Annex II: Study Methodology

Following step by step process was followed for Environmental Assessment purpose.

2.1 Initial Consultation and Desk Review

Initial consultation with project authority SPMU- OIIPCRA was conducted to get idea about project objective and proposed activities. All available preliminary information like Project Concept Note, list of MI project, reports on earlier OCTMP project were collected from department. Detailed analysis of available information was made to understand the nature of the project and project location. Potential environmental features located within project area were preliminarily assessed by internet-based survey and literature review. Detailed consultation was carried out with environmental expert of The World Bank as well as SPU to determine sample selection criteria, components of environmental assessment, andEMF. List of all line departments and other stakeholders was prepared in consultation with the team of expert for developing Project Implementation Plan (PIP).

2.2 Inception Activity

An inception report specifying study methodology, sample coverage, study tools and field plan was prepared and submitted to SPMU. Detail presentation on sampling and study approach was made to SPMU before initiation of field level assessment and primary data collection. All study tools designed for primary field level study, community consultation and departmental consultation were shared with SPMU and vetted by them.

2.3 Data Collection

Presence of significant environmental features i.e. forest area, sanctuary, protected area, ASI site, polluting industry like mine, mine based industryetc.. was determined by secondary research. Internet based study was conducted to capture significant natural environmental features located within study universe. Information on the presence of these environmental features were also collected during tank level primary study.

Meteorological information including occurrence of natural hazard within entire project universe was assessed using secondary information. Land use pattern, irrigation facilities, ground water availability & quality, cropping practice, crop production, fertilizer and pesticide consumption in project districts were also assessed during analysis of the secondary information.

Primary survey was conducted mainly to capture information like physical condition of tank, water availability for irrigation, waterlogging, environmental features like presence of Sacred Grove, temple, encroachment, public/ community utilities, cropping practice, fertilizer use, crop disease wise pesticide use, pisciculture practice, fish diseases and use of medicine within tank command area and adjacent area. Presence of any archaeological, paleontological, historical significance sites within 300 meter radius and sensitive receptor like educational institute, health centre, park etc. within 200 meter radius of command area were collected during primary survey.

Table 1: Source wise study components

Secondary Information		Primary Information	
Tank physical details	Temperature	Surface water quality	Physical cultural resource
Block Demographic Profile	Relative Humidity	Ambient Air Quality	Sensitive receptor
Agro-climatic zone	Rainfall	Soil Quality	Cropping Practices
Block land use pattern	Ground Water Availability	Noise Pollution	Crop Disease and Pesticide Use
Land use and land cover within 10 km. radious	Ground Water Quality	GIS Survey	Pest control measures
Geology and Mineral	Soil Type	Land use and land cover of sampled project	Fertilizer use and practice
Earthquake	District Forest Profile	Tank Condition	Pisciculture Practice
Wind and Cyclone	Agricultural Crops	Industrial Pollution	Fish Diseases and medicine use
Flood and Waterlogging	Pesticide Consumption	Encroachment & utility	Awareness on Climate Change
Meteorology	District Fertilizer Use	Public/ community utilities	

2.3.1 Data Collection

Baseline data were collected through site visits and on sampling basis, interaction with local people and discussion with project authority, stakeholder consultation, from relevant project records and secondary sources. The studied parameters include physical environment, biological environment, land, water, air, noise, soil, etc. of study area.

2.3.2 Primary Baseline Data

The primary baseline information on different environmental components were collected through field survey. Field surveys were carried out to collect information on the micro level environmental features such as human settlements, forest, trees within RoW of the embankment, waterbodies, sensitive locations, air, water, noise and soil quality etc. Further, primary sample surveys for the environmental components, such as air, surface water, noise and soil characteristics that are critical in the context of the project were carried out during the study period.

Sampling stations are strategically located in and around the project sites. Soil & Water samples were collected as per recommended procedure. Suitable equipment was used to record Air quality and Noise level at site / near to site. Literature and authentic records were consulted to study the environment status concerning the study areas. Status of pre-project environmental conditions were considered broadly in two aspects, i.e., (1) physical environment and (2) biological environment.

2.4 Sampling Criteria

As decided during inception meeting, a total of 9 nos. irrigation tank from proposed 538 nos. MI tank were considered for environmental assessment and EMF development purpose. Following criteria were set forth for selection of sample MI tank.

- At least one irrigation tank from each agro-climatic zone;
- Sample tank covering Scheduled as well as partly Scheduled block;
- Tank shall be selected in such a manner that it covers all river basin of study universe
- 9 nos. minor irrigation projects
- Selected tank shall be blend of earthen as well as concrete dam

- At least one MI tank with dam height more than 10m[1]

Out of total 538 MIP considered under OIIPCRA project, dam height of only 13 MIPs is more than 10 meter out of which only three (3) have dam height more than 15 meter. Dam of 319 reservoir type MIP are earthen whereas 145 diversion weirs are made of concrete and remaining two are creek. Project district wise MI reservoirs and diversion weirs and creek are given in table 2 of EMF report. All these irrigation projects are spread across 7 agro climatic zones (ACZ) out of 10 ACZ prevailed in Odisha state. ACZ as well as district wise distribution of MI tanks are highlighted in Table 1 of Annexure- III. These irrigation projects are spread across 5 river basins.

Table 2: Selected 9 tanks for environmental assessment purpose

Name of the Irrigation Project	Type	Design CCA in ha. (Kharif)	River Basin	Height of Dam/ Weir (in m.) *	Type of Dam/ weir	ACZ
Dandrabahal MIP	Reservoir	52.0	Tel	5.0	Earthen	WCTL-1
Khaibandha MIP	Reservoir	42.0	Budhabalanga	9.2	Earthen	NECP
Jallibandha MIP	Reservoir	41.0	Rushikulya	3.0	Homogeneous earth fill	ESECP
Talakholaghai, Mohanpur MIP	Reservoir	60.0	Rushikulya	4.0	Homogeneous earth fill	ESECP
Jamunasagar MIP	Reservoir	180.0	Tel	10.15	Earthen	WCTL-2
Cradigappa MIP	D/w	60.0	Tel	3.0	Concrete	NEG
Bisipur MIP	D/w	47.0	Baitarani	NA	Concrete	NCP
Dandamunda MIP	Reservoir	40.0	Tel	6.38	Earthen	EGHL
Kalimati MIP, Keonjhar	Reservoir	90.0	Baitarani	15.54	Earthen	NCP

WCTL-1: Western Central Table Land-1 *NECP: North Eastern Coastal Plain*
ESECP: East and South Eastern Coastal Plain *WCTL-2: Western Central Table Land-2*
NEG: North Eastern Ghat *NCP: North Central Platue*
EGHL: Eastern Ghat High Land
NA: Data not available, D/w- Diversion Weir ** as per design parameter*

2.5 Study Tools &Primary Assessment Methodology

Mainly focus group discussions (FGD) methodology was adopted at tank command level. FGD was conducted with at least one Pani Panchayat (PP), Fisher Folk Community, Self Help Group (SHG), Farmers Producer Organization (FPO) from sample MI location. Consultation was held with CCF of Simlipal forest region; DFO Brahmapur, Ganjam and block level office of line departments like Irrigation, Agriculture, Fishery, Integrated Tribal Development Agency (ITDA), Food Processing, Horticulture. Key informants' interview (KII) was conducted with Forest range office, Khallikote, Ganjam. KII was also carried out with local pesticide & fertilizer distributor/ retailer and owner of hatchery unit. All study tools used for primary assessment and capability assessment of stakeholder departments are given in Annexure-IV. In addition to these, state level all line departments were also consulted by team of CTRAN consulting.

Table 3: Tank wise sample coverage

SL No	MIP	PP	FPO	SHG	Fisherfolk	Fertilizer/ Pesticide	DFO/ CCF	Hatchery

[1]As per the World Bank "OP 4.37 - Safety of Dams";dams that are between 10 and 15 meters in heightare treated as large dams if they present special design complexities--for example, an unusuallylarge flood-handling requirement, location in a zone of high seismicity, foundations that arecomplex and difficult to prepare, or retention of toxic materials

SL No	MIP	PP	FPO	SHG	Fisherfolk	Fertilizer/ Pesticide	DFO/ CCF	Hatchery
1	Dhandamunda MIP, Nabarangpur	1		1	1	1		
2	Jallibandha MIP, Ganjam			1		1	1	1
3	Talakholaghai, Mohanpur MIP, Ganjam			1				
4	Bisipur MIP, Mayurbhanj	1		1	1	2	1	
5	Khaibandha MIP, Balasore	1		1	1			1
6	Cradigappa MIP, Kandhamal	1		1			1	
7	Dandrabahal MIP, Bolangir	1	1	1	1	2		1
8	Jamunasagar MIP, Kalahandi	1		1	1	1		
9	Kalimati MIP, Keonjhar		1	1	1	1		
	Total	6	2	9	6	8	3	3

PP= Pani Panchayat; FPO= Farmer Producer Organization; DFO= District Forest Officer, Brahmapur; CCF= Chief Conservator of Forest, Simlipal;.

In the absence of PP and FPO of respective tank, consultation was carried out with local farmer group and opinion of local people practicing pisciculture in domestic tank was considered in case of non-availability of fisherfolk.

Table 4: Stakeholders wise adopted study methodology

Stakeholders	Adopted Study Tools/ Methodology
Pani Panchayat (PP)	FGD
Farmers Producer Organization (FPO)	FGD
Self Help Group (SHG)	FGD
Fisherfolk	FGD
DFO/ CCF	Consultation
Irrigation, Agriculture, Fishery, ITDA, Food Processing, Horticulture	Consultation
Pesticide & Fertilizer distributor/ Retailer	KII
Hatchery Unit	KII

FGD= Focus Group Discussion, KII= Key Informants Interview, CCF= Chief Conservator of Forest

2.6 Testing of Environmental Parameters

A third-party environmental testing and monitoring laboratory (Envotech and Management Consultancy Pvt. Ltd., 1st Floor, N-5/305, IRC village, Nayapalli, Bhubaneswar-751015, Odisha) was engaged to collect and analyse soil, ambient air, surface water and ambient noise sample from six locations. Soil samples were collected from irrigation command area of respective irrigation tank, whereas water samples were collected from irrigation tanks. One water sample from Rushikulya river considering its presence at immediate vicinity of nearby irrigation project. Rushikulya River, which ultimately connects with Bay of Bengal after flowing approximately 1 km. from nearby MI tank location, is flowing immediate vicinity of Jallibandha MIP, Ganjam. Sample of air and noise was collected/ recorded from nearby villages.

Table 5: Tank wise sampling description for environetntal testing

Monitoring Location Description	Number of Sample			
Name of Minor/ Major Irrigation Project	Surface Water	Air Quality	Soil Quality	Noise Quality
Jallibandha, Ganjam	Rushikulya River - Downstream of MI point - *1 No.*	1	1	1
Talakholaghai, Mohanpur, Ganjam	*MI tank water - 1 No.*	1	1	1
Cradigappa, Kandhamal	MI Tank water- *1 No.*	1	1	1

Monitoring Location Description	Number of Sample			
Name of Minor/ Major Irrigation Project	Surface Water	Air Quality	Soil Quality	Noise Quality
Upper SuktelIrri. Project, Bolangir	MI Tank water- *1 No.*	1	1	1
Dandamunda, Nabarangpur	MI Tank surround pond water- *1 No.*	1	1	1
Bisipur, Mayurbhanj	MI Tank water- *1 No.*	1	1	1
Total Number of Sample	**6**	**6**	**6**	**6**