

Environmental and Social Monitoring Report

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Lao PDR: GMS Nam Theun 2 Hydroelectric Project

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Table of Contents

ACRONYMS	iii
ENVIRONMENTAL ACTIVITIES	2
1. INTRODUCTION-KEY MILESTONES	2
2. ORGANIZATION AND RESPONSIBILITIES	3
2.1 Historical background	3
2.2 Current organization and responsibilities	3
3. ENVIRONMENT PROGRAMS STATUS AS PER JUNE 2020	5
3.1 The Aquatic Environment Laboratory (AE Lab)	5
3.2 Water quality monitoring	5
3.2.1 Obligations	5
3.2.2 Main outputs until June 2020	6
3.3 Hydrobiology monitoring	8
3.3.1 Obligations	8
3.3.2 Main outputs until June 2020	8
3.4 Biodiversity Program	10
3.4.1 Obligations	10
3.4.2 Main outputs until June 2020	10
3.5 Environment Compliance Program	11
3.5.1 Obligations	11
3.5.2 Main outputs until June 2020	11
3.6 Erosion Monitoring Program	16
3.6.1 Obligations	16
3.6.2 Main outputs until June 2020	16
3.7 Implementation of the Environmental Management System	16
3.7.1 Obligations	16
3.7.2 Main outputs until June 2020	17
4. VISITS AND CONSULTANCIES	17
ANNEXES – ENVIRONMENT ACTIVITIES	18
Annex 1 - List of scientific articles relating to Nam Theun 2 Project	19
Annex 2 – Water quality monitoring stations from May 2017 to April 2023	22
Annex 3 – Hydrobiology monitoring stations from May 2017 to April 2023	23

Annex 4 – Parameters to be monitored from May 2017 to April 2023.....	24
Annex 5 – Frequencies and stations of the measurements in May 2017 to April 2023	25
Annex 6 – Water Quality in the Reservoir January to June 2020.....	27
Annex 7 – The 16 fixed boreholes are the most frequently used by villagers in 6 districts ...	28
Annex 8 – Chlorophyll a concentration by station.....	28
Annex 9 – Reference of Chl a result at RES08	29
Annex 10 – Maps and pictures of Aquatic Invertebrate monitoring stations.....	29
Annex 11 – Picture of AMLs monitoring result by camera trap during first semester of 2020	33
Annex 12 – Locations of <i>Mimosa pigra</i> found and destroyed in first half of 2020.....	33
Annex 13 - Landfill observation borewells testing results January to June 2020.....	34
Annex 14 – BOD and COD results	35
Annex 15 – NTPC wastewater treatment facilities monitoring results	35
Annex 16 - Environment inspection and monitoring	36
Annex 17 - Corrective and preventive action for incident reports January to June 2020.....	37
Annex 18 - Environment awareness training January to June 2020	37
Annex 19 – 2020 Health, Safety and Environment Improvement Program (HSEIP)	38
Annex 20 – List of Documents in CEMMP	39

ACRONYMS

ADB	Asian Development Bank
AE Lab	Aquatic Environment Laboratory
AIP	Annual Implementation Plan
AMLs	Artificial Mineral Licks
BH	Borehole
CA	Concession Agreement
CEMMP	Company's Environmental Monitoring and Management Plan
Chl a	Chlorophyll a
CIH	Hydro- Engineering Center of EDF
COD	Commercial Operations Date
CSR	Corporate Social Responsibility
DAFO	District Agriculture and Forestry Office
DEB	Department of Energy Business (Ministry of Energy & Mines)
DOI	Lao Department of Irrigation Analytical Chemistry Laboratory
DONRE	District Of Natural Resources and Environment
E&S	Environmental and Social
EAMP	Environmental Assessment and Management Plan
EDF	Electricité de France
EDFI	Electricité de France International
EGAT	Electricity Generating Authority of Thailand
EGCO	Electricity Generating Public Company Limited
ESMP	Environmental and Social Management Plan
GHG	Greenhouse Gas
GoL	Government of Lao PDR
GPS	Global Positioning System
HH	Household
HEC	Human Elephant Conflict
HSE	Health Safety and Environment
IUCN	International Union for Conservation of Nature
LTA	Lenders Technical Advisor
MONRE	Ministry Of Natural Resources and Environment
NBCA	National Biodiversity Conservation Area
NGO	Non-Government Organisation
NNT-NP	Nakai-Nam Theun National Park
NPA	National Protected Area
NPLAF	Nakai Plateau Livestock, Agriculture and Fishery
NRO	Nakai Resettlement Office (formerly known as Resettlement Monitoring Office)
NT2	Nam Theun 2 Project
NTPC	Nam Theun 2 Power Company Limited
PAFO	Provincial Agriculture and Forestry Office
POE	Panel of Experts
PONRE	Province Of Natural Resources and Environment
RC	Resettlement Committee
SERF	Social and Environment Remediation Fund
RFA	Reservoir Fisheries Association
RIP	Resettlement Implementation Period
RMU	Resettlement Management Unit
RNT	Residence Nam Theun
SGS	Société Générale de Surveillance
UAE	United Analyst and Engineering Consultant Co., Ltd.
UXO	Unexploded Ordnance
VFG	Village Fisheries Group
VTE	NTPC - Vientiane Office
WB	World Bank

WCS Wildlife Conservation Society
WGH Wooden guesthouse
WMPA Watershed Management & Protection Authority
WMPP Wildlife Management and Protection Program
WQB Water Quality and Biodiversity Department
WQMAP Water Quality Monitoring and Assessment Program
XBF Xe Bangfai.

GENERAL INTRODUCTION

NTPC is subject to environment monitoring obligations under the CA until the end of the CA Period.

The Environmental and Social bi - annual progress report follows the AIP 2020 Ver.1 NTPC-S-B1002-0016.

Since the obligation on reporting on social activities has ended with the closing of the Resettlement Implementation Period in July 2018, the current report only focuses on environment activities.

ENVIRONMENTAL ACTIVITIES

1. INTRODUCTION-KEY MILESTONES

There are key milestones of Environment Program during January to June 2020, referring to the key tasks of AIP 2020, as follow:

- **Water quality monitoring**

- (i) Monitor and understand the evolution of the whole NT2 hydro system in relation to Project operations, as required by the Concession Agreement;
- (ii) Provide data for predictive models of the reservoir's water quality and GHG emissions. This model developed by EDF-CIH will help in assessing scenarios of water quality evolution in the medium-term period (30 years). Greenhouse Gases are also taken into consideration in this model in order to refine the estimation of the carbon footprint of the hydropower plant within its entire concession period.

- **Hydrobiology monitoring**

- (i) As part of the concession agreement and the 4th Service Agreement of NTPC and EDF-CIH (May 2017 to April 2023), the hydrobiology monitoring includes the routine monitoring of main aquatic groups e.g. Chlorophyll a (as production indicator in the Reservoir), aquatic invertebrates in the rivers upstream and downstream of the reservoir.
- (ii) To continue of Fish Population Monitoring in the rivers and reservoir with a total of 15 sampling stations in order to monitor the fish biomass in the project area.

Additional activities will lead to support the end of research programs by providing assistance of data analysis and interpretation.

- **Biodiversity Program**

- (i) Follow up the Nakai Elephant Program with Nakai DAFO.
- (ii) Education and outreach on HEC, provide the necessary support and follow up the effectiveness of HEC mitigation and awareness activities by the HEC outreach team from Nakai DAFO.
- (iii) Chinese Swamp Cypress germination program: (i) Environment team plan to continue the joining with the experts from IUCN Conifer Redlist Authority to collect Swamp Cypress seed; (ii) organise germination, (iii) plant seedlings in the Nakai-Nam Theun National Park(NNT- NP).
- (iv) Continue invasive species monitoring and control; and
- (v) Mineral lick replenishment: as advised by an Elephant Specialist (WCS), one replenishment has been organised in 2020 before the wet season.

- **Environment Compliance Program**

- (i) To undertake periodic inspection of all activities by NTPC or its contractors to ensure the compliance with CEMMP.
- (ii) Organize and manage the waste disposal in appropriate methodologies for the wastes stored in NTPC Landfill (hazardous wastes, laboratory wastes, recyclable wastes, used fluorescents and electronic wastes).
- (iii) Regularly organize the landfill observation borewells water quality monitoring for NTPC landfill by using the appropriate methodologies and suitable frequency to ensure that potential of contamination leached from waste cells and/or its leachate ponds are captured and corrective action to avoid further contamination into the local groundwater system.
- (iv) Continue to follow up with NTPC-Site management on taking a proper action for wastewater treatment modification and its maintenance, ensure that the effluent water discharged from NTPC facilities are under the GoL effluent standard guidelines and no environmental impact to the local discharged areas.
- (v) Progress work of the Nakai Landfill construction project and its associated activities; and
- (vi) Continue to support and promote the environmental awareness program in both districts (Gnommalath and Nakai).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Historical background

The Environment Management Office was divided into two separate departments in 2010. The role of ensuring compliance with NTPC's environmental commitments was transferred to the Health, Safety and Environment Department and is under NTPC's Integrated Management System Division. In June 2015, this unit has been renamed Risk and Strategy Unit, along with this organisational change, all tasks related to biodiversity monitoring and management; water quality monitoring and analysis (chemistry, hydrobiology); and erosion monitoring have been maintained within E&S Division's Water Quality and Biodiversity Department. Since January 2016, the Environment Compliance team under the Risk and Strategy Unit was transferred to Water Quality and Biodiversity Department and the name of department has been changed to Environment Department since August 2016. As of October 2018, the social activities were complete and the E&S unit was split into 2 parts: Environment Department is integrated in Technical Branch and Social team is re-named to CSR Department which is under CSR, Government relations and Communication Unit.

The Forth Service Agreement between EDF and NTPC to support the Laboratory started in May 2017 and will last till April 2023.

2.2 Current organization and responsibilities

The department is organized as below:

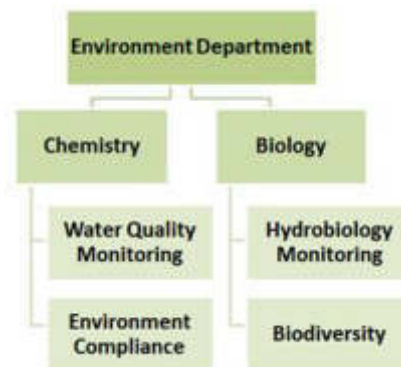


Figure 1 – Environment Department Organization

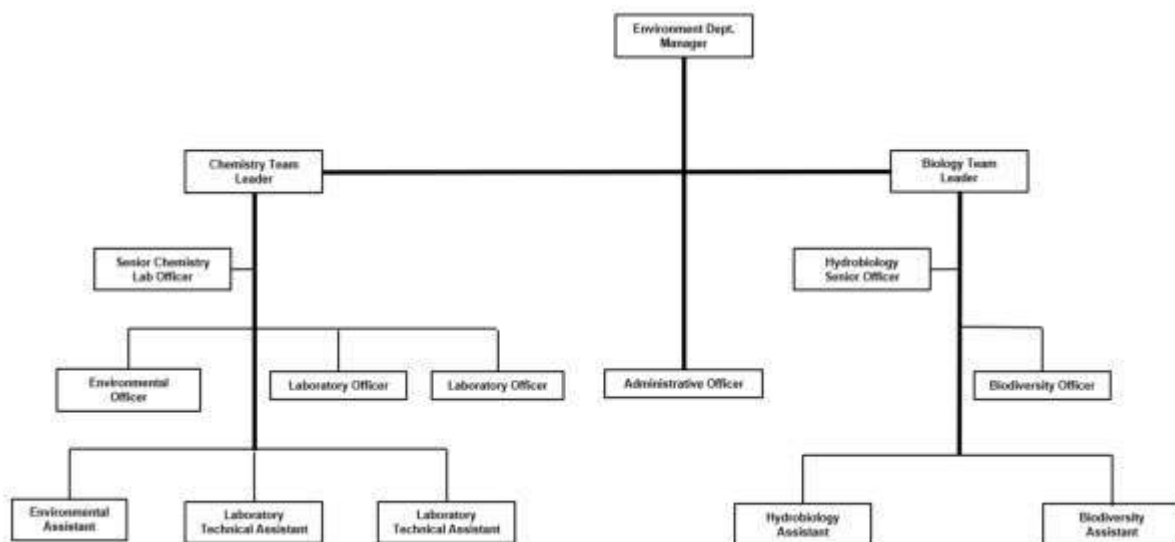


Figure 2 – Detailed Organization Chart of the Environment Department

The Environment Department is in charge of design, implementation and monitoring of activities and achievement of objectives of Environmental (including all water quality and biodiversity) contractual obligations of NTPC during the Operational Phase.

The Aquatic Environment Laboratory (AE Lab), within the Environment Department to monitor water quality, hydrobiology and greenhouse gas emissions in the reservoir, upstream and downstream areas. The funding agreement between NTPC and EDF-CIH has extended and continues until April 2023 with agreement for a lightened scope of monitoring. The environment team also conducts the riverbank erosion monitoring along the Xe Bangfai river. A fish catch monitoring program in the Nakai Reservoir is ended accordingly to the RIP closure(CA obligations), however, a handing over to the Nakai district was realized to ensure their capacity to perform the monitoring upon the needs and important information and document were shared with the NPLAF team.

The environment compliance team monitors, inspects and manages all environmental internal issues and supports the solid waste management in the 2 local districts (Gnommalath and Nakai). The mission ensures that there is no negative impact by the

project to the local environment in a short term and on a long run. The corrective and preventive actions are taken for any environment incident and follow up by the team.

The elephant program, the invasive species program and swamp cypress program are under the biodiversity section of the Environment Department.

3. ENVIRONMENT PROGRAMS STATUS AS PER JUNE 2020

3.1 The Aquatic Environment Laboratory (AE Lab)

After twelve years of operation of NT2 Aquatic Environment Laboratory (AE Lab), the *Service Agreement* between NTPC and EDF for water quality will end as of April 30, 2023. Since 2008 four contracts were signed with EDF-CIH.

The AE Lab was set up in order to develop two kinds of in-house capacities:

- Perform the analysis of most water quality parameters to be monitored by NTPC to fulfil its obligations under the **Concession Agreement** (only analysis such as oil and grease are still being sent for analysis to UAE, a Thai laboratory based in Bangkok).
- Support various **research programs**: Greenhouse Gas (GHG) emissions measurements and related studies, Dynamic of Mercury content in fish flesh, Fish stock assessment in the reservoir, and Effects of a reservoir on fish composition using a tropic approach.

The main outputs for the AEL are the following:

- Maintained the quality of Laboratory and staff performance by continuing to conduct the internal QA/QC by performing the tests of method blank analysis, blind samples analysis and quality control standards by certified reference materials (CRM).
- The proficiency testing (PT) program for the external QA/QC could not be participated with the accredited provider in USA due to the coronavirus outbreak(Covid-19) and the program will be resumed when the situation of Covid-19 become a normal state.
- Support of the scientific researches:
 - Greenhouse gas (GHG) emission monitoring: the monitoring continues in routinely basis but the sampling sites, as well as frequencies are decreased according to the 4th Service Agreement of NTPC and EDF-CIH. The monitoring result is on progress of review by the researchers (Toulouse University, IRD etc.).

As of June 2020, **28 scientific articles** relating to Nam Theun 2 Project have been published in peer reviewed journals and are accessible online (**Annex 1**).

3.2 Water quality monitoring

3.2.1 Obligations

References related to CA Obligations - Volume 2A, Schedule 4, Part 2, Subject 9: 1 to 4.

The Concession Agreement (Volume 2A, Schedule 4, Part 2) details the obligations of NTPC in regard to water quality monitoring during the whole Concession Period. In the CA, it is specified that NTPC has to provide a detailed program to cover the three different phases to check that the Project meets environmental standards (i) prior to inundation, (ii) during the reservoir impounding throughout the construction period and (iii) during operation. A water quality monitoring program has to ensure an accurate assessment of water quality and

biological parameters relating to the project (rivers, domestic water supply, groundwater in the Project Land, effluent discharge, livestock drinking and irrigation water). Monitoring of variations and trends exceeding specified trigger levels are as well clearly specified. The water quality monitoring program has to be regularly reviewed and evaluated to assess its effectiveness.

Reference related to the 4th Service Agreement between NTPC and EDF-CIH (period of May 2017 to April 2023). The maps of the monitoring stations are presented in **Annex 2, Annex 3, Annex 4 and Annex 5**.

3.2.2 Main outputs until June 2020

Reservoir and Downstream Water Quality

Reservoir

- NT2 reservoir still showed clear thermal stratification cycles following natural seasons (December to January: mixing stage, March to July: stable stratification, and August to October: weak stratification due to the disturbance of water current from the rainy runoff). Influence of stratification sequences remains the key driving factor for reservoir chemistry: (i) maximum of nutrients/gas release was recorded at the end of the stratified period, (ii) nutrients/dissolved gas decrease from annual flooded and reached minimum consecutive to the mixing event.
- High value of dissolved oxygen (>5mg/L) at the surface water were always observed in all stations.
- DO at the bottom level tend to increase during mixing period around 6mg/L at Thalang (RES04) and around 7mg/L at Water Intake (RES09). When the stratification appeared, the anoxic condition was observed at RES04 at various layers (3 to 11 m) from February to June. The summary of Water Quality in the Reservoir January to June 2020 are respectively presented in **Annex 6**.

Rivers

Key WQ results related to Project releases during the January to June 2020:

- **Dissolved Oxygen (DO)** remained above the surface water guideline for Nam Theun, Nam Kathang and Xe Bangfai Rivers throughout the 6 months.
- **Biological Oxygen Demand (BOD)**, all measured values in the surface water meet the guideline.
- **Chemical Oxygen Demand (COD)** slightly exceeded the guideline for few months in Xe Bangfai downstream of the downstream channel (DSC) confluence, in Nam Kathang downstream of the Regulating Dam and in Nam Theun downstream of Nakai Dam (If the uncertainty of measurement is considered on the reported results, values may remain under the guideline or slightly exceed the guideline).

The water discharged to Xe Bangfai still shows seasonal effects on temperature and conductivity parameters due to the cooler water and low conductivity of water from the reservoir.

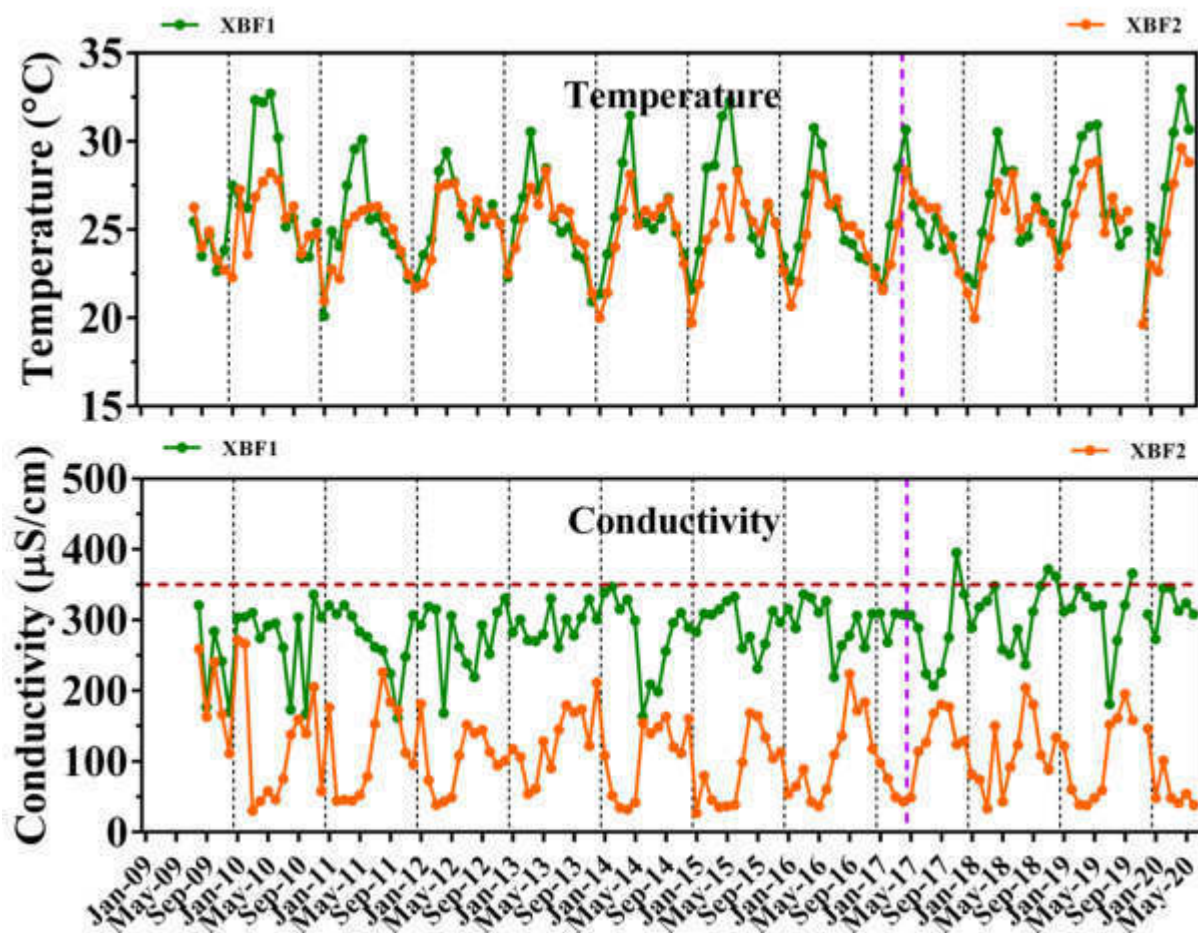


Figure 3 – Measurement of Temperature and Conductivity in Xe Bangfai river

Greenhouse Gas (GHG) Monitoring

GHG emission monitoring continues on a routine basis in reservoir, tributaries, downstream rivers and civil work areas, the monitoring frequency is set as same as Reservoir and Downstream Water Quality Monitoring. **Six scientific articles** relating to GHG emission in NT2 project are published.

Village Water Supply and Water Quality

New cycle of borehole monitoring started in 2018. Up to June 2020, a total of 383 of 827 boreholes (BH) (46%) of total in-use boreholes installed by NTPC since construction period are monitored. Monitoring results of groundwater for Village Water Supply in 2020 are:

- i) Q1_2020: 86 boreholes (including 16 fixed boreholes, see **Annex 7**) were monitored, 44 BH in Nakai Resettlement area and 42 BH in Downstream Program area.
- ii) Q2_2020: due to Covid-19 outbreak, in April and May, most of BH samplings were postponed to June and July, only 30 BH in Downstream Program area (including 9 fixed boreholes, see **Annex 7**) were monitored by end of June.

Monitoring period	Guideline*exceedances
Q1_2020	- Total Hardness exceedance at 1 BH at Xaibouly - pH, conductivity and turbidity : 36 BH showed results exceeding guidelines at least one of these parameters
Q2_2020	- pH, conductivity and turbidity : 23 BH showed results exceeding guidelines at least one of these parameters

*Water quality standard guideline of groundwater for drinking purpose, Decision on National Environmental Quality Standard, Prime Minister's Office, No.81/PMO. 2 Feb 2017, MoNRE, Vientiane Capital

Laboratory QA/QC for Water Quality Testing

To maintain the quality of laboratory and staff, AE Lab continued to conduct the QA/QC plan for internal QA/QC (method blank analysis, blind samples analysis, quality control chart and method comparison), no external QA/QC laboratory was performed due to a limit lead time of samples shipment, no air freight agency could provide a service during the Covid-19 outbreak.

From January to June 2020, AE Lab staff participated to the blind samples' analysis for Total Suspended Solid, Total Nitrogen and Chemical Oxygen Demand(COD) parameters. All testing results were in the acceptance range.

3.3 Hydrobiology monitoring

3.3.1 Obligations

Reference related to CA obligation Volume 2A, Schedule 4, Part 2, Subject 9: 1, 7, 13 and the 4th Service Agreement between NTPC and EDF, the monitoring are conducting for biological production parameters in reservoir ([Chl a] and fish) and rivers (aquatic micro-invertebrate and fish).

3.3.2 Main outputs until June 2020

Routine monitoring conducted according to the CA and in the framework of the 4th Service Agreement with EDF-CIH, hydrobiology program realized in first semester of 2020 as following:

- (i) Routine monitoring for main Aquatic Group ([Chl a] in reservoir);
- (ii) Field sampling for Aquatic Invertebrate monitoring for 2020 in April; and
- (iii) Fish Population Monitoring was conducted for end of Warm-Dry season (WD) 2020.

Fish Population Monitoring

Nam Theun Downstream of Nakai Dam

According to the pandemic of covid-19, to prevent the risk of cross contamination, the mission to downstream of Nakai Dam was cancelled (end of Warm-Dry season 2020) and no data to update in this report.

Fish Population in the Xe Bangfai

The result of the monitoring at Ban Mahaxai (XBF2) showed (**Figure 4**):

- A trend of an increase in abundance, biomass and taxonomic richness since the COD for a same fishing effort and same station.

- Abundance, biomass and taxonomic richness reached low value in end of 2018 and then slightly increased in 2019. In June 2020, abundance and biomass parameters are reached high value while taxonomic richness was in moderate range.
- After the COD, the biomass is fluctuated at around 1.5 Kg per catch except highest catch in June 2020 due to catch of large individual of *Hypsibarbus vernayi* (>200g/individual) and high catch in term of abundance in this area.

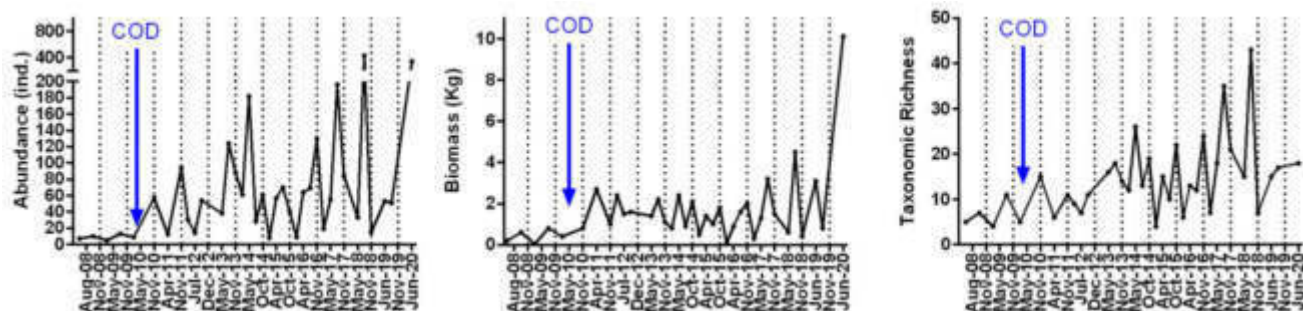


Figure 4 – Fish population parameters (abundance, biomass & taxonomic richness) at Ban Mahaxai

Chlorophyll a [Chl a]

Chlorophyll a concentration showed the same pattern since 2011 (**Figure 5**). After a higher production in 2010 (trophic upsurge), concentration decreased to reach a stable level in 2011. Concentration showed an annual production peak observed at the end of warm-dry (June) and second weaker peak in end of the warm-wet (October). In general, the low concentration of [Chl a] underlined the oligo-mesotrophic level of NT2 Reservoir. In 2018, a high peak observed in August and this was observed at RES08 (**Annex 8**) and this could be linked to the higher amount of total Phosphorus (0.041mgL^{-1}) which is the main factor for Chlorophyll a concentration (**Annex 9**). During the first semester of 2020, [Chl a] showed the same trend with gradual increasing from January to reach the peak in June.

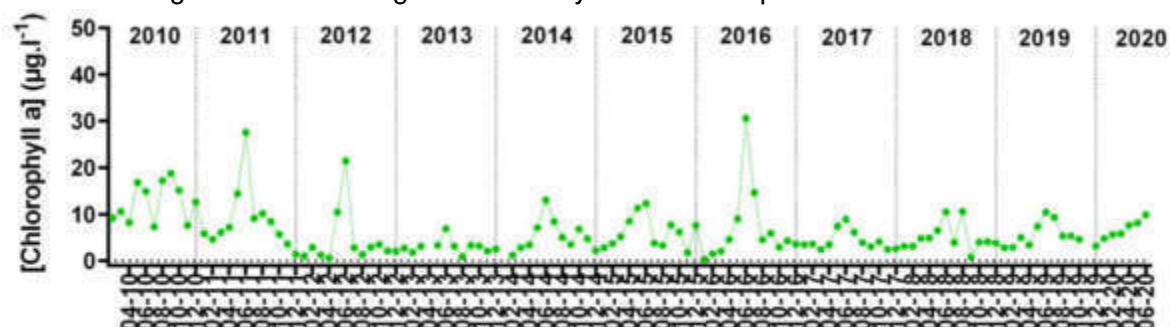


Figure 5 – Monthly average (of all stations) of [Chl a] ($\mu\text{g.L}^{-1}$) in NT2 reservoir from 2010 to mid of 2020

Aquatic Macroinvertebrate Monitoring

Pictures and maps of the monitoring stations in

Annex 10.

Nam Theun Area

To prevent the cross contamination by Covid-19, the sampling collection in Nam Theun downstream (NTH6) was cancelled, and only sampling mission in Nam Theun

upstream(NTH1) has been performed. The habitat this station was mainly composed by sand, roots and pebbles. Its water velocity was ranged between 5 – 150 cm/s.

Nam Kathang/Gnom Area

Most of substrates of the area were composed by mineral sediment of medium to big size; sand and silts size less than 2.5 mm; big size of rocks and bed rock. The water velocity of this area was dominated by 5 – 150 cm/s, but some area presented water velocity higher than 150 cm/s.

Xe Bangfai Area

It is large area of the river and composed by various habitat. The substrate of sampling sites were mainly composed by sand, silts, and mineral sediments of medium to large size of 2.5 – 25 mm. The water velocity of sampling area was mainly ranged between 5 – 150 cm/s and at the river body, the water velocity can be higher 150 cm/s.

A result of samples identification of all areas from this campaign will be summarized in 2020 Annual E and S report.

3.4 Biodiversity Program

3.4.1 Obligations

References related to CA Obligations - Volume 2A, Schedule 4, Part 2, Subject 9: 4, 9, 12, 14, 15, 16, 18, 19, 20.

3.4.2 Main outputs until June 2020

Elephant Program

Human Elephant Conflict (HEC) Monitoring and Mitigation

111 HEC incidents occurred during January to June 2020. 29 incidents were related to Thalang Group and 82 incidents were caused by the Group of Three. 18 incidents were related to the crop; 47 incidents were related to property and 46 incidents were related to crop and property.

From March to June 2020, the Group of Three elephants (6 individuals) roaming in large area cover 4 main districts; Vilabouly, Boualapha, Mahaxay and Xaibouathong districts. This movement caused more HEC incidents compared to the same period 2019 by this group. As a result of the elephant movement, NTPC in collaboration with Wildlife and Aquatic Management Division of Forestry Department from Ministry of Agriculture and Forestry conducted HEC awareness raising at impacted villages in 3 districts; Boualapha, Xaibouathong and Mahaxay, and a total of 364 participants attended the program.

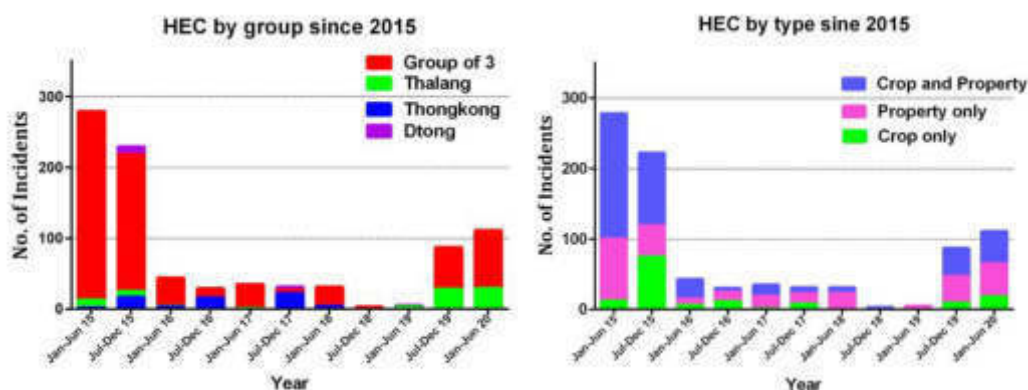


Figure 6 – HEC incidents in bi-annual since 2015 (by group and by type)***Artificial Mineral Lick Replenishment (AMLs) and its monitoring for Jan-Jun 2020***

Artificial Mineral Licks replenishment for Dry Season 2020 was conducted in February. The total mineral salt including 1,082 kg of Sodium chloride(NaCl); 607 kg of Monosodium phosphate(NaH_2PO_4); 213 kg of Calcium carbonate(CaCO_3) and 97 kg of Potassium chloride(KCl) were refilled.

The monitoring of wildlife visitation at the AMLs has been conducted for both methods (observation and camera trap monitoring) as scheduled. The evidence showed elephants, wild ungulate using all AMLs in 3 zones. Cattle found using AMLs in zone II and III. Human acts evidence found in all AMLs sites (**Annex 11**).

Invasive species survey and destruction

The survey and destruction of *Mimosa pigra* was conducted 2 rounds in the first semester of 2020(March and June). There were approximately to 150,000 mature trees and countless seedlings were destroyed. The survey and destruction were focused in Regulating pond area, Headrace channel near Water intake and resettlement villages.

Chinese Swamp Cypress conservation program

The monitoring of *Glyptostrobus pensilis* planted in 2019 found only 2 individuals are survived and in good condition. 6 seedlings germinated in 2019 were planted in May 2020 at reservation area in Oudomsouk village, and most of them are well grown now.

3.5 Environment Compliance Program**3.5.1 Obligations**

References related to CA Obligations - Volume 2A, Schedule 4, Part 2, Subject 9: 35, 39 and Volume 2A, Schedule 4, Part 1, 15.1(b): (i), 2.2.

3.5.2 Main outputs until June 2020***NTPC Waste management facility***

Since January 2018, The NTPC solid waste facility in Gnommalath district is performed by a new sub-contractor (PKC Co., Ltd) under a strictly management by NTPC. The solid wastes are well-separated as per classification(general waste, composted waste, recyclable waste and hazardous waste). The solid wastes from all NTPC premises(RNT, Powerhouse, NRC, WGH, Nongboua boat camp and Dam Site) were transferred to landfill for the further process. The recyclable wastes are sold to the local traders and the food wastes are in trial process for producing of fertilizer (Effective Micro-organism (EM)). The hazardous wastes are well stored in the close building where the access is restricted, and the general wastes go into the waste cell. As of June 2020, about 40% of in-use waste cell was filled (waste cell No. 7). In addition, the construction works for renovating of Hazardous waste storage and chemical waste evaporation ponds were done in January. The Acid/Base waste disposal by evaporation has started in February, about 80L of Base and 530L of Acid have been dispose of. The solid particulates after the evaporation process were collected and stored in the Hazardous waste storage.

Landfill observation borewell

Groundwater quality monitoring in 9 monitoring borewells (5 of the existing ones and 4 of the new installation) around the NTPC landfill is performed on monthly basis. Guideline exceedances in some parameters (pH, BOD, COD and Lead) can be observed sometime. In 2020, due to Covid-19 outbreak, the samples of April to June could not be sent to UAE in Thailand for analysis because the border has closed. The **Annex 13** shows monitoring results during the 1st semester of 2020.

NTPC Wastewater Treatment Management (Black and Grey Wastewater)

Up to date, effluent from all 5 wastewater treatment plants (3 Black wastewater treatment plants at RNT and Powerhouse, and 2 Grey wastewater treatments at Wooden Guesthouse and Nongboua) are routinely monitored in monthly basis. The effluent guideline exceedances have been observed sometime in some parameters (BOD, COD, TSS, Ammonia-Nitrogen, Oil&Grease and Faecal Coliform Bacteria) (**Annex 14** and **Annex 15**).

- ***Environment site inspections and monitoring***

As part of Environment Department, the Environmental Compliance team continues to fulfil its role of undertaking the audits, inspections and monitoring of all facilities to ensure and comply with NTPC environmental guidelines and Lao PDR law.

Total of 72 environmental inspections at all NTPC sites were conducted from January to June 2020. 17 environmental inspections for special mission were conducted during January to June (**Annex 16**).

- ***Environment incident management***

There are 2 environmental incidents were reported during January to June 2020 as shown in **Figure 7** by level classifying:

- Level 1 – Minor Environmental Pollution
- Level 2 – Significant Environmental Pollution
- Level 3 – Serious Environmental Pollution
- Level 4 – Major Environmental Pollution
- Level 5 – Catastrophic Environmental Pollution

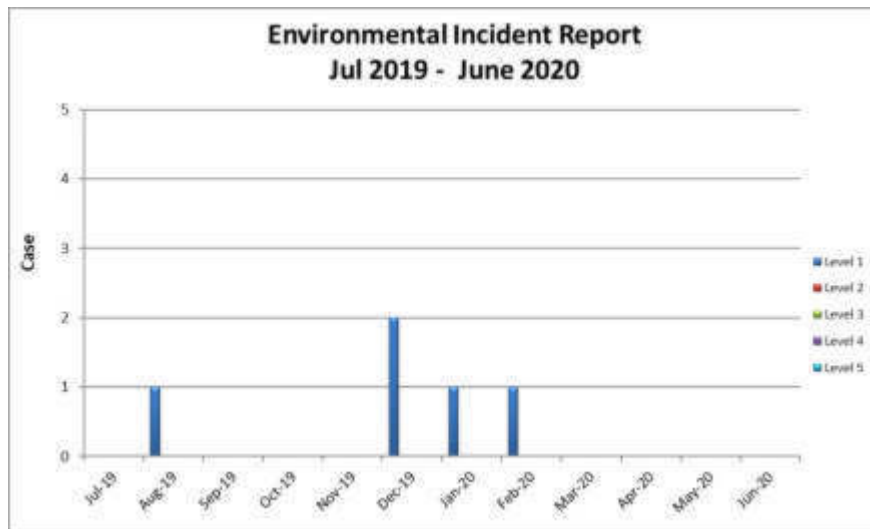


Figure 7 - Environment Incident Reports during July 2019 to June 2020

Corrective and preventive actions for the reported environment incidents are clarified in **Annex 17**

- **Environment awareness programs**

Awareness training

The environmental training was conducted for both NTPC staff and contractor from January - June 2020 (**Annex 18**).

- NTPC Staff, Consultant and Fresh Graduates: 18 persons for induction training
- NTPC's Contractor: 59 persons for induction training and 155 persons for refresh training.

The training assessment was performed via quiz, question, game and real practice on waste management with good participation from all attendances.

Environment awareness program - Plastic bag usage reduction

Since 2013, the program has included into a yearly implementation of Health, Safety and Environmental Improvement Programs(HSEIP). In 2020, two main camps (RNT and WGH) were included to the plastic bag usage reduction campaign (HSE 11/2020, **Annex 19**).The yearly reduction percentage of 2020 was set at 5% (this number is based on the limitation of reduction, the plastic bag are needed in some case such as waste collection and waste delivery). From January to June 2020, the decreasing rate is 16.1% compared to January – June 2019. Below are the current situation of the program:

- **RNT:** The consumption rate is decreased compared to the previous year (1,130 packs in January to June 2020 and 1,322 packs in January to June 2019). The trend of changes are shown in **Figure 8**.

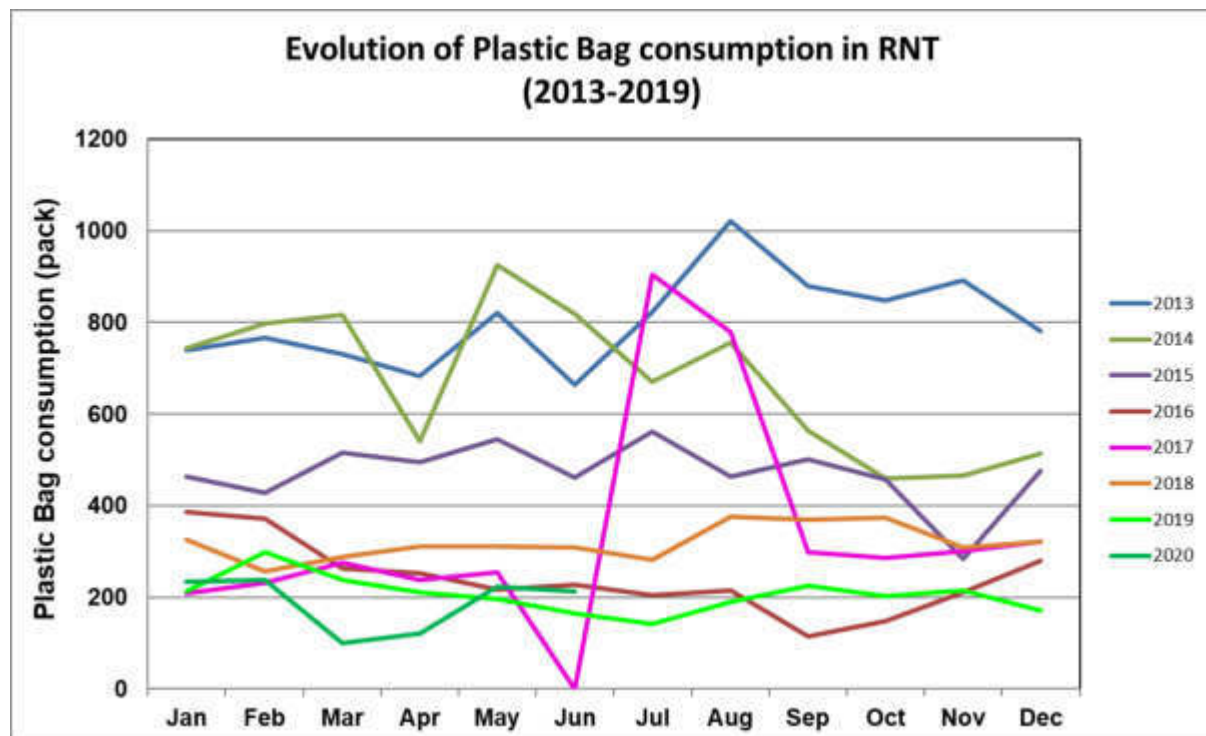


Figure 8 – Monthly Plastic Bag consumption in RNT (2013-2020)

- **WGH:** the total consumption in Wooden guesthouse was decreased as well (114 packs in January to June 2020 and 161 packs in January to June 2019, **Figure 9**)

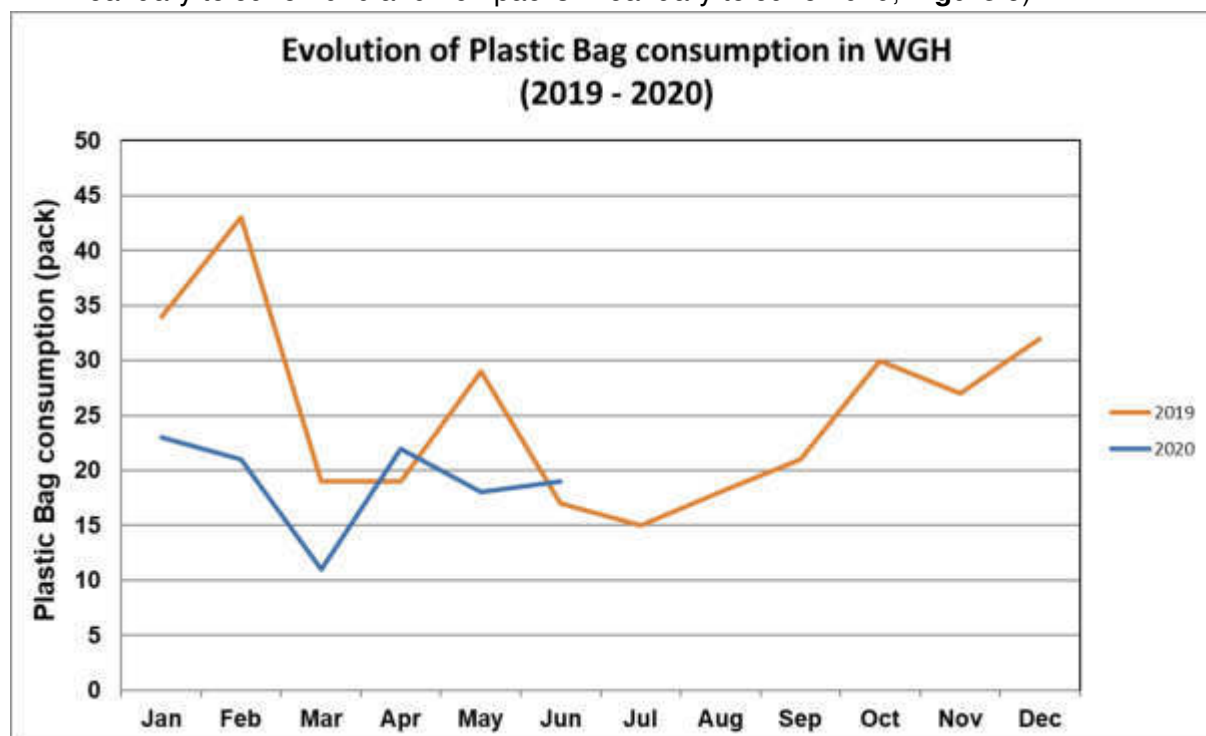


Figure 9 - Monthly Plastic Bag consumption in WGH (2019-2020)

Environment awareness program - Paper usage reduction

This program was launched since 2017 to record the paper consumption from all offices. In 2020, the target of paper usage reduction is set at 5% compared to year 2019. Based on the data collected, the paper usage depends on the needs of users and only the A4 type was used regularly and easy make comparison each period. The graph below showed the evolution of A4 consumption, the most common paper type regularly used. A Total of 34.2% of A4 paper reduction was achieved during the 1st semester 2020, the trends for each offices (VTE, RNT and Powerhouse) illustrated in **Figure 10**).

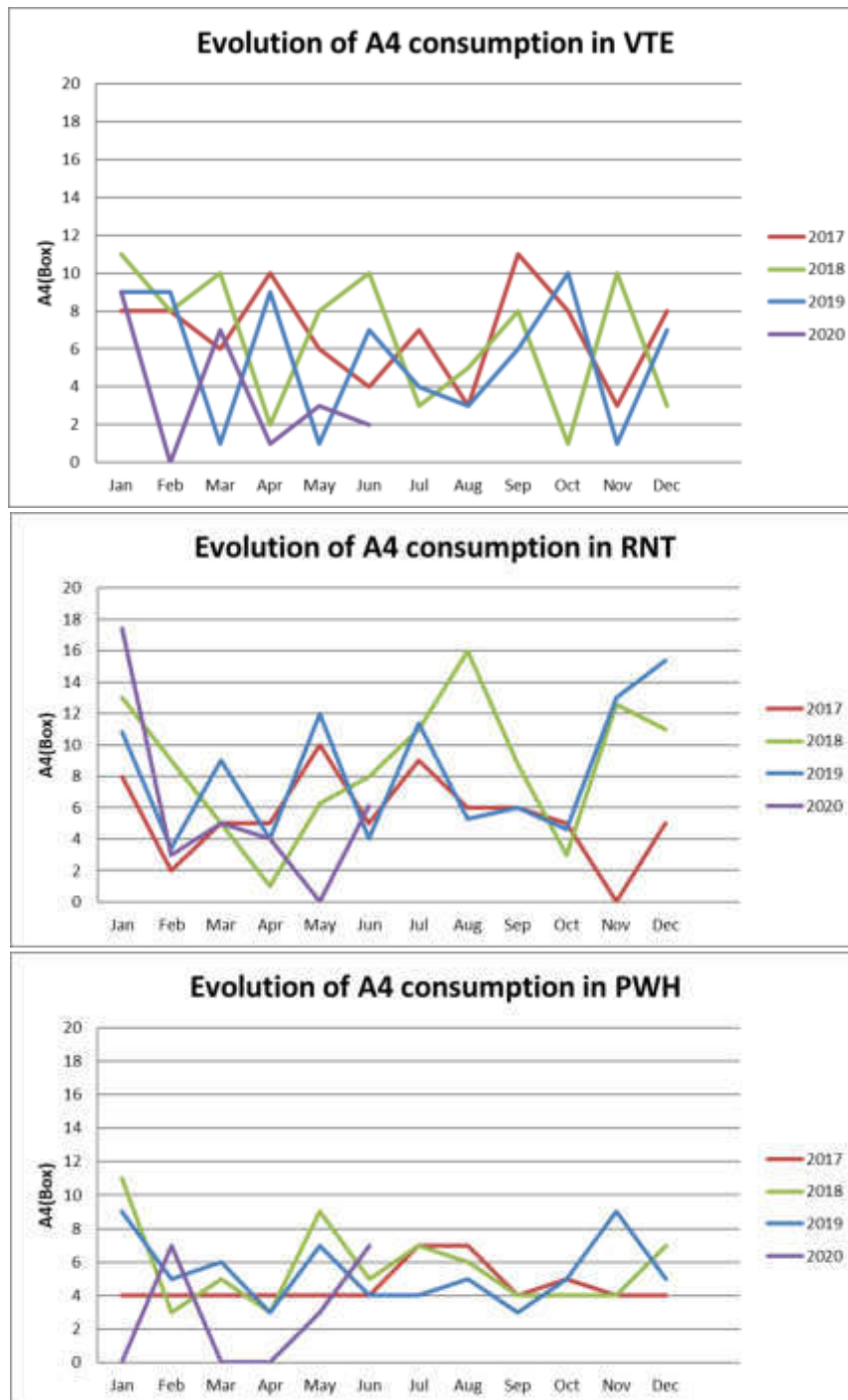


Figure 10 – The evolution of A4 paper usage at 3 offices

- **Supporting of Gnommalath District Solid Waste Management**

To increase the efficiency of the waste segregation and secure the area, a guard was hired by Gnommalath DoNRE to work at the landfill with financial support of NTPC until end of 2020, he has also segregated the waste and to guide other people who come to dump their waste at landfill.

Regarding the implementation of district waste management study by GRET, the contract has been finalized but due to Covid – 19 outbreak, the work was delayed and expected to be started as soon as the situation is back to normal state. This project will also undertake the same study in Nakai district.

- **Supporting of Nakai District Solid Waste Management**

Referred to Company ambitions “For our Communities and Environment”, NTPC has decided to participate in regular education programs regarding waste management plans and service in Nakai Resettlement villages in order to develop an initiative with the district.

The project of new Nakai Landfill construction completed in June 2020. It was officially handed to Nakai DoNRE for management. Furthermore, in order to sustain the landfill management of district together with their service contractor, Environment team organized a basic training on waste management in January for 5 members of contractor working for Nakai waste collection team and Nakai DoNRE, the training agenda also included the site visit at NTPC landfill to see the real practice of NTPC regarding waste management.

3.6 Erosion Monitoring Program

3.6.1 Obligations

References related NTPC Obligations - Volume 2A, Schedule 4, Part 2, clause 9, Item 11 (e)).

3.6.2 Main outputs until June 2020

Photograph survey is still being conducted, as part of on-going erosion monitoring in the Xe Bangfai (including Total Suspended Solids measurements and Cross Section Survey). This survey also gathers data on erosions in sensitive areas (i.e. temples, school).

The latest Xe Bangfai riverbank survey (the 28th mission) was conducted by the Environment team on 8th – 9th June 2020. 737 locations including 27 indicator sites were monitored: (i) 1 indicator site (Ban Bouakhai) and 3 non-indicator sites (2 at Ban Natai and 1 at Ban Phakpheuatai) showed a slight erosion expansion and; (ii) found 1 new erosion site (Ban Nasang) comparing to the mission of December 2019. The indicator sites were where (i) erosion has been significant; (ii) the site has potential for further erosion; and (iii) the site is located near infrastructure such as bridges, houses, temples, or irrigation pumps.

3.7 Implementation of the Environmental Management System

3.7.1 Obligations

Referred to the HSE Legal and Other - Requirements Register (Ref: NTPC M B150302) in the Company's Environmental Management and Monitoring Plan (CEMMP – **Annex 20**).

3.7.2 Main outputs until June 2020

In 28 March 2014, NTPC has been certified on Environmental Management System (ISO 14001) by SGS (Thailand) as Certifying Body under UKAS. In March 2020, the 2nd re-certification audit was planned but due to Covid-19 the mission was postponed, SGS Thailand has exceptionally extended the currently certification until 4th October at last. The online audit (via Microsoft Team) is scheduled in September 2020.

4. VISITS AND CONSULTANCIES

During the 1st semester of 2020, there were main activities of visits, audits and consultancies as follows:

- Lab visit by delegation from MoNRE, PoNRE of Khammouan and Bolikhamxay, DoNRE of Gnommalath, Nakai and Khamkeut in January to exchange with Environment Department regarding the Environment Management Plan of NTPC. A presentation session on general activities of the department was conducted. In addition, , site visits were organized at hazardous waste management and Hazarsoud material storage at Powerhouse, operation process at NTPC Landfill and at DSC channel sink hole repairing work.
- **Environment Management system** – external audit for re-certification planned in March but it was postponed, due to Covid-19 outbreak, to September or until the boundary crossing is back to normal state. SGS exceptionally extended the ISO cetification to October.
- **Site visit by Faculty of Environment, NUOL** - A visit of bachelor's degree students (in February) and master's degree students (in March). The general information regarding environment department such as the monitoring program on water quality, hydrobiology as well as biodiversity activities were presented.
- In February, discussion with Dr Frédéric Guérin, GHG specialist from IRD on:
 - (i) validation of the data of N₂O for 2018 EDF annual report, data of GHG monitoring for 2019 and resume work for writing of the article on N₂O emission from NT2 reservoir,
 - (ii) planning of 2020 for a site visit of student from University of Sciences and Technology of Hanoi (USTH),
 - (iii) tentative schedule for 2020 campaigns of IRD research program; and
 - (iv) status of Gas chromatography and the comparison of testing results of samples between old technique vs new sampling method.
- Participation in LTA audit 2020 via video conference in April, main highlight was focused on solid waste management within NTPC, Gnommalath and Nakai district.
- In May, meeting with Dr Frédéric Guérin, GHG specialist from IRD on the GHG monitoring results and technical support on current work, the discussion has included:
 - (i) Comparison result of the GHG analysis by two different sampling collection techniques.
 - (ii) Estimation of Greenhouse gas emitted from NT2 project in 2019.
 - (iii) Setting parameters and process prior to commissioning of new Gas Chromatography.

ANNEXES – ENVIRONMENT ACTIVITIES

Annex 1 - List of scientific articles relating to Nam Theun 2 Project.....	19
Annex 2 – Water quality monitoring stations from May 2017 to April 2023	22
Annex 3 – Hydrobiology monitoring stations from May 2017 to April 2023	23
Annex 4 – Parameters to be monitored from May 2017 to April 2023.....	24
Annex 5 – Frequencies and stations of the measurements in May 2017 to April 2023	25
Annex 6 – Water Quality in the Reservoir January to June 2020.....	27
Annex 7 – The 16 fixed boreholes are the most frequently used by villagers in 6 districts...	28
Annex 8 – Chlorophyll a concentration by station.....	28
Annex 9 – Reference of Chl a result at RES08	29
Annex 10 – Maps and pictures of Aquatic Invertebrate monitoring stations.....	29
Annex 11 – Picture of AMLs monitoring result by camera trap during first semester of 2020	33
Annex 12 – Locations of <i>Mimosa pigra</i> found and destroyed in first half of 2020.....	33
Annex 13 - Landfill observation borewells testing results January to June 2020.....	34
Annex 14 – BOD and COD results	35
Annex 15 – NTPC wastewater treatment facilities monitoring results	35
Annex 16 - Environment inspection and monitoring	36
Annex 17 - Corrective and preventive action for incident reports January to June 2020.....	37
Annex 18 - Environment awareness training January to June 2020	37
Annex 19 – 2020 Health, Safety and Environment Improvement Program (HSEIP)	38
Annex 20 – List of Documents in CEMMP.....	39

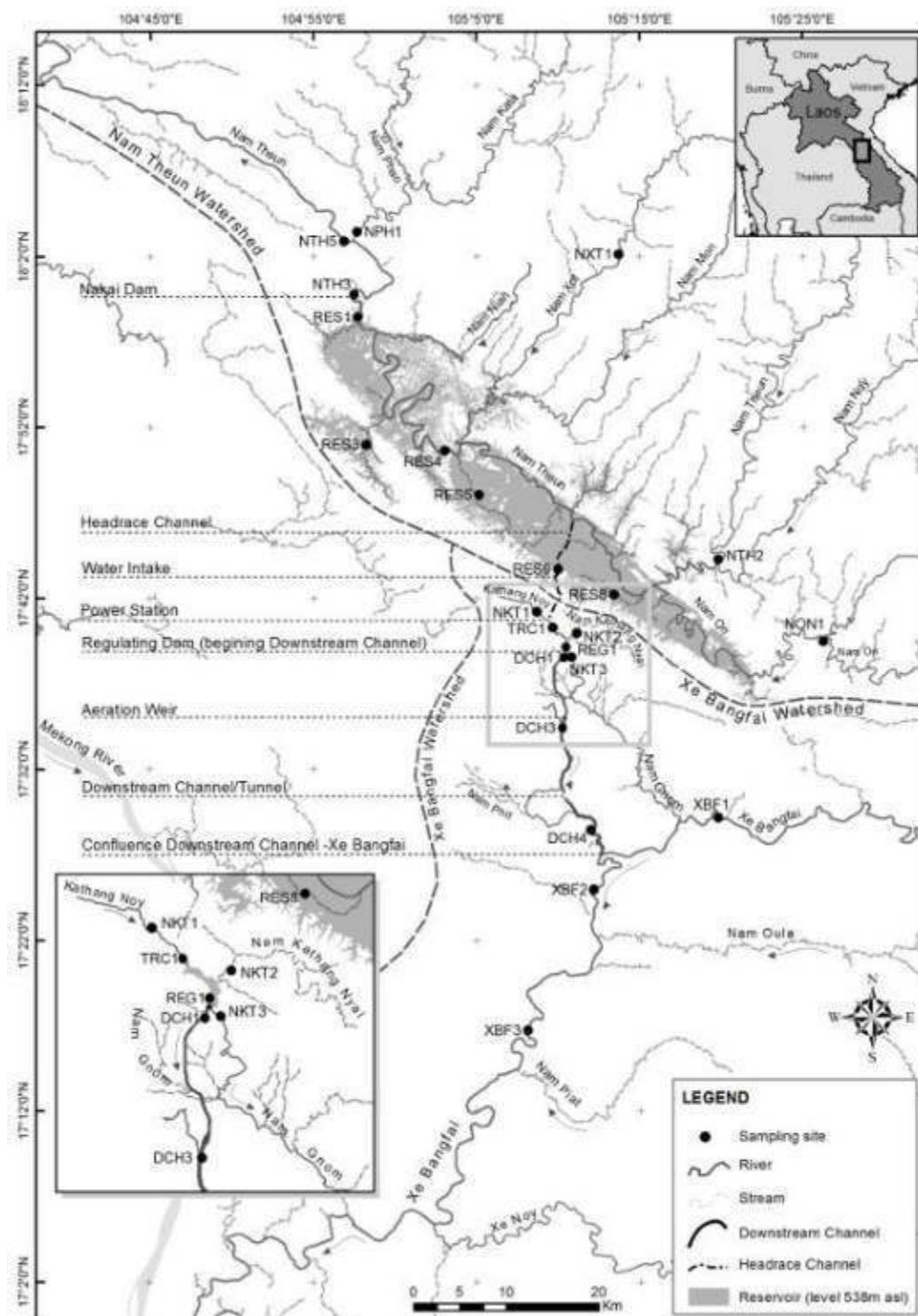
Annex 1 - List of scientific articles relating to Nam Theun 2 Project

Articles	Under review	Approved	Published and online
HYDROECOLOGIE APPLIQUEE – NAM THEUN 2 SPECIAL ISSUE			
Descoux et al. Main features of the Nam Theun 2 hydroelectric project (Lao PDR) and the associated environmental monitoring programme. Hydroeco. appl., 2014			√
Chanudet et al. Evolution of the physico-chemical water quality in the Nam Theun 2 Reservoir for the first 5 years after impoundment. Hydroeco. appl., 2014			√
Chanudet et al. Hydrodynamic and water quality 3D modelling of the Nam Theun 2 Reservoir (Lao PDR): results of simulations of some scenarios. Hydroeco. appl., 2014			√
Martinet et al. Phytoplankton community and trophic status assessment of a newly impounded sub-tropical reservoir: case study of the Nam Theun 2 Reservoir (Lao PDR, Southeast Asia). Hydroeco. appl., 2014			√
Descoux et al. Efficiency of the Nam Theun 2 hydraulic structures on water aeration and degassing. Hydroeco. appl., 2014			√
Cottet et al. Fish Population dynamic in the newly impounded Nam Theun 2 Reservoir (Lao PDR). Hydroeco. appl., 2015			√
Pécastaings et al. Biofilm colonizing the Nam Theun 2 Power Plant Penstock (Lao PDR) - mechanism and potential evolution. Hydroeco. appl., 2014			√
Visser et al. Developing approaches for establishing a fisheries baseline: case-study for Xe Bangfai basin (Lao PDR). Hydroeco. appl., 2014			√
Attwood & Cottet. Malacological and parasitological surveys along the Xe Bangfai and its tributaries in Khammouane Province, Lao PDR. Hydroeco. appl., 2015			√
Streicher U. The Wildlife Rescue Programme of the Nam Theun 2 Hydropower Project (Lao PDR). Hydroeco. appl., 2014			√
Som & Cottet. Turtle and tortoise rescue and monitoring programme in the Nam Theun 2 Reservoir (Laos). Hydroeco. appl., 2015			√
Kottelat. The fishes of the Nam Theun and Xe Bangfai drainage, Laos. Hydroeco. appl., 2015			√
Clavier et al. Spatial and temporal variation of benthic macroinvertebrates in the Nam Gnom Basin receiving discharged waters from the Nam Theun 2 Reservoir (Laos). Hydroeco. appl., 2015			√

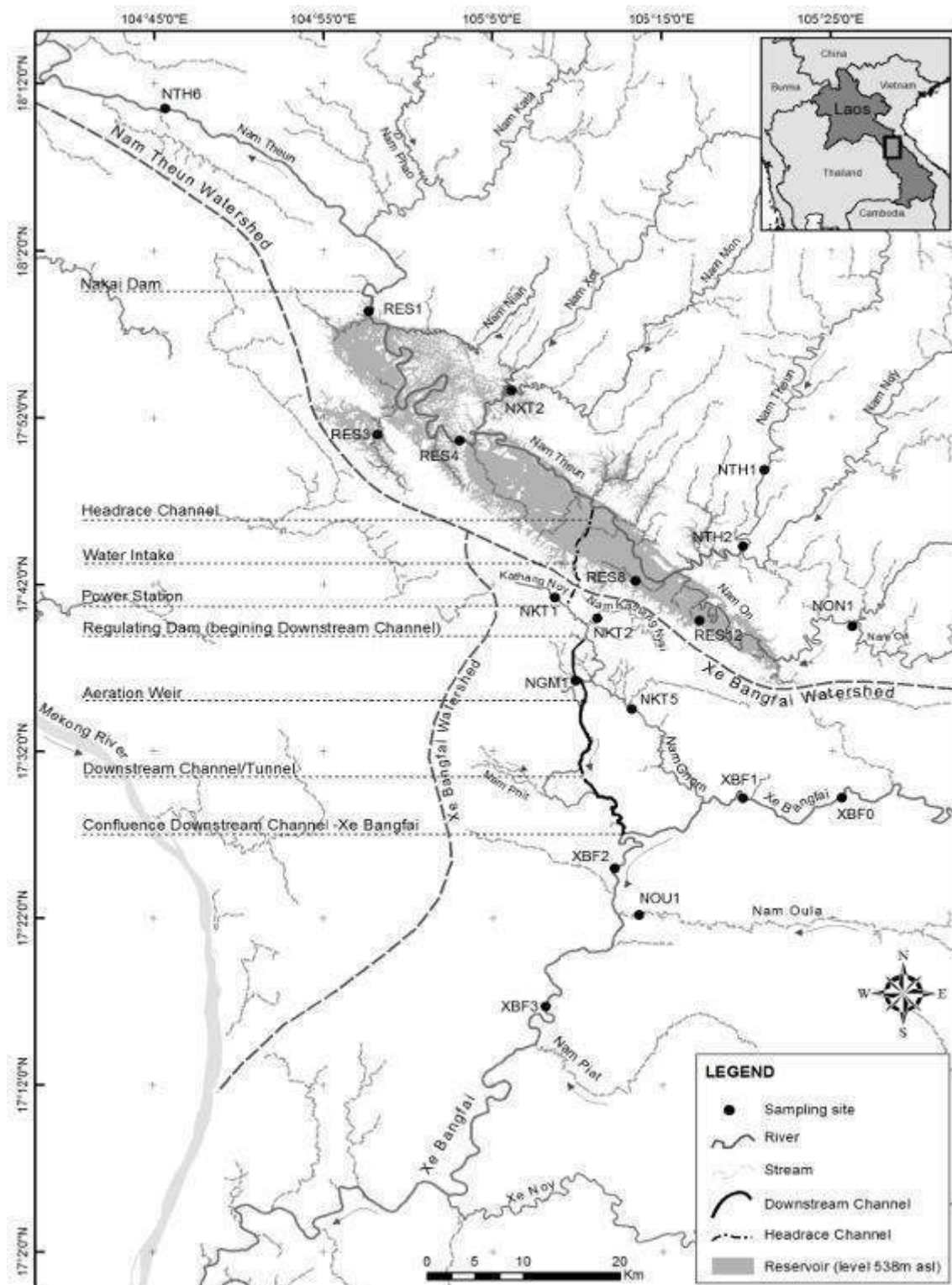
Articles	Under review	Approved	Published and online
Descoux & Cottet. 5 years of monitoring of zooplankton community dynamics in a newly impounded sub-tropical reservoir in Southeast Asia (Nam Theun 2, Lao PDR). Hydroeco. appl., 2015			√
D. Serça et al. Nam Theun 2 Reservoir four years after commissioning: significance of drawdown methane emissions and other pathways, Hydroécol. Appl., 19, 119-146, 2016.			√
GREENHOUSE GAS			
Deshmukh et al. Physical controls on CH ₄ emissions from a newly flooded subtropical freshwater hydroelectric reservoir: Nam Theun 2 Biogeosciences Discuss., 11, 3271-3317, doi:10.5194/bgd-11-3271-2014, 2014.			√
Deshmukh, C., Guérin, F., Labat, D., Pighini, S., Vongkhamsoo, A., Guédant, P., Rode, W., Godon, A., Chanudet, V., Descoux, S., and Serça, D.: Low methane (CH ₄) emissions downstream of a monomictic subtropical hydroelectric reservoir (Nam Theun 2, Lao PDR), Biogeosciences, 13, 1919-1932, 2016.			√
F. Guérin et al., Effect of sporadic destratification, seasonal overturn and artificial mixing on CH ₄ emissions at the surface of a subtropical hydroelectric reservoir (Nam Theun 2 Reservoir, Lao PDR). Biogeosciences. 22 June 2016			√
M. Adon, C. Galy-Lacaux, D. Serça, P. Guedant, A. Vongkhamsoo, W. Rode, Y. Meyerfeld, F. Guérin: First assessment of nitrogen deposition budget following the impoundment of a subtropical hydroelectric reservoir (Nam Theun 2, Lao PDR). Atmospheric Chemistry and Physics			√
C. Deshmukh et al., Carbon Dioxide emissions from the bottom and shallow Nam Theun 2 Reservoir: drawdown area as a neglected pathway to the atmosphere. Biogeosciences			√
LIMNOLOGY			
Martinet et al. Phytoplankton functional groups for ecological assessment in young sub-tropical reservoirs: case study of the Nam-Theun 2 Reservoir, Laos, South-East Asia. Journal of Limnology, doi:10.4081/jlimnol.2014.958, 2014.			√
Pedrono et al. Seasonal algal community succession in epixylic biofilms in a tropical meso-oligotrophic shallow reservoir, Nam Theun 2 (Lao PDR). Journal of Limnological		√	
FISH and FISHERIES			
Cottet et al. Total iron concentrations in waters and fish tissues in the Nam Theun 2 Reservoir area (Lao PDR). Environmental			√

Articles	Under review	Approved	Published and online
and Monitoring Assessment.			
Tessier et al. Fish assemblages in large tropical reservoirs: overview of fish population monitoring methods. Journal of Fisheries Sciences and Aquaculture.			√
A. Tessier, J. Guillard, V. Chanudet & M. Cottet: Length-weight relationships of 8 Asian freshwater fish species from Nam Theun 2 Reservoir (Lao PDR)			√
M Cottet & T. Visser: Fish catch and fishing practices in the Nam Theun 2 Reservoir and watershed (Lao PDR)			√
Hughes et al. Combination of direct fishing and indirect e DNA metabarcoding monitoring during a 3 years survey significantly improves the fish biodiversity report around a South East Asian reservoir.			√
A.Tessier et al., Low input of the pelagic zone of a large tropical neo-reservoir to fisheries		√	
Tessier, et al. Life history traits of the exploited Nile Tilapia (<i>Oreochromis niloticus</i>) in a subtropical reservoir (Lao PDR)			√
A.Tessier, et al. Life history and exploitation of <i>Hampala macrolepidota</i> in the Nam Theun 2 reservoir, Lao PDR	√		
D. Beaune, et al. Population dynamics of the Nile Tilapia in a large Asian reservoir: Length-at-age versus length frequency distribution growth analyses	√		
E. Baran et al. Developing a fishery in a subtropical reservoir- experience from Nam Theun 2 Dam in Lao PDR	√		
GENERAL ENVIRONMENT			
Descoux et al., 2011: Co-assessment of biomass and soil organic carbon stocks in a future reservoir area located in Southeast Asia. Environmental Monitoring and Assessment			√

Annex 2 – Water quality monitoring stations from May 2017 to April 2023



Annex 3 – Hydrobiology monitoring stations from May 2017 to April 2023



Annex 4 – Parameters to be monitored from May 2017 to April 2023

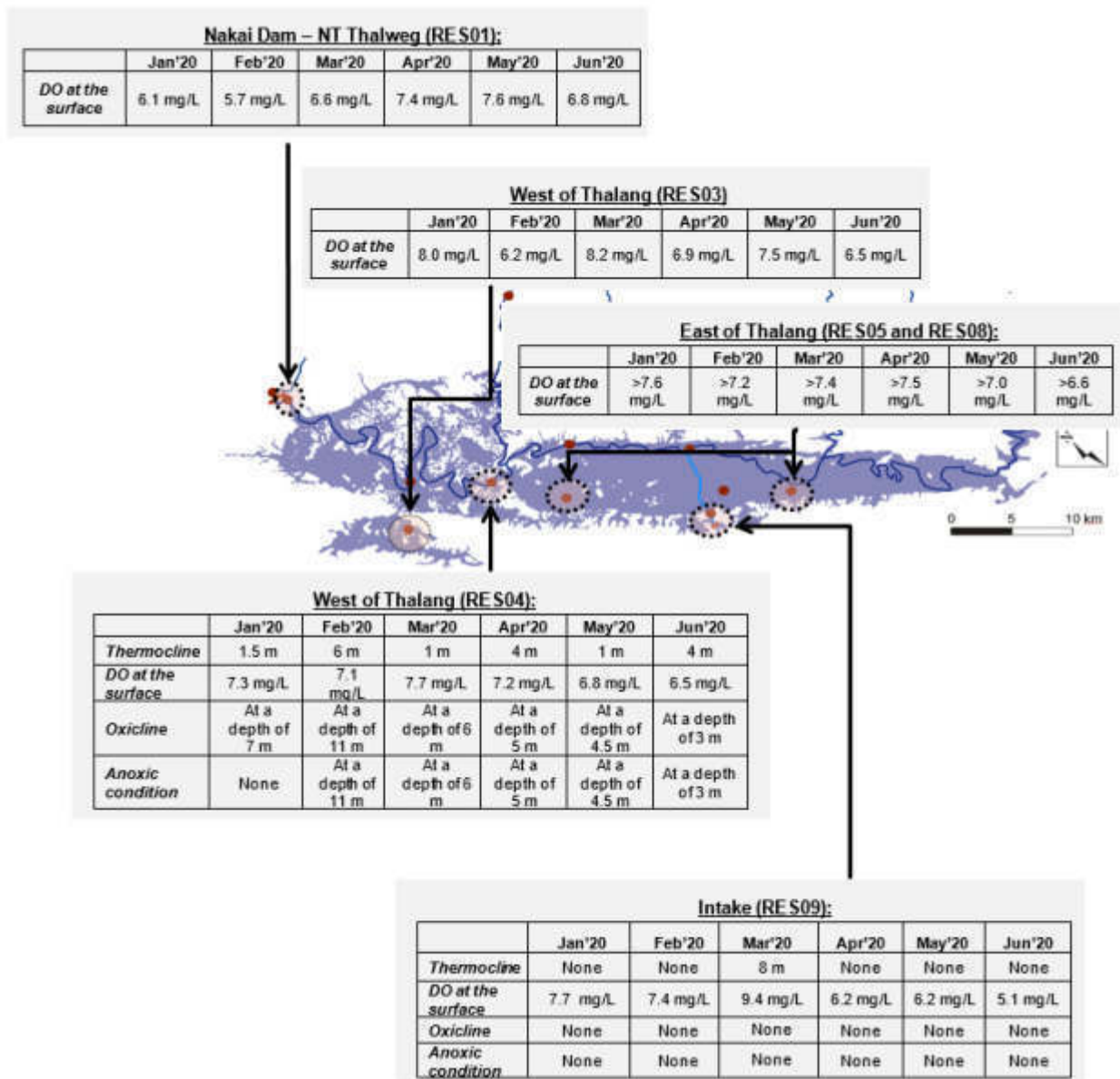
Number	Group	Parameters
1	In situ	Total Depth, Temperature, pH, Dissolved Oxygen, Turbidity, Conductivity, Transparency
2	Carbon budget	Dissolved CH ₄ , Dissolved CO ₂ , Total Organic Carbon, Total Carbon, Total Inorganic Carbon (Calculation), Total Alkalinity
3a	Other major parameters	BOD, TSS, Total N, Total P, Fe II, Fe III, Total Dissolved Iron, Dissolved Silica
3b	COD	COD
4	Anions and Cations	Potassium, Sodium, Calcium, Magnesium, Ammonium, Phosphate, Sulfate, Chloride, Nitrite, Nitrate, Fluoride
5	N₂O	Dissolved N ₂ O
6	Gas fluxes (bubbling)	Bubbling CH ₄ , CO ₂
7	Chlorophyll <i>a</i>	Chlorophyll <i>a</i>
8	Benthic macroinvertebrates	Number and identification of specimen per family (per genus or species whenever possible)
9	Fish	Number, identification, size, weight, sex and maturity of specimens per net, species and stomach content
10	Fish flesh for Hg	Mercury (Hg) measurement

Annex 5 – Frequencies and stations of the measurements in May 2017 to April 2023

Group of Stations		Frequencies			
		Monthly	By 3 seasons	Biannual	Annual
Nam Theun River and Tributaries	NTH3	1, 2, 3a, 3b, 4, 5	-	-	-
	NTH5	1, 3a, 4	-	-	-
	NTH6	-	9	10	8
	NPH1	1, 3a, 4	-	-	-
	NXT1	1, 2, 3a, 4, 5	-	-	-
	NXT2	-	9	-	-
	NTH2	1, 2, 3a, 4, 5	9	10	-
	NON1	1, 2, 3a, 4, 5	9	10	-
	NTH1	-	9	10	8
Reservoir	RES1 (1)	1, 2, 3a, 3b, 4, 5, 7	9	10	-
	RES3 (1)	1, 2, 3a, 4, 5, 7	9	10	-
	RES4 (6)	1, 2, 3a, 4, 5, 7,	9	10	-
	RES5 (1)	1, 2, 3a, 4, 5	-	-	-
	RES8 (1)	1, 2, 3a, 4, 5, 7,	9	10	-
	RES9 (3)	1, 2, 3a, 3b (3), 4, 5	-	-	-
	RES12	-	9	10	-
	3 bubbling stations	6(6 missions /year)			
Civil Works	TRC1	1, 2, 3a, 4, 5	-	-	-
	REG1 (3)	1, 2, 3a, 3b (1), 4, 5	-	-	-

Group of Stations		Frequencies			
		Monthly	By 3 seasons	Biannual	Annual
	DCH1	1, 2, 3a, 3b, 4, 5	-	-	-
	DCH3	1, 2, 3a, 4, 5	-	-	-
	DCH4	1, 2, 3a, 3b, 4, 5	-	-	-
Nam Kathang	NKT1	1, 2, 3a, 4, 5	-	-	8
	NKT2	1, 2, 3a, 3b, 4, 5	-	-	8
	NKT3	1, 2, 3a, 3b, 4, 5	-	-	-
	NKT5	-	-	-	8
	NGM1	-	-	-	8
Xe Bang Fai	XBF0	-	9	-	8
	XBF1	1, 2, 3a, 3b, 4, 5	9	10	8
	XBF2	1, 2, 3a, 3b, 4, 5	9	10	8
	XBF3	1, 2, 3a, 4, 5	9	-	-
	NOU1	-	9	-	-

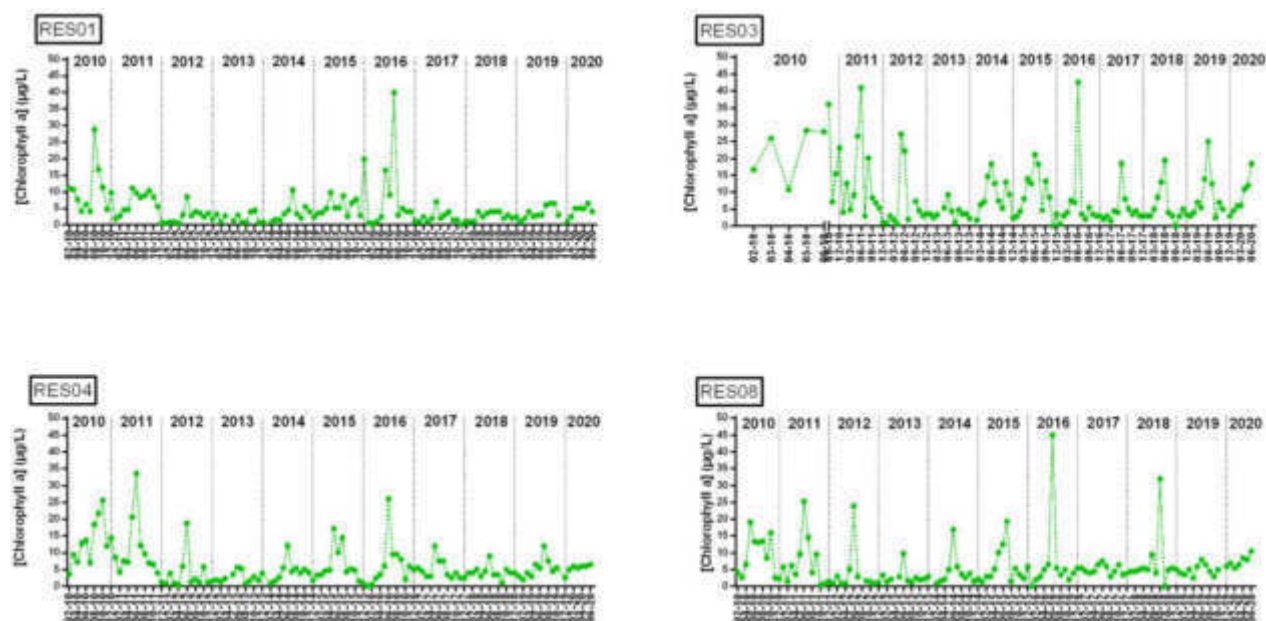
Annex 6 – Water Quality in the Reservoir January to June 2020



Annex 7 – The 16 fixed boreholes are the most frequently used by villagers in 6 districts

District	Village	Site Code	Village & Borehole No
Gnommalath	Ban Nongping	GML01003	Nongping BH3
	Ban Khoksavang	GML13105	Khoksavang BH5
Nakai	Ban Nakai Neua	NAK0113	Nakai Neua BH13
	Ban Nong Boua Kham	NAK0911	Nong Boua Kham BH11
	Ban Thalang	NAK1310	Thalang BH10
	Ban Nong Boua	NAK1606	Nongboua BH6
	Ban Sop On	NAK1915	Sop On BH15
Mahaxai	Ban Mahaxai	MHX02410	Mahaxaitai BH10
	Ban Pova	MHX02609	Povatai BH9
Xebangfai	Ban Kuase	XBF03708	Kuase BH8
	Ban Dangtha	XBF04204	Dangtha BH4
Xaibouly	Ban Khamsavang	XBL03901	Khamsavang BH1
	Ban Thaphoxai	XBL07802	Thaphoxai BH2
	Ban Thakharm	XBL07902	Thakharm BH2
Nongbok	Ban Sorkbor	NBK05307	Sorkbor BH7
	Ban Hatxiengdee	NBK05902	Hatxiengdee BH2

Annex 8 – Chlorophyll a concentration by station



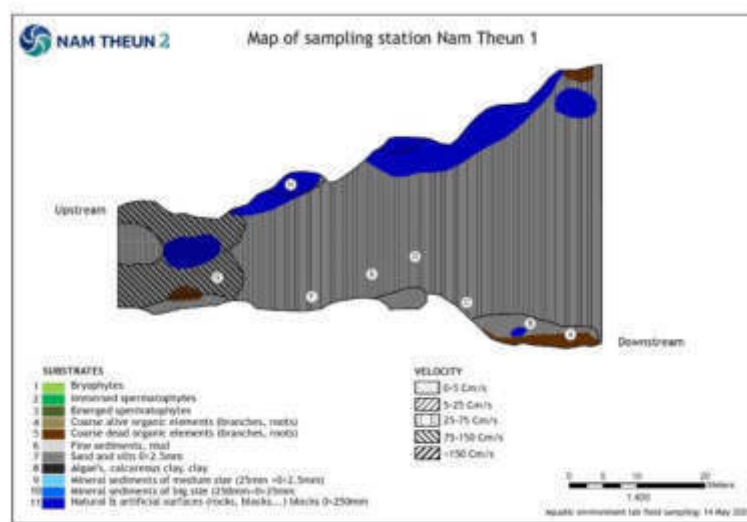
Annex 9 – Reference of Chl a result at RES08

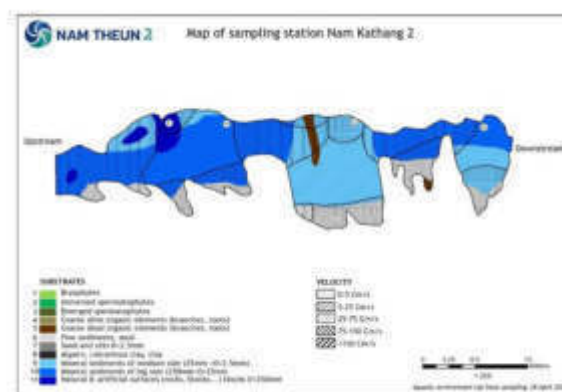
- (i) Normally in August (high water level in NT2 reservoir) the concentration of Phosphorus is ranged between 0.01-0.036 mg.L⁻¹ since 2012, but in August 2018 Phosphorus' concentration could reached 0.041 mg.L⁻¹
- (ii) BZ. Pan *et al.* Factors Influencing Chlorophyll a Centration in the Yangtze-Connected Lake Fresenius Environmental Bulletin, PSP Volume 18 – No 10.2009

Annex 10 – Maps and pictures of Aquatic Invertebrate monitoring stations

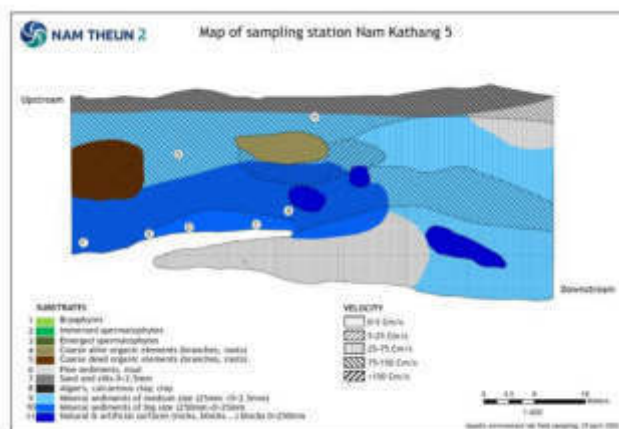
Nam Theun Area

Nam Theun (NTH1)

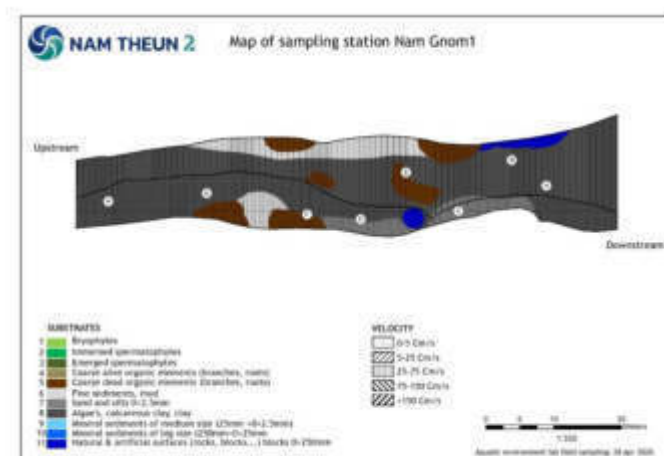


Nam Kathang/Gnom Area**Nam Kathang (NKT1)****Nam Kathang (NKT2)**

Nam Kathang (NKT5)



Nam Gnom (NGM1)

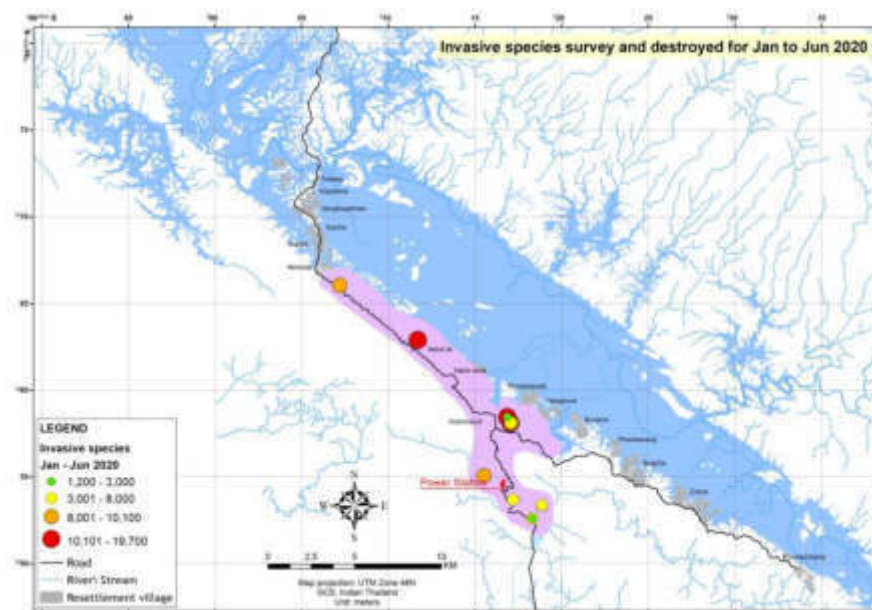


Xe Bangfai Area**Xe Bangfai (XBF0)****Xe Bangfai (XBF1)****Xe Bangfai (XBF2)**

Annex 11 – Picture of AMLs monitoring result by camera trap during first semester of 2020



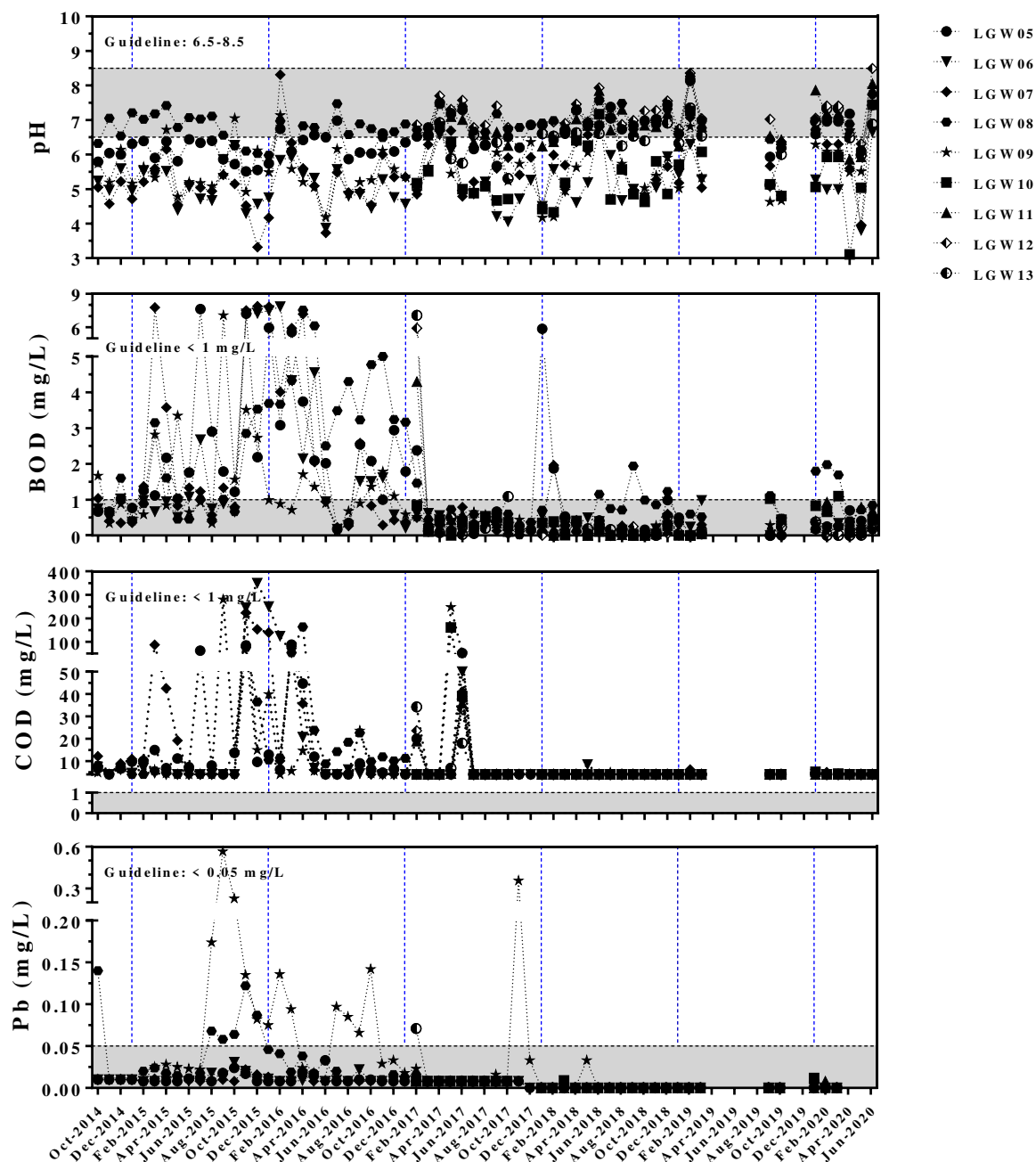
Annex 12 – Locations of *Mimosa pigra* found and destroyed in first half of 2020



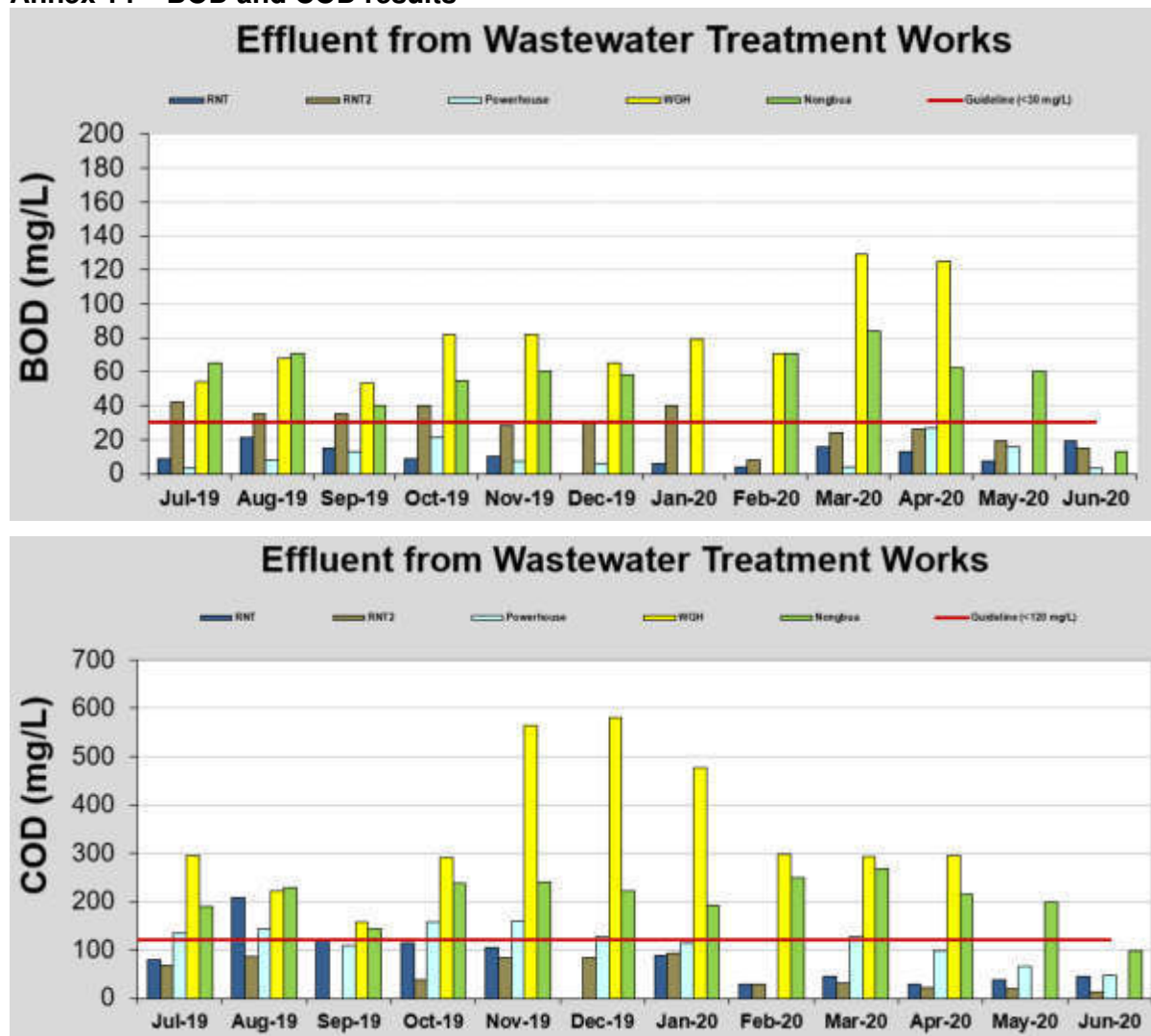
Annex 13 - Landfill observation borewells testing results January to June 2020

Data comparing to the GoL standard* of groundwater for drinking purpose (in grey shade)

(*Water quality standard guideline of groundwater for drinking purpose, Decision on National Environmental Quality Standard, Prime Minister's Office, No.81/PMO. 2 Feb 2017, MoNRE, Vientiane Capital).



Annex 14 – BOD and COD results



Annex 15 – NTPC wastewater treatment facilities monitoring results

Parameter	Guideline values	Exceedance revealed (at least a month) from January to June 2020				
		RNT1	RNT2	Powerhouse (PWH)	Wooden Guesthouse (WGH)	Nongbua Boat camp
Biological Oxygen Demand (BOD)	<30mg/L		X		X	X
Chemical Oxygen Demand (COD)	<120 mg/L			X	X	X
Total Suspended Solids (TSS)	<40mg/L				X	
Thermotolerant (Faecal) Coliform	<1000 CFU/100mL	X	X			
Ammonia-nitrogen (NH ₃ -N)	< 4 mg/L			X		
Oil & Grease	< 5 mg/L				X	

Note: No effluent discharged during the sampling day at PWH in February, at WGH in May and June

Annex 16 - Environment inspection and monitoring

NTPC sites	Number of Inspection
	January to June
Nakai Dam Site	3
Wooden Guesthouse	3
PWH & Switchyard	3
RNT Complex	14
Gnommalath Landfill	37
Surge Shaft/Access Adit	3
Intake and Headrace Channel and Tunnel	3
Nong Boua Boat area	3
Regulating Dam	3
Total	72

Note: Due to the Covid-19 outbreak, the monthly inspections at industrial sites were cancelled in April to June to limit the access to industrial sites for staff non-related to power generation and to implement the social distancing rule.

There are 24 environmental issue raised from the industrial site inspection and workplace inspection (non-industrial site) during January to June 2020, the status is reported in table below:

Period	Inspection area	Number of issues	Status		Remark
			Closed	Pending	
January to June 2020	Industries site	15	14	1	Action follow up is on going
	Non-Industries Site	9	7	2	

The issues raised from these inspections were informed, via the joint inspection checklist or email, to concerned parties such as AB-site management, AB-security, TB-QHSE, KGS contractor or the area owner for improvement.

The Environment team participated in 17 special missions of environmental inspection in January - June 2020 as follows:

- 1 mission of Daily managerial patrol during the 2020 Major Overhaul (January to March)
- 2 missions of Workplace inspection at RNT organized by RSU (February and March)
- 1 mission of Workplace inspection at Vientiane office (February)
- 4 mission of Managerial patrol at AE Lab (March, May and June)
- 2 missions of inspection at Gnommalath district landfill (January and February)
- 2 missions of inspection at Nakai district landfill (January and June)
- 2 missions of joining final inspection in January: stainless door-cover sand tanks-
Nam Kathang bridge door, toilet-generator house

- 3 missions of construction sites: warehouse shelter (February and March) and construction work along DSC (June)

The issues observed during each inspection/patrol were mainly related to waste segregation and waste disposal. All issues were immediately informed to concerned parties such as a site engineer, contractor, AB-site management or TB-QHSE for improvement.

Annex 17 - Corrective and preventive action for incident reports January to June 2020

No	Incident Date	Level	Description of Incident	Corrective Action Plan	Status	ID Ref.
01	23-1-2020	1	The styrofoam was used for packaging in Newrest mini-mart which not complied to NTPC environmental care policy.	The Newrest must be informed not to used the styrofoam, the biodegradable container is acceptable to use.	Closed	2,544
02	9-2-2020	1	Found the oil leakage from junction box 111MTB204BD and cable pipe in junction box 111MTB402BT.	TB-Mechanical to perform Root Cause Failure Analysis (RCFA) and implement.	CAP Follow up	2,568

Annex 18 - Environment awareness training January to June 2020

- **For NTPC staff and family**

No.	Description of group	#Trained Persons	Remarks
1	NTPC new staff, consultants	3	
2	NTPC new fresh graduates	15	

- **For Contractors**

No.	Company name of contractors/providers	#Trained Persons	Remarks
1	SSV Education Group	4	
2	Newrest	2	
3	English Teacher	1	
4	Koncept Furniture	3	
5	KSSSE	4	
6	KGS	12	
7	ISOS	1	
8	Automation service	2	
9	BK	17	
10	SCC	8	
11	SSS	5	
12	SSV Education group	23	Catch up the 2019 yearly refresh
13	KSSSE	132	

Annex 19 – 2020 Health, Safety and Environment Improvement Program (HSEIP)

Objective & Target Reference	Objectives	Targets
HSE 08/2020	Saving Energy and Water Program	<ul style="list-style-type: none"> -Install the meters to record water and electricity consumption -Organize at least 2 events to promote the program -Implement "Earth Hour" event (turn off the light and other electrical appliance together about 1 hour, doing outdoor activity together)
HSE 09/2020	Environmental <ul style="list-style-type: none"> - To prevent major environment accident. - To comply with the local law and other requirements (LTA, IMA and POE), Project: waste cell, wastewater treatment. 	Zero major environment accident
HSE 10/2020	To ensure that the emergency cases for chemical spills will be well-handled in a good manner	Implementation the drill once a year in AE Lab, Oil storage at RNT, Powerhouse and Dam Site, and 100% report is submitted
HSE 11/2020	Promotion and implementation of Environment Awareness Programs in NTPC community <ul style="list-style-type: none"> - To reduce the usage of plastic bag in RNT campus - To reduce the usage of paper in NTPC's offices 	<ul style="list-style-type: none"> - 5% reduction of plastic bag usage compare to 2019 - 5% reduction of paper usage compare to 2019
HSE 12/2020	To promote the Chemical awareness to all staff	<ul style="list-style-type: none"> -Add the chemical awareness knowledge into the induction/yearly refresh training content. - Organize at least 2 campaigns Chemical awareness for concerned staff (who work closely with chemicals)
HSE 13/2020	To start the Laboratory waste disposal	<ul style="list-style-type: none"> - Conduct the trial disposal process of Acid and Base waste by evaporation (to reduce at least 10% of existing chemical waste amount).

Objective & Target Reference	Objectives	Targets
		- Record and write a procedure
HSE 14/2020	Supporting of Nakai and Gnommalath solid waste management and providing technical assistance	- Provide training on waste management to DoNRE staff and other related parties. - Prepare and Provide the landfill operation manual applied at the district landfill
HSE 15/2020	Feasibility study on community waste management at Nakai and Gnommalath districts	- Complete the first phase of the project for site survey, data collection and set up an action plan for further steps.
HSE 16/2020	Study on recycle waste compaction process and its recycling market (to reduce storage volume)	- Finding recycling factory in lao who accept the compacted recycle waste (paper, plastic bottle, can) - Finding appropriate compacting machine
HSE 17/2020	Control and manage special waste (obsolete furniture, obsolete equipment, printer toners,...) from other departments to be disposed to NTPC landfill	- 80% of real generated waste must be disposed to landfill (only 20% of waste to be stored at temporary waste storage)

Annex 20 – List of Documents in CEMMP

- Quality Health Safety and Environment Policy (POLQSE)
- Job Hazard and Environmental aspect Assessment Instruction (PR B15 01)
- Legal and Other Requirements Procedure (PR B15 02)
- HSE Objectives Targets and Programs (PR B15 03)
- NTPC Health, Safety and Environmental Objectives and Targets (NTPC M B 15 0303 17)
- Health, Safety and Environmental Improvement Programs (NTPC M B 15 03 03 0018)

- Waste Management Plan (NTPC M B 15 03 04 0016)
- Hazardous Materials and Contamination Control Management Plan (NTPC M B 15 03 04 0012)
- Water Management Plan (NTPC M B 15 03 04 0015)
- Water Quality Monitoring Plan (NTPC M B 15 05 01 0001)
- Biodiversity Management Plan (NTPC M B 15 03 04 0017)
- Health, Safety and Environmental Training Procedure (PR B15 04)
- Training Procedure (PR 1410)
- NTPC Health, Safety and Environmental Training Needs Matrix
- HSE Communication Participation and Consultation Procedure (PR B15-05)
- Documents and Records Control Procedure (PR B15 06)
- Chemical Management Procedure (PR B14 04)
- Waste Segregation Work Instruction (WI B14 04)
- Waste Management at Gnommalath Landfill Work Instruction (WI B14 07)
- Clinical Waste Management Work Instruction (WI B14 07)
- HSE Specifications for Contracts and Bidding Documents (NTPC M B 15 04 06 0004)
- Crisis and Emergency Management Plan (NTPC M B0501 0001)
- Hydrocarbon and Chemical spill Response Procedure (NTPC O P0602 13 0002)
- OMD-Natural Disaster Management Procedure (NTPC O P1004 17 0001)
- OMD-Emergency Contingency Plan for Powerhouse (NTPC O P10 04 13 0001)
- Emergency and Preparedness and Response Procedure (PR B14 05)
- HSE Performance Monitoring and Measurement Procedure (PR B15-07)
- Reporting and Incident Management Procedure (PR B15 10)
- Nonconformity Corrective and Preventive Action Procedure (PR B15-08)
- Internal Audit Procedure (PRB15 09)
- NTPC Senior Management Review (NTPC M B 15 06 01 0001)