

Appraisal Report

**INTEGRATED MANAGEMENT PLAN FOR CONSERVATION &
MANAGEMENT OF PALA WETLAND IN MIZORAM (FOR THE
PERIOD FROM 2020-21 TO 2024-25)**

Submitted by

**ENVIRONMENT, FOREST & CLIMATE CHANGE DEPARTMENT
MARA AUTONOMOUS DISTRICT COUNCIL, SIAHA, MIZORAM**

To

**Government of India
MINISTRY OF ENVIRONMENT & FOREST & CLIMATE CHANGE
UNDER NATIONAL PLAN FOR CONSERVATION OF AQUATIC
ECO-SYSTEMS (NPCA)**

Appraised by



**HOUSING & URBAN DEVELOPMENT CORPORATION LTD.
March 2021
SALIENT FEATURES OF INTEGRATED MANAGEMENT PLAN FOR PALA
WETLAND**

1	Name of Wetland	<i>Pala Wetland</i>
	Wetland Type	<i>Permanent Lake</i>
3	Wetland Area (ha)	<i>Water body (Lake): 135 ha Catchment Area: 1850 ha</i>
4	Location	<i>District: Siahia State: Mizoram</i>
5	Name of Nodal agency for implementation of Management Plan	<i>Environment, Forest & Climate Change Department, Mara Autonomous District Council (MADC), Siahia</i>
6	Management Plan Period	<i>5 years during 2020-21 to 2024-25</i>
7	Date of approval by State Wetland Authority	<i>15.01.2021</i>
8	Major Components of the Management Plan	<i>i) Protection Measures ii) Catchment Conservation iii) Water Management iv) Biodiversity Conservation v) Sustainable Resources Development and Livelihood Improvement vi) Institutional Development</i>
9	Total Estimated Cost of the Management Plan as submitted by the Agency	<i>1240.19 lakhs</i>
10	Funds Available from Convergence / State Matching Share	<i>124.02 lakhs</i>
11	Funds requested from MoEF&CC	<i>1116.17 lakhs</i>
12	Total project cost eligible for funding under NPCA as appraised by HUDCO	<i>Rs. 796.515 Lakhs</i>
13	Total cost of Core Activities	<i>397.321 Lakhs</i>
14	Total cost of Non-Core Activities	<i>Rs. 399.194 Lakhs</i>

1. Introduction

India, owing to wide variations in rainfall, hydrology, physiography, geomorphology and climate, is bestowed with a rich diversity of wetlands, which play a significant role in providing ecological and economic security through their wide-ranging ecosystem services and biodiversity values. In these Guidelines Aquatic Ecosystems refer to wetlands including lakes. Notwithstanding the high level of dependence, wetlands have been stressed by a range of anthropogenic and non-anthropogenic pressures, such as conversion for alternate usages, land use change, fragmentation of natural water regimes, pollution, siltation, species invasion, over harvesting of natural resources, unsustainable tourism and climate change.

India is committed to conservation of wetlands. The Ministry of Environment, Forest & Climate Change (MoEF&CC), at its inception in 1985, identified wetland conservation and sustainable management as one of its important programming themes. India's assent to the Ramsar Convention in September 1982 provided an important backdrop to this decision. The Ministry established the National Wetlands Conservation Programme (NWCP) in 1986 to provide the overarching policy framework and financial assistance to the State Governments for implementation of site management plans. In 2001, the National Lake Conservation Plan (NLCP) was introduced to address pollution issues in urban and semi-urban environments through interception, diversion and treatment of pollution load entering lakes. Priority sites under the two schemes have been identified based on specific criteria laid under the two schemes. As on February 2019, over 180 sites have been prioritized for conservation and restoration. The Ministry has also designated 27 wetlands as being of international significance under the Ramsar Convention. In February 2013, considering the need for a common approach to the conservation and management of wetlands and urban and peri-urban lakes, the Govt. of India, decided to merge the two schemes into unified scheme entitled 'National Plan for Conservation of Aquatic Ecosystems' (NPCA) to enable the application of uniform policy and guidelines and promote an integrated and multi-disciplinary approach with a common regulatory framework.

Under NPCA, State Governments / UT Administrations can seek financial assistance from the Central Government for integrated management of wetlands. Financing shall be done on the basis of Integrated Management Plans (IMP). Each integrated management plan will identify a comprehensive set of activities that will need to be implemented to conserve and sustainably manage wetlands. The activities which do not have any alternate source of funding and fall within the list of identified core and non-core activities can be considered for financial support under NPCA. Overall, the core activities shall be allocated 75% of budget and the non-core activities may receive maximum of 25% of the overall allocation.

Environment, Forest & Climate Change Department of Mara Autonomous District Council (MADC), Mizoram has submitted a 5-year (2020-21 to 2024-25) Integrated Management Plan for conservation and management of Pala Wetland to MoEF&CC seeking financial assistance under NPCA. The MoEF&CC has forwarded the proposal to HUDCO for independent appraisal for funding support as per the requirement of NPCA guidelines, April 2019.

Brief description of Pala Wetland:

Pala lake is situated in Mara Autonomous District Council in the State of Mizoram. The lake is about 356 Kms from Aizawl, the capital of Mizoram and 87 Kms from Siaha and 5 Kms from the nearest villages Phura and Tokalo. It is the biggest lake and is natural fresh water lake in the State of Mizoram and plays important role in the ecological and economic security of the Siaha District.

It has been considered to be the life-line of the people of Siaha District due to its importance in their Socio-Economic and cultural life. The outflows of the Pala lake water and River Salyu with R.Tiko which was originated in the catchment area of the Pala wetland are the main water sources for irrigation and water supply for surrounding villages. The outflows of lake water can also be a Mini Hydro Power Generation for fringe village of the Pala Wetland. The population living around the lake is dependent upon the lake as the sources for their sustenance. The staple food of Siaha District is directly linked to the Pala wetland. The lake is very rich in biodiversity. The lake is surrounded / covered on the edge by many hydrophytes and the swampy areas with profusion of herbaceous vegetation as well as Grass, various species of beautiful ground and epiphytes orchids. A total of 75% of the catchment areas is covered with forest areas and 25% covered with woody forest interfaces with Bamboo brakes. It is a home to a range of Animals, birds, Amphibians and Reptiles. A survey has found more than 25 species of mammals, 120 species of Birds and 10 species of Amphibian and 22 species of Reptiles in the area. The area is also rich in butterflies with 38 species reported so far. The lake has also been the breeding ground of numbers of riverine fishes and continues to be a vital fisheries resource. It supports significant population of resident water fowl and some population of migratory birds. The Pala lake is one of the Eco-tourism potential areas in Mizoram due to unique and pristine in nature and is rich in Biodiversity. The Pala lake can be enjoyed by visiting the interesting places like Saphao at R.Kolodyne, Phura by(plain) which is the Rice bowl of Maraland and Myanmar border village Ralie and Tokalo Wildlife Sanctuary.

The total catchment area is approximately 18.5 sqkm. However, the Pala lake and its surrounding catchment areas is intended to be increased by the Council Authority and issued Pre-Notification. The final notification was awaited and if put into practice the total catchment will be increased to 24 sqkm.

The Lake is under stress mainly due to anthropogenic pressures. Deforestation and shifting cultivation and collection of minor forest produces in the catchment area has caused soil erosion resulting in increased lake siltation. The problem has further been aggravated due to prolific growth of floating weeds mainly water hyacinth. The lake suffers from both Natural and cultural eutrophication. Besides, the nutrient from the catchment areas, sediments which was carried by the stream and river discharges into the lake. In addition to the above threats, the encroachment in the lake by garden pass for farming and roads have gradually led to the shrinkage of the lake area. The combined threats of the above factors have given rises to various problems such as Decrease in the water holding capacity, Prolific Growth of aquatic weeds namely water hyacinth, Changes in water quality, Decrease in migratory and resident water bird's population, fish and other fauna productivity particularly endangered and endemic species and Loss of biodiversity.

The First Pala Wetland management plan was prepared in 2003 for period 2003-2004 to 2007-2008. During the period of 2015-16 to 2019-20, the Ministry of Environment, Forest & Climate Change, Govt. of India, has provided Financial Assistance of a total of Rs. 352.92 lakhs for Conservation and Management of Pala Wetland. As per the utilization certificates, the amount has been fully utilized for the purpose of expenditure on

Conservation and Management of Pala Wetland for which it was sanctioned. The present management plan is for next 5 years i.e. from 2020-21 to 2024-25.

2. Implementing Agency

Nodal agency identified for implementation of this Integrated management plan for Pala Wetland is Department of Environment, Forest & Climate Change, Mara Autonomous District Council (MADC), Siaha, Mizoram.

3. Management Plan and Its Objectives

Need for the Management Plan

Long term plan of the Pala Wetland was felt necessary for providing strategic and quality frame work for the management of wetlands resources. Likewise, it is also necessary to improve effectiveness of programme intervention and promote collaboration among the stakeholders. Considering this, the Pala Wetland Authority intends to propose the Management Plan of the Pala Wetland management for the next 5 years (2020-21 to 2024-25) to develop vision on promoting wise use of the wetland resource. The management plan will focus on atleast the following 6 objectives which have been identified on consultation with the stake holder (i.e. fringe village)

- 1) Wetland Biodiversity Conservation
- 2) Livelihood improvement
- 3) Institutional strengthening
- 4) Tourism development
- 5) Agro/Horti biodiversity conservation
- 6) An understanding of the habitat and species occurring.

Goal and purpose: The main goal and purpose of the management Action Plan of Pala wetland is the conservation of the lake and its catchment area and sustainable utilization of lake resources to ensure Socio-economics development of the fringe area, sound ecological basis and also promote ecotourism of the state and ensure maximum people participation in conservation of the area.

Benefit and Scope: When the wetland of Pala lake is well managed and its purity and sanctity is maintained by taking pre-emptive measures, it leads to the development of a well-established forest. A dense forest cover in and around the lake naturally acts as a sink for CO₂ and thereby purifies the quality of air and even water. Increasing the tree cover in the catchment area not only checks the soil from getting degraded but also provides a home to multiples species of Flora and Fauna. A forested catchment thus also maintains a perennial supply of water which can used by the local communities for domestic, agricultures and other needs.

Wetland protection and uses of resources sometimes appear to be in conflict, but promoting the wise use of wetland can solves the problem. Pala Wetland also face the challenge of sustainable development of wetland to greater or lesser extent. Improper use of the natural resources within the catchment area of Pala has endangered its existence. It is thus necessary to provide scientific guidance to managers and users of this wetland. The threats that adversely affect the priority wetland features may be broadly categorized as under.

- 1) Lack of Public awareness of the need for wetland conservation.
- 2) Insufficient for wetland conservation and management.
- 3) Insufficient Wetland research.
- 4) Lack of technology input for maintenance of eco-system.

Management Plan Objectives:

The objectives of the management Action Plan are as shown below:

- 1) Control on encroachment within and on the periphery of the lake. to ensure the wetland area is intact and not altered for Non wetland usage.
- 2) Setting out of the feeding channel and selective dredging of silted lake area to enhance water holding capacity and reduce silted load from the catchment area.
- 3) Control of soil erosion from watershed and degradation of Pala wetland catchment areas.
- 4) To protect and preserve the variety of species habitat ecosystem and crop diversity of the Pala wetland area and create gene pool of fauna and flora in the area to attract attention of conservationists.
- 5) To provide alternate income generation activities to the fringe communities.
- 6) To enhance the diversity of fish.
- 7) To promote eco-tourism in the region.
- 8) To improve ecological monitoring mechanism and research.
- 9) Ensuring people participation at all stages in Pala wetland development programme through various awareness programme.
- 10) Improve infrastructure in the management of the Pala lake.

4. Description of Wetlands Features

Location

Pala Wetland is located Long. 92°55'09.32" to 92°53'32.26"E and Lat. 22°10' 8.15" to 22°13'17.18" N. Pala Wetland is situated at about 356 Kms from Aizawl, the capital city of Mizoram and about 87 Kms from Siaha, the headquarter of Siaha District as well as Mara Autonomous District Council. Pala wetland falls under Phura Range, Environment & Forest Department, Mara Autonomous District Council. It is about 6 Kms far from the nearest village called Phura. The altitude of the area is 275-700 meters above the mean sea level.

Wetland Type and Extent

The Mizoram State has three types of lakes – valley lake, tectonic /landslide lakes and artificial reservoirs. Pala Lake, which is natural lake in depression in the hills may possibly be the combination of valley and tectonic lakes.

Wetland Type: Permanent fresh natural lake.

Lake Body Area: 1.35 sqkm; Wetland Area: 18.5 sqkm

Significant Inter annual changes in the Wetland: The Wetland complex is intact and no inter annual changes occurred.

Major changes in the Wetland extent in the last 20 -30yrs: The Wetland complex is intact and no major changes occurred during the last 20 – 30 yrs.

Catchment/Drainage Basin

- (1) Direct and indirect catchment of the wetland:** Direct catchments include the streams/rivulets coming especially from the western side of the lake near the Tokalo fair weather road. Some streams also approach from the northern side –like the Sakatla hill. Some rivulets even come from the southern side – the upper stream of Salyu River.

- (2) Geographical and geomorphological characteristics that have led to the formation of the wetland:**
 - (i) Geology and morphology:** Pala wetland is surrounded by the hillocks covered with lush and semi-evergreen forest. There are theories and beliefs regarding the origin of this Lake. While some believe that it was caused by Meteoritic impact subsequently filled up by the nearby stream and rivulets, other opine that it was formed by the tectonic process that operated in the area. Besides it also has its own legendary origin handed down from earlier times. Perhaps, a thorough study and survey of the lake and the nearby area may, one day be able to provide information leading to the specific conclusion regarding the origin of the lake.

 - (ii) Topography:** The area is surrounded by hillocks from all sides, east to west and south to north.

 - (iii) Drainage pattern:** Pala Lake (water) flows and meet Pala stream which originates from Sisaikhaohill near Vahai village. It flows towards north – west before making an abrupt right turn just to the north of Phura village, where it flows in the north – east direction. It then changes its direction towards north – west after passing Maisa village and continues till it joins the Beino River (R. Kolodyne). The total length of Pala River is about 15 Kms.

 - (iv) Soil types:** The soils in the wetland area are characterized by dark brown to yellowish brown in colour. The soils found are also strongly acidic, have clay loam surface and clay sub-surface. They are also well drained. Along the hill side slopes and hill crest / top, moderate to severe erosion fine loam mixed is found.

 - (v) Climate settings:** The area enjoys moderate climate owing to its Tropical location. It is neither very hot nor too cold throughout the year and the area falls under the south west monsoon. As such the area receives an adequate amount of rainfall which is responsible for a humid tropical climate characterized by short winter and long summer with heavy rainfall. During summer, the temperature could rise upto a maximum high of 34°Celsius and minimum of 19° Celsius and during winter it has a maximum of 24°Celsius and minimum of 8°Celsius. The temperature starts to fall down sharply from the month of November and it is minimized in December and January. January is the coldest month of the wetland area. The average rainfall varies from 1700mm – 3900mm per annum.

- (3) Present land use and land cover of the catchment and their implication for wetland:**

As plantations have been done along the catchment areas, the land cover has become thicker and thicker over the last few years. Major improvements have been made by the Forest Department and these have noticeably changed the overall landmarks and the sight also.

- (4) **Major development activities and their impacts:** Several projects have been carried out by the Forest Department. Some of them are – Horticulture plantations, Gap filling plantation, tunnel plantations, Hillock plantations, etc. Indigenous species of seedlings have been used for plantation. Some of the tree species are – *Terminaliamyriocarpa*, *Bischofiajavanica*, *Micheliachampaca*, *Dilleniaindica*, *Ficusspp* etc. These plantations have a great impact. They make the weather cooler and retain stream water to a large extent. The whole wetland area is demarcated by Iron pillars.

Wetland areas-land use and land cover data for the wetland

There are 7 villages in the fringe areas of the Pala Wetland proposed project area with a total of 827 households having 4556 population, about 78% of them are Jhum or Shifting cultivators. These practices are identified as one of the most detrimental factors within the catchment area which leads to heavy siltation in the lake. Main crop raised in the Jhum is paddy along with other crops like Maize, Pulse, Gourds, Mustards, Cucumber, Ginger etc. Due to the high value Biodiversity of the area, dependency of the fringe people on the forest biomass resources for meeting their daily needs and other livelihood form is depleting and degrading the area. Besides, the collection of daily needs from the forest is traditionally free and there is strong feeling of ownership in a stubborn manner. Collections of Non- timber forest products (NTFP), Bamboo, Pales, thatches etc., are some of the traditional practices. Moreover, traditional fishing was being practiced before but, after the lake having been taken over by the Forest Department, these problems have been curbed. There are no major and minor industries in and around the Wetland area. Land use and land cover: Forest (75%), Plantation (25%), Agri (0%), Settlement (Rural) (0%), Settlement (Urban) (0%), Industries (0%).

Significant inter annual changes in the Wetland

Significant changes have been done by the department. Over the years, plantation has been carried out in the Jhumland area on the identified site throughout the wetland area and these have changed a lot about the outlook of the entire wetland. Construction of Small-scale Engineering structure such as Gabion box, Anicut and Silt detention structure, to control silt entering into the lake have improved the quality of water and also increased the volume of water.

Hydrological regimes

Hydrological regime refers to characteristics of water body which are repeated in time and space, variability in its discharge through the courses of years with response to precipitation, temperature, evaporation and drainage basin.

(1) Major sources of water inflow and outflow from wetland

Pala Lake is having spring natural water sources. There are seven streamlets joining the lake, out of these two streams are perennial. These streams increase

the inflows of water in the lake and the water level also increases, especially in monsoon, from the month of July to September. River Pala (i.e. Outflows of Pala Lake water) is very important considered from Agricultural and Horticulture point of view since it has created a vast alluvial flood plain along its course. The water level is almost similar in the whole area of the lake. The Average depth of the lake is 18 mts.

(2) Major sources of sediments into the wetland

Soil erosion due to degradation of catchment area, traditional method of land use by jhum cultivation and deforestation carries the loose soil along the catchment areas/stream. These activities cause a lot of sediments to flow to the wetland areas. Modernization, especially fair-weather road constructions and maintenance of it is one of the main causes of accumulation of sediments into the wetland.

(3) Inundation regime-inundation pattern

The lake and sources of streams tend to be big and large especially during monsoon. Monsoon starts from June and usually ends in September. The inundation gradually decreases and finally some streams tend to dry up during dry season of February to April. The depth of the lake also decreases for approximately upto two to three feet.

(4) Trends in water holding capacity of decline

As a result of siltation, prolific growth of weeds, water holding capacity of the lake has considerably decreased.

(5) Water quality and pollution status

Assessment was carried out during 25th – 29th April 2013 in which the water quality was studied. Water quality study was done by Ms. Lalnunsangi Research Scholar Department of Environmental Science, Mizoram University Aizawl. The Water sample was taken from five sites in which the lake was divided into five sampling sites. Site-1 (East), Site-2(North, Site-3(West), Site-4(South), Site-5 (center of the lake). The water quality was found within the limits of the standards given by various scientific agencies except for BOD in Site 3,4 and 5 (3.4, 3.2 & 5 mg/l respectively) which indicate that the water is being polluted. The water quality is within the limits but still it can be said that it is not much as good as expected. The range of values of major water quality parameters measured at locations /sites are given below:

Temperature	: 30.7 – 32/1 °C
pH	: 7.9 – 8.1
TDS	: 50.7 – 52.7 ppm
Dissolved Oxygen	: 5 – 7 mg/l
BOD	: 1.8- 5 mg/l
Nitrate	: > 47 mg/l

(6) Water use pattern within the water catchment and implication for wetland

Outflows of the Pala lake water join Pala River and make one of the most important tributaries of the main river. Outflows of Pala water can be developed

with irrigation facilities so that more than 85% of the flooded plain area will be irrigated and the areas could turn to be the rice bowl for the entire district.

Biodiversity

Pala Lake is very rich in Biodiversity, there are many species of Flora, Fauna and species. Birand and Pawar (2001) has documented a survey on Amphibians, Reptiles and Avifauna. They recorded approximately 70 species and they found that the forest is rich in palm, rattans, dense cane brakes and reeds along the lake margin. Roy et.al (2007) in www.Samrakshan.org. studied the Flora and Fauna of Pala lake biodiversity in which they recorded 136 species of avifauna from the lake and its surrounding forest spread across three seasons.

Eco-system service

Pala Lake and its surrounding catchment areas have provided good service to human kind as well as wild animals in many ways. It is a home to ranges of Animal, Birds, Amphibians and Reptiles. Pala Lake water is the fresh water source to the fringe villages for drinking and is also main water source of irrigation for Horticulture and Agriculture. There are many species of fruit and food plants which is extensively consumed by the local community. Apart from these big trees and Bamboos within the Pala catchment area is the main sources of materials for house construction and palm leaves are used for roof purpose. Pala Lake produces many species of fishes which is the main sources of fishes to the community since there is no big rivers surrounding the Pala Lake areas. Pala wetland is one of the recreation center of eco-tourism potential areas in Mizoram for last ten years. Pala Wetland has many visitors such as from local communities and other District of Mizoram and also outside Mizoram.

Socio Economic and livelihood

There are 7 fringe villages within the Pala Wetland surrounding, most of the population are practicing Jhuming. After implementation of National Conservation of Pala Wetland in 2005, dependency of local community on forest resources has increased to a greater extent, which include collection of Minor forest produces, fishing, poaching etc. to meet their daily food, collection of timber, Bamboos, Thatches, Palm leaves, fire wood for construction of their homes and cooking purpose. After imposition of wetlands Rules 2007, though destruction of wetland catchment area has slowed down but it has led to conflict between the wetland authority and the communities of fringe villages. Unless alternate sources of income and energy generation are provided to local communities to improve their livelihood, Pala wetland and biodiversity cannot be protected for long.

5. Institutional Arrangement

The sustainable management of Wetlands depends on the existence of proper institutional framework. The current institutional arrangement combines variety of institutions raising from village level institutions to government departments and NGOs of the local communities.

Government department such as Ministry of Environment, Forest & Climate Change, Fishery Department and Forest Department/Tourism are key stakeholders among the

government agencies that inter face directly with conservation and livelihood issued within Pala wetland and their thematic area of works and how this stake holders converge within Pala wetland.

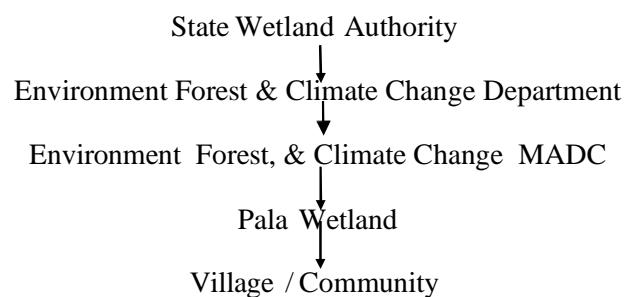
There are no NGOs directly operating in the Pala Wetland area. In the zone of influence social group such as youth and women are referred to as NGOs.

The Village Councils are the institution that have a mandate to influence land use and also have wide spread public support and legitimacy. VC's are readily viable as institution of governance which with appropriate capacity building and legislative empowerment can play the role the first tier of governance and as envisaged by the constitution.

The Major law and regulation related to wetland, access and use of wetland recourses and biodiversity include Forest (Conservation) Act 1980, Wildlife Protection Acts 1972, MADC Forest Act 1982, Biological Diversity Act 2002 and Wetlands (Conservation and Management) Rules 2017.

In the context of law, regulation and policy, the project under NPCA would need to develop facilitative frameworks and forums that enabled varied interests to come together. The catchment area of Pala wetland and within zone of influence, harnessing efforts from Forest Department (MADC) with active participation of village council (communities) is imperative in management and decision making.

The concerted efforts would be coordinated by the state Wetland Authority in such a way that legal spaces and areas of mismatch with respect to sustainable management of Pala Wetland could be mitigated. Hence an institutional arrangement for Pala wetland Management may be developed as below-



The Nodal Agency Responsible for managing Pala Wetland:

The Environment, Forest and Climate Change Department, Govt. of Mizoram is the Nodal Agency and MADC Environment, Forest & Climate Change is the implementing Agency for managing Pala Wetland under NPCA scheme. The thematic area of work of the Nodal Agency and implementing Agency are Protection measure, Water Management, Catchment

area treatment, Conservation of Biodiversity, Eco-development within zone of influence, Fisheries department and Eco-tourism.

Rules of Village Council (VCs) & NGOs:

In the villages within the zone of influence of Pala, there are five village councils. The VCs are reasonably well functioning institution of grass root democracy. The role played by the VCs could adequate them to the role assigned to the panchayats as part of 73rd amendment to the Indian constitution. Most activities and schemes of government development are implemented through VCs though the VCs implement various schemes, they have little or no role in planning. Therefore, the capacities of VCs are somewhat limited in visioning planning and implementing programme. Having said this it must be remembered that these are the only institutions that have mandate to influence land use and also have legitimacy, public NGO’s support. The role that could be played by VCs and NGO’s with respect to the sustainable management of Pala Wetland and Management of biodiversity with the zone of influence given in **Table Below**.

Thematic Area	Legal Frameworks
Village Council	1) Distribution of Jhum land outside Pala wetland.
	2) Conservation and Management of supply and safety reserves.
	3) Prevention of forest fire
	4) Environmental management as envisaged in the 73 rd constitution amendment Act
NGO	1) Conservation Education
	2) Capacity Building among Village communities.
	3) Participation in conservation related project implementation

Approval of State Wetland Authority Mizoram

The Integrated Management Plan of Pala Wetland for the period 2020-21 to 2024-25 has been approved by State Wetland Authority, Mizoram and its technical committee on 15.01 2021.

6. Components of the Management Plan

The Integrated Management Plan for conservation of Pala Wetland submitted to MoEF&CC for funding under NPCA consists of five broad components namely Protection Measures, Catchment Conservation, Water Management, Biodiversity Conservation, Sustainable Resources Development and Livelihood Improvement, and Institutional Development, details of each which are given below.

A) Protection Measures

(1) Boundary delineation and demarcation, and encroachment

Survey and demarcation and mapping with removal of encroachment. The cost of estimate involved for Boundary delineation and demarcation, and encroachment are given as below:

- i) Survey & Demarcation and Mapping and yearly maintenance boundary lines
- ii) Removal of encroachment through compensation- 8ha
- iii) Erection of Permanent pillars (total 240 nos.)
- iv) Yearly Renovation of Pillars and clearance of boundary

2) Fencing

During last ten years, some pillars were erected along the boundary lines and barbed wire fencing was also constructed at some portion of the vulnerable areas, after proper survey of the extended areas. If necessary, the boundary will be demarcated by erection of permanent pillar, trenches permanent fencing at appropriate places. In the proposed management plan, construction of 3 km half RCC with barbed wire fencing including yearly maintenance is proposed.

3) Fire Protection measures

Fire protection measures is one of the important measures to protect the areas, during the summer under this component the following item measures are proposed.

- a) **Creation of Fire line:** New creation of fire lines 5mt width and 5 km length is proposed depending on the activities of fringe village i.e. Jhum/Gardening, adjacent to the Pala areas/wherever necessary.
- b) **Maintenance of existing firelines:** Regular maintenance of existing firelines (9.5 kms.) is proposed.
- c) **Fire Awareness campaign:** The communities of fringe villages and General public need to be educated and made aware about the importance of biodiversity conservation and its good service to the human kind. The communities also need to be made aware of dangers of loss of Biodiversity due to the fire. Fire awareness campaign to 6 fringe villages 6 times each year (total 30 times) is proposed under the present IMP.
- d) **Construction of Fire Watch Towers:** 2 nos. of fire watch towers are proposed in the wetland area. These can also be used for protection Duty posts.
- e) **Engagement of Fire watchers:** Fire watchers are proposed to be engaged during fire season i.e. Dec – March, 4 months every years. For the first 3 years, 5 watchers will be engaged and 2 watchers will be engaged for the remaining 2 years.

4) Infrastructure

Few infrastructure developments works were taken up in the last ten years. For effective management of Pala Wetland protection of catchment areas, it is still required to develop the infrastructures and undertake yearly maintenance of existing infrastructure. Under this component, the following items / infrastructure works are proposed and alongwith maintenance of existing infrastructure:

- i) Construction of Staff quarters (4 nos.) including Furniture
- ii) Maintenance of existing Buildings (9 nos.)
- iii) Construction of patrolling path (2.5 Kms)

- iv) Maintenance of existing patrolling path
- v) Construction of inspection path (2.5 Kms) and its maintenance
- vi) Construction of Check post at Entry point of Pala Tipo 2 locations
- vii) Yearly Maintenance of Phura - Pala Road (5 Kms)
- viii) Construction of Road from Existing PWD Road to Pala Pino (3 Kms) and yearly subsequent maintenance

5) Engagement of Protection squads (Wages)

A total of 7 persons as protection squads are engaged at present, under Pala wetland areas. In order to carry out proper and effective protection of the wetland, it is required to engage protection squads for the next 5 years too. Accordingly, under this IMP it is proposed to engage 7 squads in the first year and then 8 squads for the subsequent 4 years.

B) Catchment Conservation

The main factors of degradation of catchment to soil erosion are - Deforestation, Practice of shifting Cultivation in the catchment area, landslide and Land slips. Collection of minor forest produces like firewood, thatches and other household material also lead to degradation of the areas. All the above factors together lead to deposition of silt in the lake, and if it remains unchecked, it will ultimately choke the lake and decrease its water holding capacity.

The following intervention activities are proposed to check further degradation of catchment area leading to the siltation, and also to help the Local people with better alternatives for their needs and other means of livelihood.

Afforestation AR and ANR as well as Horticulture plantation for fringe villages, small engineering structures like Check dams, construction of trenches, Bench terracing, Gully plugging, Gabion structure etc. are proposed as described below.

Afforestation of Artificial Regeneration (AR) and Aided Natural Regeneration (ANR): - Afforestation in the watershed will be undertaken at all the streams directly or indirectly entering into the Pala lake to check land degradation and put wasteland into sustainable uses.

- a) **Artificial Regeneration:** It aims at raising of multi-tier mixed vegetation of suitable local species in the steep and sensitive's catchment areas of Rivers/Streams with the objectives of keeping such areas under permanent vegetation cover.
- b) **Aided Natural Regeneration:** In order to promote recovering of degraded forest, sowing of seeds/planting of seedling in specific areas will be undertaken in addition to protection measures in critically degraded areas. ANR plantation of locally useful and diverse and indigenous tree species will be under taken.
- c) **Plantation of Horticulture crop:** Horticulture crop plantation is proposed to reduce and control shifting cultivation in the catchment areas of Pala Tipo and also to ensure people participation of all stages in the Wetland development programme. It also aims at creating alternate source of income generation for fringe villages. Total areas of 100ha will be covered under this component during the project period of 5 years. Species selected for this component are Mango, Banana, Lemon etc. which are suitable crop in

this area. This Horticulture plantation scheme will be disbursed to the Jhumia families of the fringe villages with the objectives of supplementing their income.

- d) **Bench Terracing:** To encourage the Jhumies to settled types of agriculture on one hand and to check soil erosion on the other and also to reduce the rate of siltation in the Pala lake, Bench terracing will be carried out at suitable lower slope. Bench terracing is proposed to be carried out on 25 ha of area each year i.e. total of 125 ha during next 5 years. Priorities will be given to Horticulture crop grower families.
- e) **Soil conservation through small scale Engineering:** During last 10 years – 9 nos. of Anicut, check dams, 1000 mts of contour trenches was constructed. However, some erosion is still taking place in the catchment areas and some areas have been identified to be prone to soil erosion. To check the soil erosion and land degradation, the following small Engineering measures are proposed. i) Gully plugging: 13 nos. of gully plugging are proposed. ii) Contour trenches: 175 Kms length is proposed at suitable lower areas. iii) Construction of drainages and maintenance of existing drainage iv) Gabion structure: 11 nos. of Gabion structures are proposed, and v) Maintenance of Existing ancient / Spillway/check dams - Gabion structure.

C) Water management

The Pala lake is under pressure due to soil erosion from the *catchment* area. Prolific growth of water hyacinth and other weeds and encroachment as a result of these factors, the water holding capacity of lake has been reducing every year; though there is no data to indicate the exact reduction in the capacity of the lake. The prolific growth of Water hyacinth and other aquatic weeds have further aggravated the problem by retarding the flows of water current which is conducive for enhancing Eutrophication. There are numbers of streams and nallas flowing from Northern and Eastern side of the lake which maintain a continuous supply of lake water. Moreover, these streams bring some quantities of silt in the lake during raining season.

There is only one outflows from the lake. It also has very potential for Mini Hydel Project as well as irrigation

For reducing the rate of siltation in the Pala lake and to improve the water quantity and life of Pala Wetland as well as improve/increase water sources in the catchment areas, the following **silt control measures** are proposed during the plan period:

1) Preventive control measures:

- i) **Construction of silt detention structures:** Silt detention structures will be constructed in a series at different points/locations along the feeding channel joining the lake. These structures will prevent flow of course silt into the lake. This silt will be removed from these structures periodically. The nos. of structures proposed during the plan period are 11.
- ii) **Renovation and Maintenance of existing silt detention structure:** Periodical renovation and maintenance of existing structure is also proposed in the plan period
- iii) **Silting Basin:** About 5 nos. silting basin will be constructed at the appropriate locations/sites of major stream flowing into the lake. Fine silt entering through these channels will be deposited within these basins and thus prevent its entry to the lake.

Provision will also be made for periodical clearance of these basins as whenever necessary.

2) Curative measures:

- i) **Desiltation by dredging:** Pala lake is a natural lake. Enormous quantities of silt have got deposited in the bottom of the lake. It is neither feasible nor possible to dredge the entire lake; so 4 critical areas of the lake have been identified where the removal of silt is essential to increase its water holding capacity and to improve ecological condition of the lake. The total quantity of silt to be removed from the lake is 3100 cum from 4 four locations during the period of 5 years. The siltation will be transported outside the catchment areas using vehicles/ Truck.
- ii) **Construction of Drainage channel:** The streams which are directly flowing into the lake from the catchment areas need construction of drainage channel to control flows of water especially during raining season. Provision will be made for periodical clearance of these channels as and when necessary. Out of 7 streams entering into the lake, 2 streams are identified for construction of drainage channels.
- iii) **Construction of weir at outlet (Pala lake water):** In order to increase volume of water in the lake and to measure **volumetric rate** of water outflow, it is proposed to construct weir at the outlet of the Pala lake.
- iv) **Construction of sluice gate:** Construction of sluiceways is proposed at four identified places of water entering into the lake to regulate / control the flows of water particularly during the monsoon when water level rises and flows directly into the Pala lake which bring a quantity of silt in the lake. The number of sluiceways proposed are 5.
- v) **Desiltation of stream:** The streams which are flowing directly into the lake from the catchment areas get heavily silted during summer, as a result of which the Eco-system of the hydrology of lake is affected. In order to improve the system of hydrology of the lake, desiltation of the stream is needed. Out of 7 nos. of streams, 2 nos. have been identified for desiltation. The length of stream proposed for desiltation is 4.5 kms during the plan period.
- vi) **Peripheral bunding:** Construction of Ring bund around the lake to control flooding and defining the lake boundary is proposed. It is not possible to construct peripheral bunding totally, these constructions may also be interfering with the natural eco-system, so, specific locations which are vulnerable to over flow will be identified for execution of works. The total length for the bunding has been estimated to be 2.1 kms.
- vii) **Weed control:** Judicious and prudent removal of weeds without disturbing the balance of ecosystem in and around the lake is needed. The removal of weed like water hyacinth etc. will be carried out by manually. Total weed quantity to be removed is estimated at 3500cum for 5 years.

D) Biodiversity Conservation

Pala Lake and its surrounding has very rich Biodiversity having many species of Flora, Fauna and other species. From year 2000, Biodiversity of Pala Lake and its surrounding

catchment area continues to decline due to the expanding of human population and developmental activities and over harvesting of fish wildlife and plants. Yearly maintenance of existing Phura Road passing through catchment areas of Pala wetland has silted / polluted the Pala lake and its catchment area. Moreover, vehicles movement along this road incidentally brought invasive species to this area. These species (Foreign species) established their new Environment and spread and covered hectares of area within a short period. The factors such as deforestation, expanding of population, developmental activities, increasing of invasive species and Global warming has resulted in the losses to Biodiversity of the Pala lakes and its surrounding.

It is necessary to protect and preserve the wealth and variety of species, habitat, eco-system of Pala Lake for which the following activities are proposed:

- 1) Raising a Nursery:** To compensate the loss that has been inflicted by rampant destruction and over utilization of the fruit bearing species, raising of a nursery has been proposed. There are many floras, some are fruit bearing species which attract birds and animals to this area, but due to the destruction of the area and also the food, the number of species are decreasing year by year. So, it is proposed to collect these seeds and raise in nursery for cap planting of catchment areas. Raising of total 70000 nos. of indigenous fruit bearing trees is proposed during 5 years at an estimated cost of Rs. 7.5 lakhs.
- 2) Gap Plantation/Habitat Restoration:** There is some degraded land in the catchment area of Pala Lake due to Jhum cultivation and destruction of forest by fringe villages. This area needs restoration of Biodiversity by planting the indigenous species, specifically fruit bearing species. Under this cap plantation the activities proposed are Survey & demarcation, Clearance of sites, Planting of seedling and Weeding. A total of 55000 seedlings are proposed to be planted during 5 years at an estimated cost of Rs. 16.65 lakhs.
- 3) Improvement of Water holes/Sources:** There are many sources of water and ponds within the catchment area of Pala lake, water level of these water holes/pond is decreasing, especially in the month of March and April every year. There is a need to improve water level by adopting small scale Civil Engineering structures such as check dam, gully plugging etc. for wild animal and bird. Under this component the following activities are proposal for the Plan period.
 - i) Maintenance of existing Pala Tipo Pino (2 km long)
 - ii) Construction of Check Dam (1 no.) at Pala Tipo Hlipa
 - iii) Construction of Water holes (6 nos.).
 - iv) Making / Preparation of Artificial salt lake sites (9 nos.).
- 4) Construction of Orchid House:** There are 8 species or more different species of orchid in Pala lakes and its catchment areas. Due to the collection of these species and deforestation of the areas, no. of orchid species is gradually decreasing. To preserve and propagate the orchid species present in the Pala Lakes areas, construction of Orchid House including collection of species and maintenance is proposed, with estimated cost of Rs. 6.2 lakhs over the plan period of 5 years.
- 5) Programme/ Fund provision for wetland Mitras (Friend of Wetland):** The Wetland Mitras are a group of community volunteers from fringe villages who work to protect and preserve wetland areas from biotic pressure such as collection of Minor Forest produces, fishing poaching and encroachment of wetland area. They may also be

entrusted to organise awareness Programmes in their respective villages. It is proposed to organize awareness programmes on wetland conservation / protection measures by engaging 6 wetland Mitras one each from 6 villages namely Tokalo, Phura, Pala, Vahia, Miepu & Kiasie which will require an estimated expenditure of Rs. 7.8 lakhs during next 5 years.

- 6) Awareness Raising on Biodiversity Conservation:** Awareness raising is an important tool for Biodiversity conservation of Pala Wetland area. The loss of Biodiversity of the area is mainly due to human activities such as poaching, felling /collection of Minor Forest produces, collection of household material etc. To contain the loss of Biodiversity, the communities of fringe villages and general public need to be educated / made aware of the importance of Biodiversity conservation. An amount of Rs.4.5 lakhs is estimated for this component for 5 years.
- 7) Eradication of invasive species / Reducing invasive species:** There are some invasive plant species identified in the Pala Wetland areas such as Dichandra repens, Montis perfoliata, Claytonia perfoliata etc. These species are fast-growing species and if these species are not checked, they may suppress other species. Hence it is required to be eradicated from the area. For removal of invasive weed / species physical method will be applied by engaging daily labourers from fringe villages and removal will be carried out manually uprooting / cutting and burning. The estimated amount for this activity is Rs. 4.45 lakhs for the plan period of 5 years.

E) Sustainable Resources Development and Livelihood improvement

As we know the main reason of the degradation of Flora and Fauna in Pala Lakes and its surrounding catchment area is human activities of the fringe Villager such as collection of Minor Forest produces, fishing and poaching etc., to meet their daily needs. Unless we provide alternate source of energy for cooking, alternate source of income generation, improve their livelihood, the Pala wetland areas and its biodiversity can't be protected and conserved for long term. So, this component is aimed at ensuring sustained provision of Pala lake ecosystem service for well-being of Wetland dependent communities. The following activities are proposed under this component:

- 1) Financial Assistance to Agriculture and Horticulture Farmers:** It is proposed to provide Financial Assistance @Rs.25000/- (Rupees Twenty-five thousand) per family per year to the Agriculture and Horticulture farmers of the fringe villages so as to improve their farming. This Assistance may be in kind or cash depending on the need. The Estimate amount Rs.19.5 lakhs is proposed for 5 years to support 74 farmer families.
- 2) Provision for Irrigation (Development of irrigation facilities):** The outflows of Pala lake water flow through plain area of Phura which is called as the Rice Bowl of Maraland. The outflows of the water from Pala lake have good potential for irrigation for Phura since the source of water is located much higher than Phura. The water can be stored in the main reservoir through GI pipes, after which it can be distributed to RCC reservoir and from here the water will be used to irrigate fields through sprinklers. Under this component, following works are proposed: i) Construction of Irrigation channel / pipes (2.5 km) including intake chamber ii) Construction of main reservoirs (2 nos.), and iii) Construction of distribution reservoirs (4 nos.) including distribution pipes. The total cost estimated of works is Rs. 54.5 lakhs for five years.

3) **Livelihood provision / activities for low-income persons:** The following provisions are proposed under this project:

- Provision for GI sheet (4 bundles each to 1 family) to 135 families:
- Provision of alternate source of Energy (gas connections) to 400 families:
- Solar light to 70 families
- Provision of piggery /Poultry farming to 30 families
- Assistance to Micro-Enterprises (17 nos.)
- Medical Health Camp

The total estimated cost for this component is Rs. 65.37 lakh for 5 years.

4) **Sustainable fisheries development:** - Fisheries is one of the potential occupations and sources of income for the people around the Pala lake. There are many fish species in the lake. Common fish species found in the lake are namely *Eel-Anguillidae*, *Tilapia-Oreochromis niloticus*, *Common carp- Cyprinus carpio*, *Rohu carp-Labeo rohita*. Apart from this, tortoise and soft turtle are also present. Hence fishery development is one of the important components of this project. Under this component the activities are proposed in the period are.

- Construction of Hatcheries (4 nos.)
- Construction of fish Dam with Net at the outflow of Pala lake (4 nos.)
- RCC Jetty / Floatable Jetty (3 nos.)
- Construction of Boat sheltering yard (2 nos.)
- Purchase of fishing Boat / Dug out Boat (2 nos.)
- Construction & installation of Cage Culture (5 nos.)
- Training & Capacity Building (6 times)
- Regulatory measures

The total estimated cost for this component is Rs. 29.50 lakh for 5 years.

5) **Eco-tourism Development:** During last 10 years some activities i.e. Nature trail, One Tourist hut, 2 watch towers, one waiting shed have been constructed and two boats were purchased under this component. All these need to be maintained/ renovated yearly. Action plan during the plan period aims at tapping full potential of Pala lake as tourist site. Under this component, for the development of tourist infrastructure, the following activities are proposed:

- Construction of Mara Typical House / log House (5 nos.)
- Maintenance Of existing waiting shed (2 nos. each year)
- Construction of interpretation Centre /Conference Hall (1 no.)
- Construction of waiting shed cum ticket selling counter (1 no.)
- Construction of Watch Tower (3 nos.)
- Maintenance of Existing watch tower
- Connection of Electric / Installation of Solar light
- Construction of Nature trail
- Maintenance of Existing Nature trail (2000 m)
- Maintenance of pavement along the peripheral of the Lake (2.5 km. each year)

- Engagement of Tourist guide/Receptionist (1 for first 3 years and 2 nos. for next 2 years)
- Engagement of Boat man (1 person for 5 years)
- Purchase of Boat (5 nos.)
- Construction of Toilet with water connectivity& maintenance (3 nos.)
- Improvement / Renovation of existing furniture like signages, Visitor guidelines, Awareness a month visitor
- Planting / Raising of Avenue Trees along the road & Eco Park area including fencing with subsequence Maintenance
- Waste Management (making of bamboo dust bin and cleaning & burning of debris at incineration chamber)

The total estimated cost for this component is Rs. 155.34 lakh for 5 years.

F) Institutional Development:

The management of the lake eco-system involves essentially understanding structural and functional aspects of the lake eco-system. The lake system has its individual identity depending upon its origin, Geological formation, climate and ecological Relationship between biotic and abiotic component, complexity of the various component of the Eco-system and their inter relationship have to be clearly understood before any management activities are undertaken for the conservation of the lake. Pala lake is a very complex eco-system and is under serious pressures due to Anthropogenic activities. The hydrology of the lake is very complicated. No research / no systematic attempt has been made to collect baseline data till today. The following activities are proposed under this management plan.

1) Research & monitoring: The main objective of setting up of laboratory is to collect scientific data which could be utilised for the practical management of the lake eco-system. The laboratory will provide the necessary Assistance to the manager by providing specific inputs on scientific basis and also will continuously monitor the eco-system response to management activities. The research and monitoring will be encouraged in the Hydrology, limnology and fishes, Biodiversity of the areas i.e., Identification of Flora & Fauna and Impact of activities taken up till today - advantage and disadvantage for the conservation of the area. The activities proposed are a) Construction of Research and monitoring Laboratory b) Research on Hydrology, limnology and fishes & Identification of Flora and Fauna c) Impact of assessment Surveying of socio-economy of the fringe village d) Monitoring. The total estimated cost for these activities is Rs. 57 .00 lakh for 5 years.

2) Communication and Outreach Programme: It is one of the important components to deliver important messages to the stakeholder and general public, related to conservation of Pala lake Eco-system. Under this component the following activities are proposed.

- a) Education and awareness Programme
- b) Conservation of world Wetland day & Pala tipu
- c) Publication of booklet/ /Brochure / Calendar

The total estimated cost for the above activities is Rs. 24.5 lakh for 5 years.

- 3) **Equipment and Stationeries:** The Implementation of the project will require procurement of various items of equipment, special tools and plant etc. Office Equipment / Furniture, Computer with Printer, Vehicle, Pumping set, Motor launch & JCB. The total estimated cost for this is Rs. 33.75 lakh for 5 years.

7. Monitoring and Evaluation Plan

Performance Indicators

Monitoring and Evaluation Plan is to enable assessment of overall management effectiveness and identify needs for mid-term correction. For each of management objectives, a set of performance indicator is identified. The performance indicator will provide evidence on the condition of one or a set of features. For each performance indicator, a baseline value based on information provided in the Integrated Management Plan shall be employed. These values shall be tracked over the course of management plan implementation to assess whether the management objectives are being met.

Monitoring parameters, frequency and Responsibilities

Besides setting up performance indicators for the management plan, it is also essential to set up a monitoring system for Pala wetland in order to be able to assess change in ecosystem condition over a period of time. The matrix for monitoring, method and frequency is tabulated in the IMP.

Institutional design

As per the IMP, the institutional design head covers how the nodal department will co-ordinate all monitoring activities for implementation of management plan. However, the NPCA guidelines states that the institutional design shall cover how the coordination between different monitoring agencies will be achieved.

Infrastructure and human resources design

As mentioned in the IMP, apart from concurrent monitoring to ensure effectiveness of project, the circle Management rendered by the Nodal Department, the service of research organization, NGO's and Local University shall be harnessed with respect to third party monitoring and evaluation. However, the IMP lacks the information regarding infrastructure and human resource requirement details necessary to successfully implement the IMP

Reporting

The concurrent monitoring evaluation will be done by the Nodal department according to the time frame of activities mentioned in the Integrated Management Plan. Whereas, the third-party monitoring and evaluation shall be executed once a year by research organization NGOs and a Local university.

Review and adaptation

The IMP does not provide the suitable details regarding, how the monitoring outcomes shall be used to improve/implement the management plan further. The IMP highlights that the monitoring outcomes shall be used for mid-course correction and they shall be well documented.

8. Management Action Plan

The Management Action Plan focuses defining action plan or specific interventions in the catchment area that address the identified management objectives. The action plan needs to be developed in two steps: (1) comprehensive listing of activities which are required to be implemented and then (2) the activities should be filtered with reference to core and non-core activities as prescribed under NPCA and detailed further. Ecosystem-based interventions /activities should be promoted as far as possible whereas Engineering interventions should be taken up in a limited manner, with impact assessments conducted for major works. The Integrated Management Plan submitted for Pala Wetland consists of both type of interventions i.e., Ecosystem-based as well Engineering, but engineering interventions constitute major portions of activities.

Comprehensive list of activities:

A generic listing of activities that may be required for integrated management of wetlands needs to be indicated in Management Plan. The list of activities and its sub-activities with descriptions indicating why activity is required and where activities are to be implemented along with their key considerations are presented in the Integrated Management Plan for Pala Wetland.

Preparing an Action Plan for NPCA support:

From the generic list of activities compiled under the previous step activities which fall within the list of core and non-core activities covered under NPCA needs to be filtered out and elaborated. However, while working out funding requirement for Pala Wetland management plan, all the activities included in IMP have been posed for funding under NPCA without filtering out ineligible activities. All the activities listed in the IMP, have been sorted as core and non-core activities without referring to the guidelines of NPCA. Further some non-core activities have been listed under core activities. It is seen that as per NPCA guidelines a large number of activities considered under the Pala Wetland Management Plan are not eligible for funding under any of the two categories i.e., core and non-core. Hence, the various activities included in the Management Plan have been recategorized under core, non-core, alongwith their estimated costs, filtering out ineligible activities as presented in Table below:

7.2 All activities proposed to be funded list of the Core and Non-Core Activities under NCPA and State Matching Share

Reference

1) Core Area =

2) Non Core Area =

Table-26

SI No	Management Plan component	Core Area Activities	Non-Core Area Activities	Quantitative target	Amount of Core under NCPA	Amount of Non Core under NCPA	Target of (SMS)	Target of Total Budget
1	Protection Measure	1) Boundary delineation and demarcation						
		i) Survey & Demarcation and Mapping and yearly maintenance boundary lines		LS	4.500		0.5000	5.000
		ii) Erection of Permanent pillar		240nos	2.700		0.3000	3.000
		2) Fencing						
		i) Construction of half RCC with Barbed wire fencing including yearly maintenance		3kms		14.400	1.6000	16.000
		3) Infrastructure						
		i) Construction of patrolling path		2kms		2.250	0.2500	2.500
ii) Construction of inspection path and its maintenance		2.5 kms		3.375	0.3750	3.750		

			iii) Constn.of Road from Existing PWD Road to Pala Pino and yearly subsequence maintenance	1.5 kms		4.275	0.4750	4.750	
2	Catchment Conservation	1) Artificial Regeneration Plantation						0.0000	
		i) Advance work		70ha	15.660		1.7400	17.400	
		ii) Creation of works		50ha	22.095		2.4550	24.550	
			iii) 1st year Maintenance	35ha		5.027	0.5586	5.586	
			iv) 2nd year maintenance	20 ha		2.052	0.2280	2.280	
			v) 3rd year maintenance	10ha		0.855	0.0950	0.950	
			vi) 4th year maintenance	50ha		4.104	0.4560	4.560	
		2) Aided Natural Regeneration Plantation						0.0000	
		i) Advance work		60ha	9.657		1.0730	10.730	
		ii) Creation of works		55 ha	14.108		1.5675	15.675	
			iii) 1st year Maintenance	40 ha		3.557	0.3952	3.952	
			iv) 2nd year maintenance	60 ha		5.130	0.5700	5.700	
			v) 3rd year maintenance	50 ha		4.104	0.4560	4.560	
			vi) 4th year maintenance	40 ha		3.010	0.3344	3.344	
		3) Horticulture Plantation						0.0000	
		i) Advance work: Including areas clearance, nursery etc		100 ha	30.510		3.3900	33.900	
		ii) Creation of plantation : Alignment & planting, constn. Of Hut, Inspection path planting, watering		1005ha	67.983		7.5537	75.537	

		iii) Maintenance of Plantation			0.000	0.0000	
		a) 1st year Maintenance(after one year)	85ha		19.951	2.2168	22.168
		b) 2nd year maintenance	65ha		13.993	1.5548	15.548
		c) 3rd year maintenance	45ha		9.469	1.0521	10.521
		e) 4th year maintenance	25ha		2.138	0.2375	2.375
		4) Soil Conservation through Small scale Engineering					0.0000
		i) Check dam/gully plugging with yearly maintenance	13 nos	5.850		0.6500	6.500
		ii) Contour trenches 2'x2½' Size with yearly maintenance	1750 mt	3.938		0.4375	4.375
		iii) Construction of drainages and maintenance of existing drainage	1500 mt	3.375		0.3750	3.750
		iv) Construction of Gabion structure	11 nos	4.950		0.5500	5.500

3	Water Management	1) Preventive control measures					0.0000	
			i) Construction of 5ft detention structure	11nos		14.850	1.6500	16.500
			ii) Renovation and maintenance of existing silt detention structure	47 nos		8.460	0.9400	9.400
		iii)	Construction of silting basin	5nos	13.500		1.5000	15.000
		2) Curative measure					0.0000	
	i)	Desiltation by dredging from silting basin as well as an identified location of the lake areas.	4100 cum	18.450		2.0500	20.500	
		ii)	Construction of drainage channel & subsequence maintenance	2400 mt		21.600	2.4000	24.000
		iii)	Desiltation of streams 2 streams every year	4.5 km	3.825		0.4250	4.250
		iv)	Construction of peripheral bunding including yearly maintenance	2100 mt		26.550	2.9500	29.500
		v)	Removal of weeds (Weed control)	3500 cum		16.200	1.8000	18.000
4	Biodiversity Conservation	1)	Raising of indigenous fruit bearing trees for gap planting, polybags 2 feet tall @Rs.10/per seedling	70000 nos	6.750		0.7500	7.500

		2) Gap planting of seedling including clearance, transportation and stacking			0.0000	
	i) Survey & demarcation		Ls	1.129	0.1254	1.254
	ii) Clearance of site		Ls	1.485	0.1650	1.650
	iii) Planting of seedling including, transportation, clearance and stacking		55000 nos	12.375	1.3750	13.750
		iv) Weeding		0.000	0.0000	
		a) 1st weeding	40000 nos		7.200	8.000
		b) 2nd weeding	25000 nos		3.375	3.750
		c) 3rd weeding	10000 nos		0.900	1.000
		3) Improvement of water source for Wildlife			0.0000	
	i) Construction of Dam at Pala Tipo Hlipa, its subsequent maintenance		1 no	9.450	1.0500	10.500
	iii) Construction of Water holes		6 nos	3.060	0.3400	3.400
	4) Biodiversity conservation awareness		Ls	4.050	0.4500	4.500
		5) Eradiction of invassive species / reducing invassive species	Ls		4.005	4.450

5	Sustaina-ble Resources development and livelihood improvement	1) Development of irrigation facilities equipment					0.0000		
			i) Construction of irrigation channel / Pipes including intake chamber	2.5 km		15.300	1.7000	17.000	
			ii) Constn.of Main Reservoir	2 nos		15.750	1.7500	17.500	
			iii)Constn.of distribution reservoir including distribution pipes	4 nos		18.000	2.0000	20.000	
			2) Provision for low income families					0.0000	
			i) Assistance to the Micro-enterprises	17	8.640		0.9600	9.600	
			ii) Medical Health Camp	Ls		6.120	0.6800	6.800	
			3) Sustainable Fishery development					0.0000	
			i) Construction of Hatcheries	4 nos	3.600		0.4000	4.000	
			ii) Constn.of Fish Dam with Net at the outflow of Pala Lake	4 nos	4.050		0.4500	4.500	
			iii) Constn.of Jetty / Floatable Jetty	3 nos	6.750		0.7500	7.500	
			iv) Consnt,of Boat Sheltering yard	2 nos		5.400	0.6000	6.000	
			v) Purchase of fishing Boat / Dug out Boat	2 nos		1.800	0.2000	2.000	
	vi) Constn.& installation of Cage culture	5 nos		2.250	0.2500	2.500			
	vii) Regulatory measures likes signages / information.	Ls		0.900	0.1000	1.000			

		4) Eco-tourism development					
		i) Constn.of Mara Typical House and subsequent	5 nos		27.450	3.0500	30.500
		ii) Constn.of Interpretation centre	1 no	13.500		1.5000	15.000
		iii) Cosnt.of Waiting shed and selling counter	1 no		5.625	0.6250	6.250
		iv) Installation of Solar light/ connection of electricfication and subsequent maintenance	Ls		10.350	1.1500	11.500
		v) Constn.of Nature trails and its maintenance	2000 mts		1.800	0.2000	2.000
		vi) Purchase of Boat	5 person		5.400	0.6000	6.000
		vii) Consnt.of Toilet with water connectivity & maintenance	3 nos		5.040	0.5600	5.600
		viii) Inmprovement / Renovation of existing furniture like signages, Visitor guidelines, Awareness amonth visitor	Ls		4.050	0.4500	4.500
		ix) Planting / Raising of Avenue Trees along the road & Eco Park area including fencing with subsequence Maintenance	Ls		6.750	0.7500	7.500

		x) Waste Management				0.0000	
		a) Preperation / making of bamboo Dust Bin	Ls		2.925	0.3250	3.250
		b) Cleaning and burning of debris at incinerable Chamber	Ls		3.060	0.3400	3.400
6	Institutional develop-ment	1) Research & monitoring				0.0000	
		a) Identification of Avi-fauna/Flora and fishes study of hydrology and linnology	Ls		24.750	2.7500	27.500
		b) Constn.of Reasearch Centre cum research Rest House with equipment materials	1 no		11.700	1.3000	13.000
		c) Impact of assessment Surveying of socio-economy of the fringe village	Ls		1.350	0.1500	1.500
		d) Monitoring	Ls		13.500	1.5000	15.000
		2) Communication and Outreach programme				0.0000	
		a)) Education and awareness programme, slide show, seminar, Training programme, workshop and like visit programme	Ls		11.250	1.2500	12.500
		b) Conservation of world Wetland day & Pala tipo	Ls		1.800	0.2000	2.000

It is to mention that, there are a number of activities in the IMP which are not explicitly mentioned under eligible activities (Annexure II of NPCA guidelines) for NPCA funding. During the appraisal, some of these activities have been considered under core and non-core category, depending upon the nature of the activity and rest have been filtered out as non-eligible activities. The activities which are considered under core and non-core heads along with the justification of their categorization are as under.

1. **Construction of patrolling path**, considered under non-core activity under head *Development of Promenade for urban wetlands*
2. **Construction of inspection path and its maintenance**, considered under non-core activity under head *Development of Promenade for urban wetland*.
3. **Maintenance activities under Artificial Regeneration Plantation, Aided Natural Regeneration and Horticulture Plantation** considered under non-core activity under head *Mechanical Removal of Invasive species*.
4. **Constn.of Road from Existing PWD Road to Pala Pino and yearly subsequent maintenance** considered under non-core activity under head *Development of Promenade for urban wetlands*
5. **Construction of 5ft detention structure** considered under core activity under head *construction of sewage treatment plants*.
6. **Construction of drainage channel & subsequence maintenance** considered under core activity under *construction of sewage treatment plants*.
7. **Removal of weeds (Weed control)** considered under non-core activity under head *Mechanical Removal of Invasive species*.
8. **Construction of Dam at Pala Tipo Hlipa**, its subsequent maintenance considered under core activity under head *Large Engineering structures within wetland*. The maintenance is included under non-core head.
9. **Construction of Water holes** considered under core activity under head *Large Engineering structures within wetland*.
10. **Biodiversity conservation awareness** considered under core activity under head *Organization of events to enhance appreciation of wetland values and functions*.
11. **Construction of irrigation channel /Pipes including intake chamber** considered under non-core activity under head *promotion of water efficient agricultural systems in wetland catchments*.
12. **Constn. of Main Reservoir and Constn. of distribution reservoir including distribution pipes** considered under non-core activity under head *promotion of water efficient agricultural systems in wetland catchments*.
13. **Purchase of Boat** considered under non-core activity under head *development of tourism related infrastructure*.

14. **Preparation / making of bamboo Dust Bin** considered under non-core activity under head *development of tourism related infrastructure*.
15. **Cleaning and burning of debris at incinerable Chamber** considered under non-core activity under head *development of tourism related infrastructure*.
16. **Constn.of Research Centre cum research Rest House with equipment materials** considered under core activity under head *Research addressing specific wetlands management needs*.
17. **Office equipment & furniture, Computer with Printers, Pumping set, Motor launch & JCB (Dredger) and Laboratory equipments** considered under non-core activity under head *Infrastructure development for wetland authorities*.

7.3 Action Plan with time frame

The implementing schedule with year-wise break-up for various action components has been provided in the Integrated Management Plan.

9. Total Cost of Implementation of the Management Plan

The cost of implementation of the Integrated Management plan for Pala Wetland has been worked out for 5 years from 2020-21 to 2024-25. The estimated cost worked out by the Implementing Agency and the eligible cost as appraised by HUDCO are given below.

9.1 Summary of the cost estimated by the Agency

SI No	Management Plan component	Budget (Rs. In lakhs)
I	Protection Measure	35.000
II	Catchment Conservation	279.461
III	Water Management	137.15
IV	Biodiversity Conservation	59.754
V	Sustainable Resources development and livelihood improvement	193.9
VI	Institutional Development	91.25
	Grand Total	796.515

9.2 Year wise breakup of requirement of funds as estimated by the Agency

Rupees in lakhs

SI No	Activity/Items of works	Funds Required in Yr I (2020-21)		Funds Required in Yr II(2021-22)		Funds Required in Yr III(2022-23)		Funds Required in Yr IV(2023-24)		Funds Required in Yr V(2024-25)		Total of 5 year
		Phy.	Fin	Phy.	Fin	Phy.	Fin	Phy.	Fin	Phy.	Fin	
I	<u>Protection Measure</u>											
	1) Boundary delineation and demarcation											
	i) Survey & Demarcation and Mapping and yearly maintenance boundary lines	LS	5.000									5.000
	ii) Erection of Permanent pillar			240nos	3.000							3.000
	Sub-Total		5.000		3.000		0.000		0.000		0.000	8.000
	2) Fencing											
	i) Construction of half RCC with Barbed wire fencing including yearly maintenace	1Km	6.000	1Km	5.000	1Km	5.000					16.000
	Sub-Total		6.000		5.000	0.000	5.000	0.000	0.000	0.000	0.000	16.000
	3) Infrastructure											
	i) Construction of patrolling path	1Km	1.000	1km	1.000	0.5km	0.500					2.500
	ii) Construction of inspection path and its maintenance			1KM	1.500	0.5Km	0.750	1km	1.500			3.750
	iii) Constn.of Road from Existing PWD Road to Pala Pino and yearly subsequence maintenance	1.5kms	2.250	LS	0.250	LS	0.500	LS	0.750	LS	1.000	4.750
	Sub-Total		3.250		2.750		1.750		2.250		1.000	11.000
	Total of Protection measure		14.250		10.750		6.750		2.250		1.000	35.000

II	Catchment Conservation											
	1) Artificial Regeneration Plantation											
	i) Advance work	10ha	2.496	10ha	2.496	15ha	3.744	15ha	3.744	20ha	4.920	17.400
	ii) Creation of works			10ha	4.910	10ha	4.910	15ha	7.365	15ha	7.365	24.550
	iii) 1st year Maintenance					10ha	1.596	10ha	1.596	15ha	2.394	5.586
	iv) 2nd year maintenance							10ha	1.140	10ha	1.140	2.280
	v) 3rd year maintenance									10ha	0.950	0.950
	vi) 4th year maintenance	50ha	4.560									4.560
	Sub-Total		7.056		7.406		10.250		13.845		16.769	55.326
	2) Aided Natural Regeneration Plantation											
	i) Advance work	10ha	1.790	10ha	1.790	10ha	1.790	15ha	2.680	15ha	2.680	10.730
	ii) Creation of works	10ha	2.850	10ha	2.850	10ha	2.850	10ha	2.850	15ha	4.275	15.675
	iii) 1st year Maintenance			10ha	0.988	10ha	0.988	10ha	0.988	10ha	0.988	3.952
	iv) 2nd year maintenance	30ha	2.850			10ha	0.950	10ha	0.950	10ha	0.950	5.700
	v) 3rd year maintenance			30ha	2.736			10ha	0.912	10ha	0.912	4.560
	vi) 4th year maintenance					30ha	2.508			10ha	0.836	3.344
	Sub-Total		7.490		8.364		9.086		8.380		10.641	43.961
	3) Horticulture Plantation											
	i) Advance work: Including areas clearance, nursery etc	20ha	6.780	20ha	6.780	20ha	6.780	20ha	6.780	20ha	6.780	33.900
	ii) Creation of plantation : Alignment & planting, constn. Of Hut, Inspection path planting, watering	25ha	17.985	20ha	14.388	20ha	14.388	20ha	14.388	20ha	14.388	75.537
	iii) Maintenance of Plantation											
	a) 1st year Maintenance(after one year)			25ha	6.520	20ha	5.216	20ha	5.216	20ha	5.216	22.168
	b) 2nd year maintenance					25ha	5.980	20ha	4.784	20ha	4.784	15.548
	c) 3rd year maintenance							25ha	5.845	20ha	4.676	10.521
	d) 4th year maintenance									25ha	2.375	2.375
	Sub-Total		24.765		27.688		32.364		37.013		38.219	160.049

	4) Soil Conservation through Small scale Engineering											
	i) Check dam/gully plugging with yearly maintenance	2nos	1.000	3nos	1.500	3nos	1.500	2nos	1.000	3nos	1.500	6.500
	ii) Contour trenches 2'x2½' Size with yearly maintenance	250m	0.625	500m	1.250	500m	1.250	250m	0.625	250m	0.625	4.375
	iii) Construction of drainages and maintenance of existing drainage	250m	0.625	250m	0.625	500m	1.250	250m	0.625	250m	0.625	3.750
	iv) Construction of Gabion structure	1no	0.500	2nos`	1.000	3nos	1.500	3nos	1.500	2nos	1.000	5.500
	Sub-Total		2.750		4.375		5.500		3.750		3.750	20.125
	Total of Catchment conservation		42.061		47.833		57.200		62.988		69.379	279.461
III	Water Management											
	1) Preventive control measures											
	i) Construction of 5ft detention structure	1no	1.500	2nos	3.000	2nos	3.000	3nos	4.500	3nso	4.500	16.500
	ii) Renovation and maintenance of existing silt detention structure	6nos	1.200	7nos	1.400	9nos	1.800	11nos	2.200	14nos	2.800	9.400
	iii) Construction of silting basin			2nos	6.000	1no	3.000	1no	3.000	1no	3.000	15.000
	2) Curative measure											
	i) Desiltation by dredging from silting basin as well asan identified location of the lake areas.	200cum	1.000	400cum	2.000	1000cum	5.000	1000cum	5.000	1500cum	7.500	20.500
	ii) Construction of drainage channel & subsequence maintenance	300mt	3.000	700mt	7.000	400mt	4.000	500mt	5.000	500mt	5.000	24.000
	iii) Desiltation of streams 2 streams every year	0.5km	0.250	1km	1.000	1km	1.000	1km	1.000	1km	1.000	4.250

	iv) Construction of peripheral bunding including yearly maitnenance	100mt	1.500	500mt	6.500	500mt	6.500	500mt	7.500	500mt	7.500	29.500
	v) Removal of weeds (Weed control)	300cum	1.500	500cum	3.000	700cum	3.500	1000cum	5.000	1000cum	5.000	18.000
	Total of Water Management		9.950		29.900		27.800		33.200		36.300	137.150
IV	Biodiversity Conservation											
	1) Raising of indegenous fruit bearing tress for gap planting, polybags 2 feet tall @Rs.10/per seedling	5000nos	1.000	15000nos	1.500	15000nos	1.500	15000nos	1.500	20000nos	2.000	7.500
	2) Gap planting of seedling inclding clearance, transportation and stacking											
	i) Survey & demarcation	LS	0.114	LS	0.114	LS	0.342	Ls	0.342	LS	0.342	1.254
	ii) Clearance of site	LS	0.150	LS	0.150	LS	0.450	LS	0.450	LS	0.450	1.650
	iii) Planting of seedling including, transportation, clearance and stacking	5000nos	1.250	5000nos	1.250	15000nos	3.750	15000nos	3.750	15000nos	3.750	13.750
	iv) Weeding											
	a) 1st weeding			5000.000	1.000	5000	1.000	15000	3.000	15000	3.000	8.000
	b) 2nd weeding					5000	0.750	5000	0.750	15000	2.250	3.750
	c) 3rd weeding							5000	0.500	5000	0.500	1.000
	Sub-Total		2.514		4.014		7.792		10.292		12.292	36.904

	3) Improvement of water source for Wildlife											
	i) Construction of Dam at Pala Tipo Hlipa, its subsequent maintenance			1no	7.500	Ls	1.000	Ls	1.000	Ls	1.000	10.500
	ii) Construction of Water holes			2nos	1.000	1no	0.500	1no	0.700	2nos	1.200	3.400
	4) Biodiversity conservation awareness	Ls	0.500	Ls	0.250	Ls	1.000	Ls	1.250	Ls	1.500	4.500
	5) Eradiction of invassive species / reducing invassive species	Ls	0.500	Ls	0.750	Ls	1.000	Ls	1.000	Ls	1.200	4.450
	Sub-Total		1.000		9.500		3.500		3.950		4.900	22.850
	Total of Biodiversity conservation		3.514		13.514		11.292		14.242		17.192	59.754
V	Sustainable Resources development and livelihood improvement											
	1) Development of irrigation facilities equipment											
	i) Construction of irrigation channel / Pipes including intake chamber			2.5km	15.000	Ls	0.500	Ls	0.500	Ls	1.000	17.000
	ii) Constn.of Main Reservoir					1no	15.000	1no	2.500			17.500
	iii)Constn.of distribution reservoir including distribution pipes							2nos	10.000	2nos	10.000	20.000
	Sub-Total		0.000		15.000		15.500		13.000		11.000	54.500

2) Provision for low income families												
i)	Assistance to the Micro-enterprises			4fly	2.000	4fly	2.300	5fly	2.900	4fly	2.400	9.600
ii)	Medical Health Camp	LS	1.000	LS	1.000	LS	1.500	LS	1.500	LS	1.800	6.800
Sub-Total			1.000		3.000		3.800		4.400		4.200	16.400
3) Sustainable Fishery development												
i)	Construction of Haccheries			1nos	1.000	2nos	2.000	1no	1.000			4.000
ii)	Constn.of Fish Dam with Net at the outflow of Pala Lake			2nos	2.000			2 nos	2.500			4.500
iii)	Constn.of Jetty / Floatable Jetty			1no	2.500	1no	2.500	1no	2.500			7.500
iv)	Consnt,of Boat Sheltering yard			1no	3.000	1no	3.000					6.000
v)	Purchase of fishing Boat / Dug out Boat					1no	1.000	1no	1.000			2.000
vi)	Constn.& installation of Cage culture			1no	0.500	1no	0.500			3nos	1.500	2.500
vii)	Regulatory measures likes signages / information.	LS	0.100	LS	0.150	LS	0.200	LS	0.250	LS	0.300	1.000
Sub-Total			0.100		9.150		9.200		7.250		1.800	27.500
4) Eco-tourism development												
i)	Consnt.of Mara Typical House and subsequent			1no	6.000			2no	11.500	2no	13.000	30.500
ii)	Constn.of Interpretation centre					1no	15.000					15.000
iii)	Cosnt.of Waiting shed and selling counter					1no	5.000	LS	0.750	LS	0.500	6.250
iv)	Installation of Solar light/ connection of electrification and subsequent maintenance			LS	10.000	LS	0.500	LS	0.500	LS	0.500	11.500
v)	Constn.of Nature trails and its maintenance					1000mts	1.000	1000mts	1.000			2.000

	vi) Purchase of Boat			1no	1.000	1no	1.250	2nos	2.500	1no	1.250	6.000
	vii) Consnt.of Toilet with water connectivity & maintenance	1nos	1.500	LS	0.250	1nos	1.600	1no	1.750	LS	0.500	5.600
	viii) Inmprovement / Renovation of existing furniture like signages, Visitor guidelines, Awareness amonth visitor	LS	0.500	LS	0.500	LS	1.000	LS	1.000	LS	1.500	4.500
	ix) Planting / Raising of Avenue Trees along the road & Eco Park area including fencing with subsequence Maintenance	LS	1.000	LS	1.250	LS	1.500	LS	1.750	LS	2.000	7.500
	Sub-Total		3.000		19.000		26.850		20.750		19.250	88.850
	x) Waste Management											
	a) Preperation / making of bamboo Dust Bin	LS	0.500	LS	0.500	LS	0.500	LS	0.750	LS	1.000	3.250
	b) Cleaning and burning of debris at incinerable Chamber	LS	0.400	LS	0.500	LS	0.750	LS	0.750	LS	1.000	3.400
	Sub-Total		0.900		1.000		1.250		1.500		2.000	6.650
	Total of Sustainable Resources development and livelihood improvement		5.000		47.150		56.600		46.900		38.250	193.900
VI	Institutional development											
	1) Research & monitoring											
	a) Identification of Avi-fauna/Flora and fishes study of hYdrology and linnology	LS	2.500	LS	5.000	LS	5.000	LS	7.500	LS	7.500	27.500
	b) Constn.of Reasearch Centre cum research Rest House with equipment materials			1no	10.000	LS	1.000	LS	1.000	LS	1.000	13.000

	c) Impact of assessment Surveying of socio-economy of the fringe village	LS	0.200	LS	0.200	LS	0.300	LS	0.300	LS	0.500	1.500
	d) Monitoring	LS	2.000	LS	2.500	LS	3.000	LS	3.500	LS	4.000	15.000
	2) Communication and Outreach programme											
	a)) Education and awareness programme, slide show, seminar, Training programme, workshop and like visit programme	LS	2.000	LS	2.500	LS	2.500	LS	2.500	LS	3.000	12.500
	b) Observation of world Wetland day & Pala tipo	LS	0.250	LS	0.250	LS	0.500	LS	0.500	LS	0.500	2.000
	Sub-Total		6.950		20.450		12.300		15.300		16.500	71.500
	4) Equipment and stationeries											
	i) Office equipment & furniture	LS	0.500	LS	1.000	LS	1.000	LS	1.000	LS	1.500	5.000
	ii) Computer with Printers	LS	1.000	LS	0.250	LS	0.500	LS	0.500	LS	1.000	3.250
	iii) Pumping set					1no	1.500					1.500
	iv) Motor launch & JCB (Dradger)							1no	5.000	LS	1.500	6.500
	v) Laboratory equipment	LS	0.500	LS	0.500	LS	0.500	LS	1.000	LS	1.000	3.500
	Sub-Total		2.000		1.750		3.500		7.500		5.000	19.750
	Total of Institutional Development		8.950		22.200		15.800		22.800		21.500	91.250
	Grand Total		83.725		171.347		175.442		182.380		183.621	796.515

9.3 Summary of the Cost estimate by the HUDCO

SI No	Management Plan Component	Fund Requirement (Rs.in lakhs)		
		Core Activities	Non Core Activities	Total Eligible activities(Rs. In lakhs)
I	Protection Measure	8.000	27.000	35.000
II	Catchment Conservation	197.917	81.544	279.461
III	Water Management	39.750	97.400	137.15
IV	Biodiversity Conservation	39.554	20.200	59.754
V	Sustainable Resources development and livelihood improvement	40.600	153.300	193.900
VI	Institutional Development	71.5	19.750	91.25
	Grand Total	397.321	399.194	796.515

10. Means of Financing

Fund requirement from different sources as proposed by the Hudco

SI No	Activity	Funds(Rs. In lakh) from Central Government under NCPA (CSS) 90%	Fund (Rs. In lakh) from State Government (SMS) 10%	Total Budget requirement (Rs. In lakhs)
I	Protection Measure	31.500	3.5000	35.000
II	Catchment Conservation	251.515	27.9460	279.461
III	Water Management	123.435	13.7150	137.15
IV	Biodiversity Conservation	53.780	5.9740	59.754
V	Sustainable Resources development and livelihood improvement	174.510	19.3900	193.9
VI	Institutional Development	82.125	9.1250	91.25
	Grand Total	716.865	79.6500	796.515

11. Commitment regarding share of State Govt.

The agency has furnished a letter dated 26.02.2021 of the Environment, Forest & Climate Change Department, Government of Mizoram, regarding commitment of the State for providing 10% of the budget estimate for the project Conservation and Management of Pala Wetland.

12. Observations

HUDCO has appraised the IMP for Pala Wetland based on the information given by the agency in the IMP and further clarification to HUDCO's queries vide the email dated 04.03.2021. Due to time constraints and other reasons, HUDCO has not conducted any site visit or inspection to the Pala Wetland area.

- (1) The Pala Wetland covers an area of 1850 hectares and the altitude of the area is 275-700 meters above the mean sea level. Pala Lake is very rich in Biodiversity, there are many species of Flora and Fauna. It is a home to a range of Animals, birds, Amphibians and Reptiles. A survey has found more than 25 species of mammals, 120 species of Birds and 10 species of Amphibian and 22 species of Reptiles in the area. The area is also rich in butterflies with 38 species having been reported so far. There are 7 villages in the fringe areas of the Pala Wetland with a total of 827 households having 4556 population, which is directly or indirectly dependent on the wetland for their livelihood. Pala Lake water is the source of fresh water to the fringe villages for drinking and is also main water source of irrigation for horticulture, agriculture and aquaculture. The above characteristics of the wetland makes it well qualified for inclusion under NPCA as per the guidelines.
- (2) The Integrated Management Plan for conservation and management of Pala Wetland for the period 2020-21 to 2024-25 has been approved by the State Wetland Authority, Mizoram and its technical committee on 15th January, 2021. The agency has also furnished the letter dated 26.02.2021 of the Environment, Forest & Climate Change Department, Government of Mizoram, regarding commitment of the State for providing their share of budget. i.e., 10%.
- (3) The Brief Document of the management plan has been framed as per the format present in the NPCA guidelines which give all requisite information pertaining to the wetland.
- (4) The map of zone of influence and wetland map provide are as per standard GIS format.
- (5) The IMP consists of eight chapters and is more or less aligned with the format suggested in the NPCA guidelines. However, the following are some exceptions:

- Under section 6.3 of IMP i.e., Institutional Design - As per the IMP, the institutional design head covers how the nodal department will co-ordinate all monitoring activities for implementation of management plan. However, the NPCA guidelines states that the institutional design shall cover how the coordination between different monitoring agencies will be achieved.
 - Under section 6.4 of IMP i.e., Infrastructure and human resources design - As mentioned in the IMP, apart from concurrent monitoring to ensure effectiveness of project, the circle Management render by the Nodal Department, the service of research organization, NGO's and Local University shall be harnessed with respect to third party monitoring and evaluation. However, the IMP does not give the information regarding infrastructure and human resource requirement details necessary to successfully implement the IMP
 - Under section 6.6 of IMP i.e. Review and adaptation - The IMP does not provide the suitable details regarding, how the monitoring outcomes shall be used to improve/implement the management plan further. The IMP highlights that the monitoring outcomes shall be used for mid-course correction and they shall be well documented.
- (6) The IMP gives a list of activities to be undertaken for implementation of the plan, which have been categorised as core and non-core activities. A monthly chart of activities to be executed is also presented against each management Plan component.
- (7) As per the IMP, the total fund requirements(budget) for the all the activities of the six management plan components is estimated about Rs. 1240.194 lakhs. The agency has clarified that, the budget has been prepared as per approved schedule rate (Year of SORs is not mentioned)). Further, all budget for civil works are prepared in accordance with public schedule of rate (Siaha District) and all forestry related budget are in line with cost norms of National Mission for Green India (GIM) & National Afforestation Programme (NAP). However, the budget for some activities which account for 15% of the total cost has been worked out on Lumpsum (LS) basis.
- (8) As per the categorization of core and non-core activities in the IMP, a total amount of Rs. 839.335 lakhs was estimated for core activities which is about 75.20% of the total of Central Government's share. The estimate of non-core activities is about 24.80% of the Central Government's share.
- (9) As per the guidelines of NPCA, the IMP activities should have main focus on Ecosystem-based interventions and Engineering interventions in wetlands should be taken up in a limited manner. However, It was also observed that out the total fund requirements of Rs. 1240.194 lakhs, a major portion of Rs. 673.267 lakhs (54.28%) has been marked for new works and Rs. 268.323 lakhs (21.63%) was marked for maintenance activities. The budget estimated for eco development activities was only 7.47% (i.e. Rs. 92.67 lakhs) of the total budget. This shows that the focus of IMP is more on Engineering work rather than Ecosystem-based interventions as required NPCA.

- (10) It is observed that, the categorization of activities as core and non-core activities in IMP is not as per the NPCA guidelines. It is also observed that, there are number of activities included in the IMP, which are not-eligible for funding under NPCA.
- (11) It was observed that, after recategorization of activities (as per NPCA guidelines), the requirement of funds for the core activities has been estimated about Rs. 397.321 lakhs. Similarly, for non-core activities the estimated cost is about Rs. 399.194 lakhs. The activities found not eligible as per NPCA guidelines estimates to about Rs. 443.679 lakhs. Hence, the total fund requirement of core and non-core activities works out to about Rs. 796.515 lakhs which is 64.22% of the total budget estimated (Rs. 1240.194 lakhs). The remaining amount of 35.73% was under activities not-eligible for funding as per NPCA guidelines.
- (12) As per NPCA guidelines, the budget for non-core activities should not exceed 25% of the total budget. However, the fund requirements for non-core activities is estimated at Rs. 399.194 lakhs which is about 50.12% of the eligible activities (as per NPCA guidelines) and 32.14% of the total budget cost mentioned in the IMP.