. The TAG can also outsource sample verification to a consultant that will report directly to the TAG.

Public Disclosure

7.2.7 A copy of the ESI Screening and ESMP will be submitted to the office of the Gram Panchayat where it can be accessed by any member of the village for future references. The sub projects will form part of the documentation that will be in public domain and will be available at the district project offices for inspection with prior information.

7.3 Institutional Arrangements and Capacity Development

7.3.1 The institutional arrangement includes the distribution of roles and responsibilities in the preparation of ESI Screening and in the implementation of ESMP. The key players and their responsibilities will be as follows:

Organisation/ Designation	Responsibility
Senior Technical Memberof the Field Implementation Team at the district level	• Preparation of ESI Screening and ESMP through the process of community consultation and through walkthroughs in the village. • Coordinate with experts in geo-hydrology, agriculture engineering, forestry and aquaculture for the Screening of impact on soil and water. • Presentation of ESI Screening and ESMPs in the District Steering Committee. • Oversee implementation of ESMP that will be undertaken by Junior Technical members and Field Associates.
Junior Technical Member and the **Field Associates**of the Field Implementation Team at the district level	• Assist the Senior Technical Member in the preparation of the ESI Screening and ESMP at the village level. • Presentation of ESI Screening and ESMP in the meetings of the Gram Sabha. • Implementation of the ESMP at the village level.
Project Coordinator at the State level	• Monitor the progress and quality of ESI Screening and ESMP • Ensure that the protocol for the presentation and placement of a copy of the ESI Screening and ESMPs are placed in the Gram Sabha and the respective Gram Panchayat • Facilitate the district teams in the preparation of the ESI Screening and ESMPs by making available the services of experts as and when required by the team • Present the consolidated ESI Screening and ESMPs to the Technical Advisory Group
District Steering Committee	• Review the ESI Screening and ESMP by entrusting the review to a sub-committee constituted for the purpose that reports back to the Steering Committee • Comments, expresses concerns and give opinions on specific ESI Screening and the ESMPs
Technical Advisory Group	• Technical Advisory Group reviews ESI Screening and ESMPs. It can also undertake sample checks and give expert opinion on the quality of ESI Screening and the mitigation measures identified in ESMPs.
NIE (NABARD)	• Monitor and review the process of ESI Screening and ESMP • Review the prepared ESI Screening to ensure they conform to acceptable standards and quality

	• Sample check and verify the ESI Screening and ESMP in the project villages

7.3.2 The Job Descriptions and Performance Management systems of the respective project staff will include their responsibilities related to preparation of ESI Screening and implementation of ESMPs. Similarly, the Terms of References that will be developed for the District project Steering Committee and the Technical Advisory Groups will include their role and responsibility in ensuring that the project develops ESI Screening that includes environmental and social safeguards and implement ESMP to enhance the environmental and social impacts at the village level.

Capacity Development

7.3.3 The project will have in-house capacity in fresh water aquaculture, agriculture engineering and institution development. The capacity development of the staff on issues of Public Health; Workers Safety and Labour Rights; Gender Orientation; and Forestry need to be built to enable them to undertake ESI Screening and ESMP in the project villages.

7.3.4 The capacity building plan of the project staff will be as follows:

Description of Training	No of Training	Technical Assistance
Public Health and Water Borne Vector Diseases (2 day training on identification of risks and development of mitigation measures)	One	Public Health Expert and Expert in Environmental Sanitation
Labour Rights and Worker Safety (2 day training on identification of risks and development of mitigation measures)	One	Expert on Labour Laws; Occupational Safety; and Rights of the Child
Gender Orientation (2 day training on development of Gender perspective and Making Projects Gender Sensitive)	Two	Gender Expert
Forestry (2 day field training on the process of consultation and identification of plants, shrubs and grasses)	One	Forestry Expert with experience in PRA and Biodiversity issues

8.0 Monitoring and Reporting

8.1 ESMP will involve two layers of monitoring systems: Internal and External Monitoring process

:

(a) **Internal Monitoring Process**: The internal monitoring will be undertaken by the Project Executing Agency. Each of environment and social parameters will be monitored along with the implementation of their mitigation measures. The Executing Agency will submit a Compliance and

Impact Monitoring Report to the NIE every six months and the consolidated report will also be annexed in the Annual Report.

(b) **External Monitoring Process**: Conduct of Environment Audit and Social Audit will be carried out in sample villages every year to verify the implementation of ESMP and to report on the conduct of ESMP and its impact in the village. The Audit Reports will be shared with the NIE and a consolidated statement of these audits will be annexed to the Annual Report of the project.

9.0 Implementation Schedule

9.1 The implementation Schedule of the ESMP will be as follows:

Activities	**Time**											
	Year 1				**Year 2**				**Year 3**			
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**	**Q11**	**Q12**
Development of Technical Guidelines for the Project												
Capacity Building of Project Team												
ESIScreening of sub projects												
ESMP of sub projects												
Implementation of ESMP												
Monitoring and Reporting of ESMP												
Environment and Social Audit												

10.0 Cost for ESI Screening and ESMP

10.1 The preparation and implementation of sub project ESI Screening and ESMP will have costs that have been built in to the project budget. The cost implications and their source of funds will be as follows:

ESI Screening /ESMP related activity	**Source from where Cost will be met**
Capacity Building of Project Team	Will be absorbed in the Programme Execution Cost
Preparation of ESI Screening and ESMP	Built in the Programme Execution Cost
Screening of ESI Screening and ESMP	Built in to Project Activities Cost (Component 4)
Mitigation Measures	Built in to the Project Activities cost (Component 1 and 2)
Monitoring and Reporting	Built in the Programme Execution Cost

Conduct of Environment and Social Audit	Built in to Project Activities Cost (Component 4)

Format 1: Format of Sub Project ESI Screening

1. Project Description
1.1 Description of the proposed operation
1.2 Maps and diagrams of theproject site
1.3 Area that will be affected and impacted
1.4 Settlements that will be affected
1.5 Population that will be affected (attach list of households)

2. Baseline Condition
2.1 Description of existing environmental and social condition
2.2 Attach PRA maps and other data that has been collected

3. Impacts and Risks

Environment Impacts and Risks
The Screening will be in terms of (a) Direct Environmental Risks; (b) Direct Environmental Impacts; (c) Indirect Environmental Risks; and (d) Indirect Environmental Risks on the following issues.

3.1 Species and Habitats
3.2 Bio diversity
3.3 Soil Erosion
3.4 Water Quality
3.5 Soil Disposal
3.6 Water Resources
3.7 Waste Disposal
3.8 Public Health
3.9 Landscape
3.10 Physical and Cultural Infrastructure

Social Impacts and Risks
The screening will be in terms of (a) Direct Social Risks; (b) Direct Social Impacts; (c) Indirect Social Risks; and (d) Indirect Social Risks on the following issues.

3.11 Vulnerable Groups
3.12 Loss of Agriculture Land
3.13 Access and Use of Commons
3.14 Workers Safety
3.15 Access and Equity
3.16 Labour Rights
3.17 Human Rights
3.18 Gender and Women Empowerment
3.19 Involuntary Resettlement
3.20 Irrigation Infrastructure
3.21 Vehicles and Equipment during Construction Activity

4. Analysis of Alternatives

Description of alternatives that were identified and their Screening in terms of:

(a) Direct and Indirect Environment and Social Impact
(b) Opportunities for enhancing environmental and social benefits

5. Recommendations

Risk Management options in terms of:

(i) Preventing Risk
(ii) Avoiding Risk
(iii) Mitigating Risk
(iv) Transferring Risk
(v) Absorbing Risk

6. Process Note for the preparation of ESIScreening

6.1 Consultations held with different stakeholders in the community
6.2 Consultations held with women
6.3 Consultations held with Panchayat Representatives

Format 2: Format for Sub Project ESMP

1. Management Plan

Environment And Social Risk identified in ESI Screening	**Mitigation Measure**	**Implementation Schedule for the mitigation measure**	**Responsibility for execution of the mitigation measure**
Species and Habitats			
Bio diversity			
Soil Erosion			
Water Quality			
Soil Disposal			
Water Resources			
Waste Disposal			
Public Health			
Landscape			
Physical and Cultural Infrastructure			
Vulnerable Groups			
Loss of Agriculture Land			
Access and Use of Commons			
Workers Safety			
Access and Equity			
Labour Rights			
Human Rights			
Gender and Women Empowerment			
Involuntary Resettlement			
Irrigation Infrastructure			
Vehicles and Equipment during Construction Activity			

2. Consultation and Public Disclosure

The plan for consultation and public disclosure of the ESMP will be recorded here. The plan will be for:

(a) Consultations for preparation and implementation of ESMP
(b) Consultation with women of the village community
(c) Notification to village community when will the activities be implemented
(d) Disclosure of Monitoring and Sub Project Completion report

3. Monitoring Plan

The monitoring plan will comprise of the parameters for monitoring and the frequency with which the monitoring will be carried out. The recording and reporting procedures will also form part of the monitoring plan.

Mitigation Measure	**Monitoring Parameter**	**Responsibility for monitoring**	**Recording and Reporting Frequency**
Species and Habitats			
Bio diversity			
Soil Erosion			
Water Quality			
Soil Disposal			
Water Resources			
Waste Disposal			
Public Health			
Landscape			
Physical and Cultural Infrastructure			
Vulnerable Groups			
Loss of Agriculture Land			
Access and Use of Commons			
Workers Safety			
Access and Equity			
Labour Rights			
Human Rights			
Gender and Women Empowerment			
Involuntary Resettlement			
Irrigation Infrastructure			
Vehicles and Equipment during Construction Activity			

4. External Audit and Verification

4.1 Conduct of Environment Audit

4.2 Conduct of Social Audit

4.3 External Verification processes

5. Sub Project ESMP Completion Report