# Biodiversity Offset Design Report

Nam Ngiep One Power Company

January 2014

0200749

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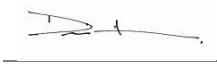
|---|---|
| *Approved by:* | David Nicholson |
| *Position:* | *Project Manager* |
| *Signed:* |  |
| *Date:* | 17 January 2014 |
| *Approved by:* | Cristina Pellegrino |
| *Position:* | *Partner Director* |
| *Signed:* |  |
| *Date:* | 17 January 2014 |

*Environmental Resources Management Australia Pty Ltd Quality System*

# Biodiversity Offset Design Report

Draft Report

Nam Ngiep One Power Company Limited

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**FINAL REPORT**

Nam Ngiep One Power Company Limited

# Biodiversity Offset Design Report

January 2014

Reference: 0200749

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***BIODIVERSITY OFFSET DESIGN REPORT***

## *EXECUTIVE SUMMARY*

*The NNP1 Project involves construction and operation of a 290 megawatt (MW) hydroelectric power generation facility on a build-operate-transfer basis at the Nam Ngiep River, Lao PDR.*

*The Nam Ngiep 1 Power Company (NNP1PC) has been requested by the Asian Development Bank (ADB) and the Project's Independent Advisory Panel (IAP) to study the biodiversity offset requirements for the NNP1 Project and has contracted Environmental Resources Management ERM-Siam Co. Ltd (ERM) to undertake these studies.*

*The investigation for biodiversity offsets has been triggered by the Policy Principles of ADB Safeguard Policy Statement, Environmental Safeguards. (ADB 2009). This policy requires that impacts to Natural Habitats including the significant conversion or degradation of habitats are to be avoided or appropriately mitigated. The Project has been categorised under ADB's Safeguard Policy Statement (SPS) 2009 as an "A" for all of three safeguards categories; environment, involuntary resettlement (IR), and Indigenous People (IP).*

*The residual impacts identified for the NNP1 Project relate to unavoidable habitat loss within the operational footprint of the Project (including habitat for IUCN listed species) and barrier to aquatic fauna movement as a result of the dam wall. From a human use perspective the impacts relate to ecosystem services values lost from the direct use of biodiversity values. It is evident that villagers in the Project area regularly use local terrestrial and aquatic biodiversity – e.g. as a food source – largely for subsistence purposes. However, the dependence on natural resources varies by village and is primarily associated with accessibility. For example, remote villages tend to rely more heavily on biodiversity (e.g. medicinal plants as access to pharmaceuticals is limited).*

*To consider the required quantum of biodiversity offset, ERM has developed a biodiversity offset metric that captures the type (habitat and species), amount and condition of biodiversity. The biodiversity offset metric is based on the Habitat Hectare model (BBOP 2012a). This model captures the type, amount and condition of the biodiversity values present on the impacted site and candidate offset sites. The approach is designed to create a "balance sheet" to compare the biodiversity losses at the impact site with the gains available from candidate offset sites. The basis of the analysis is calculating the change in condition (loss) at the impact site compared to the change in condition (gains) at candidate offset sites over time from management. The application of the offset rules enables the most appropriate candidate offset sites to be chosen to achieve a no-net-loss of biodiversity values.*

*ERM has also undertaken consultation with Lao PDR government and NGO consultation to design implementation mechanisms for the biodiversity offset. The delivery of the biodiversity offset package will be through a combination of governance,*

*legal and institutional arrangements to administer projects designed to improve biodiversity values.*

*Land use activities in the Nam Ngiep and Nam Xan watershed that were likely to be a major threat to the long-term management of biodiversity offsets were identified. The exercise identified that the major threats to the biodiversity offset sites are mining leases and Production Forests. It was identified that this is of particular concern in the Nam Xan watershed where the majority of forested areas are Production Forests, limiting the ability to use these areas as primary conservation areas to protect terrestrial biodiversity values. Mining leases were also located across both watersheds.*

*From the biodiversity offset balance sheet analysis and considering the threats to offset management, the following biodiversity offset components are recommended:*

*Following discussions with the ADB and the IAP, it is recommended that currently available legal and administrative mechanisms be used to establish an Aggregate Offset Fund (AOF) in Lao PDR. This fund would be used to build capacity for ongoing offset management and conservation within Lao PDR. Further work (supported by the ADB) would be required to strengthen the capacity of the Lao PDR Government to enable appropriate governance and oversight of the AOF. Further policy work is also required to define an appropriate offset metric and a method to determine the value of trust fund deposits as well as the establishment of a Specialised Financial Window by the Environment Protection Fund.*

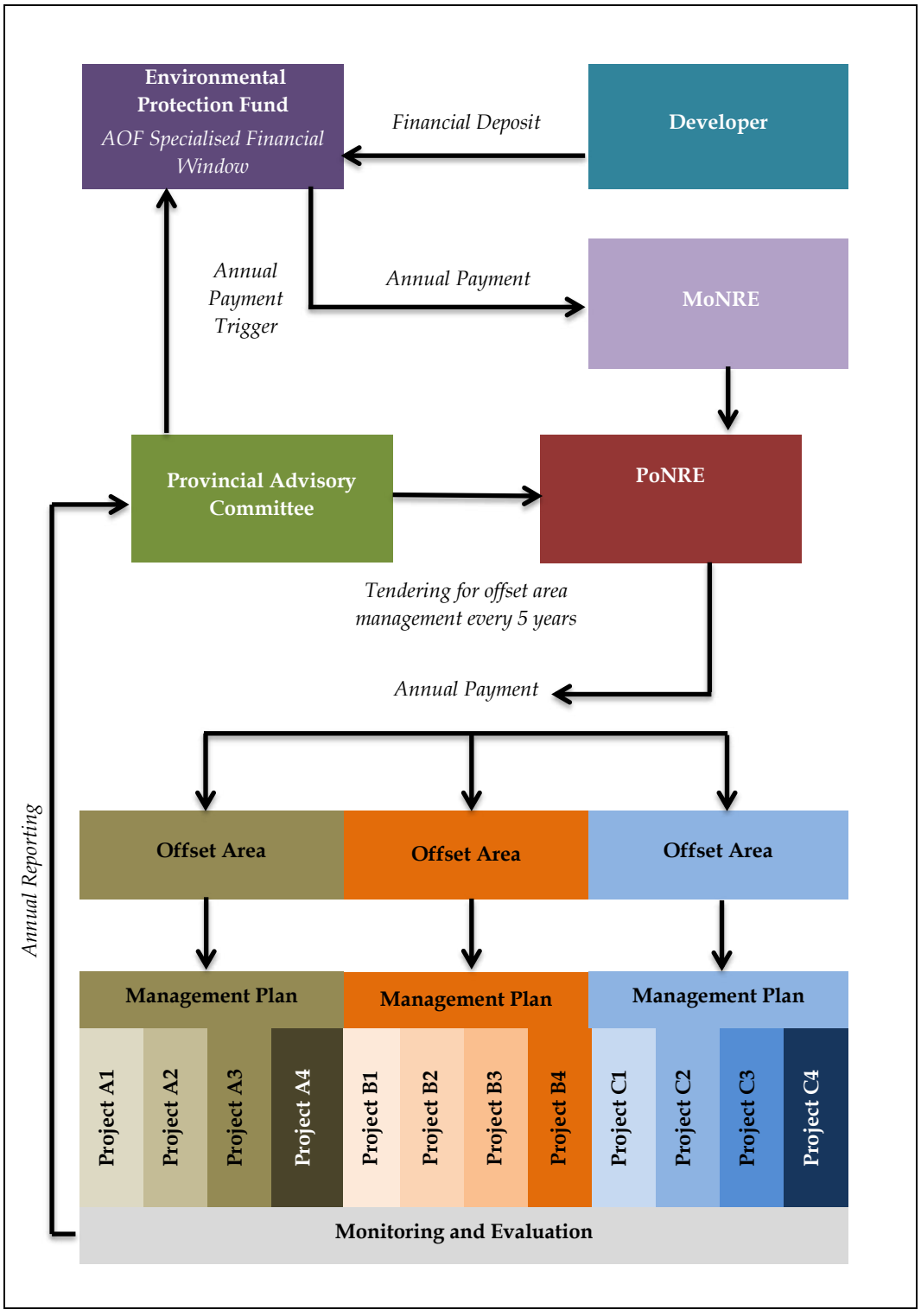
*In relation to specific offsets for the NNP1 Project, it is recommended that offset areas include: forested and riverine areas of the Phou Khouy Khouy NPA; and forested and riverine areas of the Nam Ngiep Watershed. It is anticipated that work on establishing offset sites for the NNP1 project would occur in parallel to setting up the AOF. This is necessary to ensure that appropriate offsets are established for the NNP1 project and are not delayed due to the time required to establish the AOF.*

*The offset balance sheet analysis indicates that sufficient habitat is available to offset the impacts from the project on biodiversity values. Species specific management to manage residual impacts on species are also recommended.*

*Management costs for the biodiversity offsets would be covered by the funds allocated under the Concession Agreement for the NNP1 Project. This includes allocations of $13.7 Million for watershed and environmental management costs for the biodiversity offset package for the life of the concession agreement (27 years). It is recommended that this money is invested and the returns on that investment used to find offset management of the recommended candidate offset areas.*

*Management oversight for the offsets is recommended to occur through a management committee (NNP1 Offset Advisory Committee) formed to administer offset management and tender offset management services to relevant and qualified NGOs. The Provincial Office of Natural Resources and Environment of the Lao Government would be responsible for direct oversight of the implementation of the offset projects.*

*Overview of the proposed structure for the AOF*



# 1 INTRODUCTION

The NNP1 Project involves construction and operation of a 290 megawatt (MW) hydroelectric power generation facility on a build-operate-transfer basis at the Nam Ngiep River, Lao PDR.

The NNP1 Project site is located on the Nam Ngiep River, in the provinces of Vientiane, Xieng Khouang and Bolikhamxay, approximately 145 km northeast from the city of Vientiane or 50 km north from Pakxan District. The Project will generate 262MW of its capacity for export to Thailand and 20MW for domestic supply.

The Project will be funded predominantly by private sector funds. The owners of Nam Ngiep Power Co. Ltd. include The KANSAI Electric Power Co. Inc. (Kansai) from Japan, Electricity Generating Authority of Thailand (EGAT) International Co. Ltd. from Thailand, and Lao Holding State Enterprise (LHSE) from the Lao PDR. A company has been established (Nam Ngiep 1 Power Company (NNP1PC)) as a partnership between these entities.

The NNP1PC has been requested by the Asian Development Bank (ADB) and the Project's Independent Advisory Panel (IAP) to study the biodiversity offset requirements for the NNP1 Project and has contracted Environmental Resources Management ERM-Siam Co. Ltd (ERM) to undertake these studies.

The investigation for biodiversity offsets has been triggered by the Policy Principles of *ADB Safeguard Policy Statement, Environmental Safeguards* (ADB 2009). This policy requires that impacts to Natural Habitats including the significant conversion or degradation of habitats are to be avoided or appropriately mitigated. The Project has been categorised under ADB's Safeguard Policy Statement (SPS) 2009 as an "A" for all of three safeguards categories; environment, involuntary resettlement (IR), and Indigenous People (IP).

The Project was also deemed as Highly Complex and Sensitive Project. ERM has updated the EIA in relation to the biodiversity values, to identify the residual biodiversity values impacted and those requiring offset.

The ADB requirements require the design of appropriate biodiversity offset measures to achieve at least a "no net loss" of biodiversity values.

## 1.1 PURPOSE OF REPORT

The purpose of this report is to outline the approach, methods used and results of the biodiversity offset analysis undertaken for the Nam Ngiep Hydro Power Project (NNP1 Project). This report should be read in conjunction with the NNP1 Baseline Biodiversity Report and NNP1 Revised Biodiversity Impact Assessment Report.

## 1.2 APPROACH

ERM has used the frameworks contained in the following Business and Biodiversity Offset Program (BBOP) resource documents:

- *Biodiversity Offset Design Handbook* (BBOP 2012a); and
- *Resource Paper: No Net Loss and Loss-Gain Calculations in Biodiversity Offsets* (BBOP 2012b).

ERM has applied the methodology as described by BBOP in designing the biodiversity offset for the NNP1 project.

Specifically this report includes the:

- Defining the residual biodiversity values requiring to be offset;
- Proposed delivery mechanisms for the biodiversity offset;
- Recommended biodiversity offset package;
- Methodology and approach to the design of the biodiversity offset (including loss/gain calculations);
- Framework for operational management plans, stakeholder participation programs, monitoring and evaluation arrangements, governance roles and requisite capacities; and
- Analyse available budgets and financial arrangements.

## 2 BIODIVERSITY VALUES REQUIRING TO BE OFFSET

This section of the report documents the residual biodiversity values impacted following the application of the avoidance and mitigation steps of the following mitigation hierarchy. The avoidance and mitigation steps have been applied in the EIA undertaken for the project. It is the residual values that are required to be offset to achieve a no-net-loss of biodiversity values.

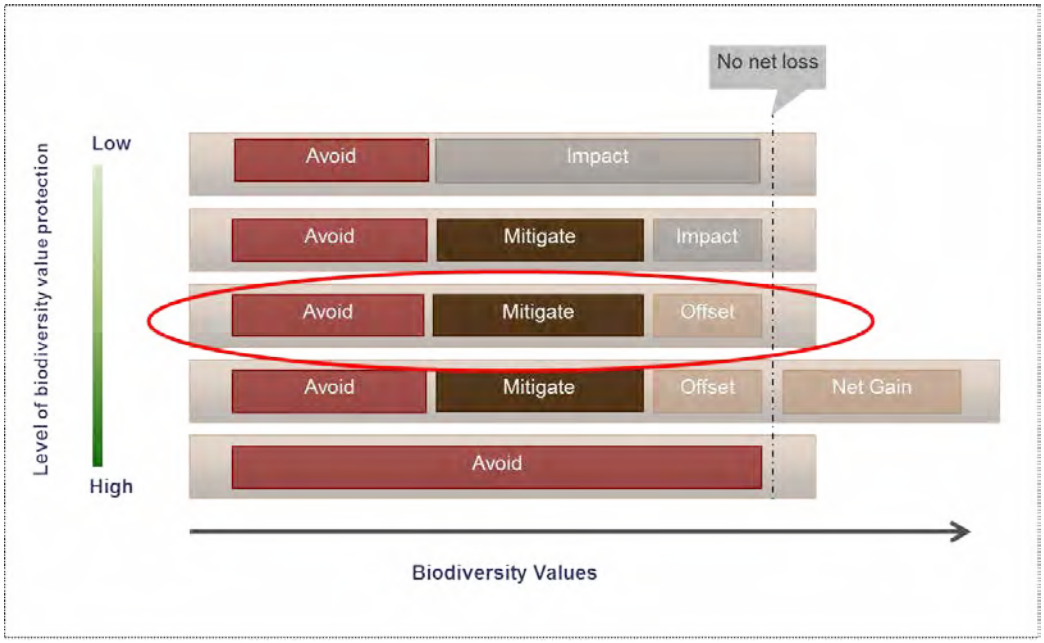
The mitigation hierarchy is outlined in *Figure 2.1*.

***Figure 2.1 Mitigation Hierarchy***

1. **Avoidance –**
   activities that limit impacts by avoiding high biodiversity areas in the development footprint;
2. **Mitigate (restoration) –**
   reducing the severity of impacts through onsite measures to protect and enhance biodiversity values;
3. **Residual Impact –**
   significant effects left after mitigation measures
4. **Offset –**
   compensation for residual impacts by *improving* biodiversity values elsewhere

The approach to the application of the mitigation hierarchy to achieve no-net-loss is outlined in *Figure 2.2*. No-net-loss is achieved where biodiversity values are appropriately mitigated and offset.

***Figure 2.2 Achieving No-net-loss of Biodiversity Values***



Documentation of the assessment process is contained in the revised Environmental Impact Assessment (EIA) (ERM 2014).

## 2.1 *RESIDUAL IMPACTS ON HABITATS*

The residual impacts identified for the NNP1 Project relate to unavoidable habitat loss within the operational footprint of the Project (including habitat for IUCN listed species) and barrier to aquatic fauna movement as a result of the dam wall. Direct disturbance to habitats will be minimised where possible however this impact assessment has identified an unavoidable loss of approximately 3944 ha of natural habitat and 3549 ha of modified habitat. *Table 2.1* summarises the breakdown of land cover types that will be permanently removed or altered.

***Table 2.1 Impacted land cover areas within the Project Area***

| Land Cover | IFC Habitat Class | Code | Area (ha) | | | Total (ha) |
|---|---|---|---|---|---|---|
| | | | Main dam | Re-regula-tion dam | Resettle-ment | |
| Deciduous Forest | Natural | DF | 2721 | 132 | 56 | **2909** |
| Evergreen Forest | Natural | EF | 508 | 27 | 0 | **535** |
| Old Fallow Land | Modified | OF | 1321 | 194 | 163 | **1678** |
| Young Fallow Land | Modified | YF | 1036 | 143 | 82 | **1261** |
| Bamboo | Natural | B | 241 | 127 | 132 | **500** |
| Slash and Burn | Modified | SB | 328 | 27 | 19 | **374** |
| Rice Paddy | Modified | RP | 107 | 5 | 15 | **127** |
| Water | - | W | 368 | 42 | 0 | **410** |
| Grassland | Modified | G | 108 | 0 | 0 | **108** |
| Urban Area | Modified | U | 38 | 3 | 0 | **41** |
| Rock | Natural | R | 1 | 0 | 0 | **1** |
| Cloud | - | CL | 4 | 0 | 0 | **4** |
| Shadow | - | SH | 16 | 0 | 0 | **16** |
| | | | 6797 | 700 | 467 | **7964** |

## 2.2 *RESIDUAL IMPACTS ON SPECIES*

ERM has applied a risk based assessment of species values to determine the significance of impacts on biodiversity values following mitigation. This risk assessment approach is outlined in the revised EIA for the NNP1 Project (ERM 2013). *Table 2.2* outlines the terrestrial species that have been identified

that have residual impacts remaining after mitigation. *Table 2.3* outlines the fish species that have residual impacts on their habitats following mitigation[1].

***Table 2.2 Terrestrial species with residual impacts following mitigation***

| | Species | |
|---|---|---|
| Flora | Dipterocarpus turbinatus | Afzelia xylocarpa |
| | Shorea roxburghii | |
| Mammals | Asian small clawed otter | Southwest China serow |
| | Asian elephant | Dhole |
| | Smooth coated otter | Sun bear |
| | Sunda pangolin | Bengal slow loris |
| | Leopard | Pygmy slow loris |
| | Tiger | Asiatic golden cat |
| | Fishing cat | Leopard cat |
| | Phayre's leaf monkey | Sambar |
| | White-cheeked gibbon | Himalayan black bear |
| | Golden jackal | |
| Birds | Wreathed hornbill | Red-breasted parakeet |
| | Great hornbill | Darter |
| | Green peafowl | Rufous necked hornbill |
| | White winged duck | Crested argus |
| | Greater coucal | Spot-bellied eagle owl |
| | Siamese fireback | Red-collared woodpecker |
| | Silver pheasant | Hoopoe |
| | Grey peacock pheasant | |
| Reptiles | Reticulated python | Elongated tortoise |
| | King cobra | Big-headed turtle |

***Table 2.3 Aquatic species with residual impacts following mitigation***

| Species name | Common name |
|---|---|
| *Poropuntius deauratus* | Yellow tail brook barb |
| *Cirrhinus cirrhosus* | Mrigal carp |
| *Cyprinus carpio* | Wild common carp |
| *Scaphognathops bandanensis* | Bandan sharp-mouth barb |
| *Yasuhikotakia splendida* | Jaguar loach |
| *Cirrhinus molitorella* | Mud carp |
| *Mekongina erythrospila* | |
| *Hemibagrus wyckioides* | Redtail catfish |
| *Luciosoma bleekeri* | Apollo shark minnow |

[1] It should be noted that further assessment of the aquatic values are currently being undertaken to determine the presence of fish species in the Nam Ngiep River and the impacts of the proposal from the development.

## 2.3 *RESIDUAL IMPACTS ON HUMAN USE VALUES*

From a human use perspective the impacts relate to ecosystem services values lost from the direct use of biodiversity values. It is evident that villagers in the Project area regularly use local terrestrial and aquatic biodiversity – e.g. as a food source – largely for subsistence purposes. However, the dependence on natural resources varies by village and is primarily associated with accessibility. For example, remote villages tend to rely more heavily on biodiversity (e.g. medicinal plants as access to pharmaceuticals is limited).

Development of the project will likely impact the ability of villagers to access both tangible human use provisioning services and intangible cultural heritage values. This includes:

- Hunting, gathering and fishing. This typically includes small animals, such as squirrels and rats, and flora species, such as bamboo and mushrooms. The flora and fauna are primarily consumed within the household;
- Collection and use of medicinal plants;
- Cultural heritage, such as cemeteries. In most cases, villagers did not identify intangible cultural heritage values, which may be attributed to relatively recent settlement of the local villages; and
- Collection of timber products to be used as fuel or in construction.

# 3 BIODIVERSITY OFFSET OPTIONS ANALYSIS

This *Section* outlines the biodiversity offset options available to NNP1PC to offset the residual impacts on the biodiversity values identified above.

The biodiversity offset options discussed in this *Section* of the report are outlined in terms of:

- Results of stakeholder consultation;
- Governance arrangements available to manage offsets;
- Candidate offset sites identified;
- Threats to the establishment of biodiversity offsets;
- Offset management programs that are available to supplement offset management.

To refine the options a "Strengths, Weaknesses, Opportunities and Threats" (SWOT) analysis has been undertaken (refer to *Table 3.2*). The biodiversity offset options are analysed in the SWOT analysis at *Table 3.4*.

*Figure 3.1* shows the location of candidate biodiversity offset sites within the Nam Ngiep and Nam Xan watersheds.

## 3.1 STAKEHOLDER CONSULTATION

ERM conducted stakeholder engagement with Regional Agencies, Lao PDR Government Departments, local officials and Non-Government Organisations (NGO) from 20 – 21 February and 26 February – 1 March 2013. Follow up consultation also occurred in August 2013 regarding the preferred offset framework. The consultation occurred in Vientiane as well as villages within the Nam Ngiep (impacted area) and the Nam Xan watershed. Full results of the stakeholder analysis can be found in *Annex A*. A summary of the results of the stakeholder analysis are summarised in *Table 3.1* below.

***Table 3.1 Summary of results from stakeholder engagement***

| Theme | Summary of Stakeholder Response |
|---|---|
| Legal | Role of the Forest Protection law |
| | Lack of legal mechanisms to secure biodiversity offsets |
| | Forest Law Enforcement, Governance and Trade (FLEGT) Project |
| | Law enforcement |
| | Institutional Jurisdiction |
| | Legal protection of cultural values |
| | Legal mechanisms unclear for cultural heritage protection |
| | Offset measures should directly benefit Lao PDR |
| | Requirements for approvals for projects in Lao PDR |
| | Contractual arrangements to manage offsets |

| Theme | Summary of Stakeholder Response |
|---|---|
| Institutional & management arrangements | Expanding scope of the study |
| | Requirement for like for like offsets |
| | New protected areas |
| | Strengthening existing protected area management |
| | Current mechanisms used to secure and manage offsets |
| | Governance and accountability |
| | Long term view for the management of protected areas |
| | Benefit sharing with communities |
| | NGO involvement in offsets |
| | ASEAN centre for Biodiversity Ecotourism |
| | National Protected Area Management Plans |
| | Initiatives of NGOs |
| | Military management of Phou Khao Khoay NPA |
| | Discussion with member countries on biodiversity management |
| | Data accessibility |
| | Existing models for biodiversity offsets |
| | Water shed management committees |
| | Compensation for impacts on forest resources |
| | KfW Entwicklungsbank Bank Forest Protection Program |
| | NPA management and staff capabilities |
| | Strategic approach to district forest protection |
| Financial | Environmental contributions are an option |
| | Establishment of a biodiversity offset fund |
| | Lao PDR Environmental Protection Fund |
| | Sustainable Forestry and Rural Development Project (SuFoRD) |
| | Convention on Biological Diversity Projects (CBD) |
| | Lack of funding for the National Protected Areas |
| | Joint Flora and Fauna International Funding |
| | Opportunities for funding through REDD+ |
| | Payment for Ecosystem Service (PES) |
| | Benefit Sharing between jurisdictions |
| | Limited operational budget for government agencies |
| | National Heritage Fund |
| | Lack of financial structures to facilitate investment in conservation |
| | Military support and funding |
| | Linking fees to conservation |
| Current and future land uses | Forestry activities |
| | Mining |
| | Hydropower schemes |
| | Development in protected areas |
| | Cumulative impacts from developments |
| | Sites and artefacts are regularly discovered due to developments |
| Threats | Pests, hunting and wildlife trade |
| | Lack of local capabilities |
| | Agriculture |
| | Transport |
| | Habitat fragmentation |
| | Scope of cultural heritage offset should be clearly defined so as to avoid threats |
| | Non-timber forest product harvesting |
| | Ongoing funding for NPAs |

250000
300000
350000
400000
2150000
2100000
2050000

**Legend**

- Catchment Boundary
- Waterbody
- Road
- City or Town
- Lao PDR Boundary

**Nam Ngiep 1 Hydropower Project:**

- Inundation Area
- Re-regulation Dam
- Re-settlement Area
- Proposed Access Road

**Candidate Offset Sites:**

- Nam Ngiep Offset Area
- Huay Ngua Provincial Protected Area
- Phou Khao Khouay National Protected Area
- Nam Xan Offset - River Centreline

N

0 10 20 30Km

1:600,000

**Basemap:** Bing Maps

Phoukout
Phonsavan
Nonghet
Muang Khoun
Phaxai
Nam Ngum
Nam Ngiep
Nam Ngiep Catchment
Thathom
Nam Xan Catchment
Vang Vieng
Nam Ngum 2 Reservoir
Nam Song Diversion
Nam Xan
Hinheup
Ba. Donkha
Nam Ngum Reservoir
Nam Ngum Reservoir
Longxan
Thinkeo
Phonhong
Nam Ngum Reservoir
Nam Leuk reservoir
Ban Keun
Nam Mang 3 Reservoir
Pakxan
Mekong River
Hai
Tha Ngon
bing

| | | | |
|---|---|---|---|
| Client: | Nam Ngiep Power Company Ltd. | | |
| Drawing No: | 0185065b_OFFSETDES_G001_R0.mxd | | |
| Date: | 13/09/2013 | Drawing Size: A3 | |
| Drawn By: | TC | Reviewed By: DN | |

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

**Figure 3.1 - Map of Offset Sites**

Nam Ngiep 1 Hydropower Project
Biodiversity Offset Design Report

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch,
Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

ERM

### *3.1.1 Discussion*

The results of the stakeholder analysis have identified:

- issues to be considered when designing the biodiversity package, including constraints from existing land uses and threats;
- opportunities to leverage existing conservation programs;
- constraints and opportunities to achieve effective offset programs through previous experience;
- identification of legal, financial and institutional arrangements necessary to deliver offsets; and
- identification of management measures needed to facilitate effective improvements in the value of biodiversity offsets.

*Legal*

The legal issues discussed with stakeholders highlighted the lack of appropriate legal frameworks and inexperience with securing offsets for the long term in Lao PDR. Discussions with existing offset managers indicate that they prefer to undertake offset management themselves rather than hand responsibility to Lao PDR Government agencies. The ability of government agencies to administer and enforce laws was also identified as a key issue. However, stakeholder engagement identified opportunities to use the *Forestry Law* to secure offsets through forest classification changes (*Article 44* of the *Forestry Law 1996*); and the ability to use the *Forestry Law* to make additions to existing protected areas. It also identified that the Environmental Protection Fund (EPF) could be used as a mechanism to administer funds designed to deliver an offset. Some concern though was raised on the robustness of the EPF's governance.

*Institutional and Management*

The institutional and management arrangements identified during the stakeholder engagement process highlighted that enhancement and support of the existing protected area network was seen as a preferred option for biodiversity offsetting. This would be through either: environmental contributions to the Lao PDR Government; support of existing conservation management programs (through NGOs); or additions to the protected area network from current land used for forestry. These approaches however would need to be undertaken within a management framework and supported by adequate funding and delivery mechanisms. Engagement of Lao PDR government agencies and NGOs was highlighted as being essential to deliver these options on the ground.

The experience of the Theun-Hinboun Power Company and MMG Sepon has highlighted that existing private funding arrangements through NGOs (WCS and IUCN) to support on-ground management has been used successfully. Stakeholders highlighted that benefit sharing, building capacity of Lao PDR government agencies, data management, governance and accountability were items that need to be considered when designing biodiversity offsets with the involvement of NGOs in delivery.

Regarding management of existing protected areas as a biodiversity offset mechanism, stakeholders highlighted some good examples and their concerns regarding others. The existing programs where DFRM were the custodian of the NPA (such as at Nam Kading NPA) were described as being successful. This was in some part due to the work of WCS in delivering management in conjunction with DFRM. However, there was concern with the current management of Phou Khao Khoay NPA and the opportunity to consider management support. It was acknowledged by stakeholders that insufficient funds exist to facilitate adequate management. However, working with the military at PKK was noted as being untested and may prove to be a risk in delivering adequate biodiversity outcomes unless capacity building is s incorporated into offsetting proposals and adequate resources are provided for the management of the NPA.

*Financial*

Financial considerations and the costs of setting up and managing offsets were highlighted by all stakeholders. The main points being: the current lack of funding for existing conservation initiatives; lack of coordination between Lao PDR government agencies; lack of adequate or untested accountability frameworks to deliver funding (payments for ecosystem services); and the ability of existing NGOs and Lao PDR government agencies to administer funds appropriately (including the EPF). However, stakeholders identified that a number of existing tested conservation programs exist that could be supplemented by additional funding to deliver conservation outcomes as part of a biodiversity offset package.

*Existing and Future Land uses*

Stakeholders highlighted that the lack of adequate land zoning makes it difficult under the *Land Law 2003* to adequately demarcate land sufficiently to protect biodiversity outside of the protected area network. Development within Protected Areas was also highlighted as an issue with existing and new hydropower schemes being developed within Nam Kading and Phou Khao Khoay NPA. Similarly, legal protection of cultural heritage was highlighted, including that sites of cultural significance require acknowledgement and management through the biodiversity offsetting process. Compensation of any losses of land to local communities due to biodiversity offsets was also identified as something that would need to be considered. Generally

however, local communities responded positively to the concept of managing local Production Forests for conservation.

Threats from mining, hydro schemes and forestry where highlighted by stakeholders as the major threats that could arise when locating biodiversity offsets. Careful siting of the offset was seen as the best approach to limit impacts. However, it was raised that it was difficult to gather information on all current development proposals to provide an indication of the geographic location of threats from changing landuses. Development pressures from provincial roads and changing technologies were also highlighted as an issue.

*Threats*

Stakeholders identified a range of current threats to biodiversity management. These included: existing and future planned developments (mining and hydro schemes); pests; wildlife trade; forestry; agriculture; resettlement sites; and cumulative impacts from development and human impacts. Opinion suggested that the siting and management of offsets was important to ensure that future land uses would not impact on any offsets and that adequate management was undertaken to reduce the impacts of identified threats.

## 3.2 *THREATS TO THE ESTABLISHMENT OF BIODIVERSITY OFFSETS*

The location of land use activities in the Nam Ngiep and Nam Xan watershed were identified that were a major threat to the long-term management of biodiversity offsets. These included:

- Existing and future hydropower projects;
- Mining Leases; and
- Production Forest Areas

This information was provided by the Ministry of Energy and Mines and DFRM.

*Figure 3.2* outlines the location of these land use threats in relation to the candidate biodiversity offset areas.

The exercise identified that the major threats to the biodiversity offset sites are mining leases and production forests. This is of particular concern in the Nam Xan watershed where the majority of forested areas are production forests, limiting the ability to use these areas as primary conservation areas to protect terrestrial biodiversity values.

This information has been used in the SWOT analysis.

250000 300000 350000 400000

2150000 2100000 2050000

**Legend**

- Catchment Boundary
- Waterbody
- Road
- City or Town
- Lao PDR Boundary
- Surrounding Hydroelectric Power Projects
- Nam Ngiep 2 Tunnel

**Mining Tenements:**

- Mining Lease Under Survey (mining not yet approved)
- Mining Lease with Survey Proposed (mining not yet approved)
- Mining Lease with Concessions

**Nam Ngiep 1 Hydropower Project:**

- Inundation Area
- Re-regulation Dam
- Re-settlement Area
- Proposed Access Road

**Candidate Offset Sites:**

- Nam Ngiep Offset Area
- Huay Ngua Provincial Protected Area
- Phou Khao Khouay National Protected Area
- Nam Xan Offset - River Centreline

**Forest Zone:**

- National Protection Forest
- Production Forest

N

0 10 20 30Km

1:600,000

**Basemap:** ESRI World Imagery

**Note:** Known extent of mining tenements displayed, with some tenements partially shown.

Phoukout
NKL Co., Ltd
Nam Ngum 4A
Phonsavan
Vinacomin
COECCO
Muang Khoun
Phou Bia Mining Limited
Nam Ngiep 3A
Phaxai
Nam Ngiep 2 Tributary Dam
Nam Ngiep 2 Main Reservoir
Nam Pot
Nam Ngiep 2 Powerhouse
Nam Ngiep
Nam Ngum
Nam Ngiep Catchment
Lao-Muang-om Mining., Ltd
COECCO
COECCO
Lao-Muang-om Mining., Ltd
Nam Bak-2
PT Construction Company., Ltd
Nam Ngum 2 Reservoir
Nam Ngum Reservoir
Ba. Donkha
Hinheup
Nam Ngum Reservoir
Agriculture Development
Longxan
Nam Mang 1
Thinkeo
Phonhong
Nam Ngum Reservoir
Nam Leuk reservoir
Nam Mang 3 Reservoir
Ban Keun
Mekong River
Pakxan
Qinghai xingqi Co., Ltd.
Schuan Above Advantage Lomon Mining (Lao) Co., Ltd
Hai
Tha Ngon
State Enterprises for Agriculture - Industry Development (DAI)
Nonghet
Daosavan Investment and Construction., Ltd
Phongsabthavy Construction., Ltd
COECCO
Phongsabthavy Construction., Ltd
PPC Consultant., Ltd
Phongsabthavy Construction., Ltd
Nam Chain
Nilandon Development Mining., Ltd
Nam San 3A
Namchong-Namgneup
Nam San 3B
Namchong-Namgneup
GnotNamxan NamPeuak
GnotNamxan NamPeuak
Thathom
Nammo
China Base Ningbo Foreign Trade Co., Ltd
Namchong-Namgneup
Nammo
Neyland Lao Minng., Ltd
Phoupasang-Punghok
Phak Beak
Nam Phouan
CAVICO Vietnam & Laoyongchaluen Trading Import-Export
Nam Xan Catchment
Nam Xan
Phoupasang-Punghok
Phak Beak
Phak Beak
Phoutume
Lao Thong Her Development., Ltd
Lao Thong Her Development., Ltd
Lao Thong Her Development., Ltd
Lao Thong Her Development., Ltd

| | | | |
|---|---|---|---|
| Client: | Nam Ngiep Power Company Ltd. | | |
| Drawing No: | 0185065b_OFFSETDES_G002_R0.mxd | | |
| Date: | 17/01/2014 | Drawing Size: A3 | |
| Drawn By: | TC | Reviewed By: DN | |

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

**Figure 3.2 - Land Use Threats**

Nam Ngiep 1 Hydropower Project
Biodiversity Offset Design Report

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

ERM

## 3.3 BIODIVERSITY OFFSET GOVERNANCE OPTIONS

### 3.3.1 Establishment of an Aggregate Offset Fund

This model would comprise of an Aggregate Offset Fund (AOF) (or Conservation Bank) set up under the EPF or other financial body that administered and provided funding to biodiversity offset projects in Lao PDR, including the NNP1 project.

The basic administrative and governance components to establish an Aggregate Offset Fund exist within Lao PDR. These include: a financial body capable of managing capital for projects (EPF); central government agencies (MoNRE and DFRM) able to determine priorities for conservation investments; a system of provincial and district governments responsible for natural resource management and ability to administer offset projects; an established protected area system (that is largely unfunded); and an established NGO network able to deliver offset management services (WCS, WWF, & IUCN). Offsets can also be legally required either through a Prime Ministerial Decree or through formal agreements with Lao PDR agencies.

The lack of a formal biodiversity offset framework in Lao PDR (through either legislation or a Prime Ministerial Decree) is however a drawback. This means that some components necessary to measure the biodiversity values to be offset and the amount of funds to be deposited do not currently exist. These include a common biodiversity assessment metric to measure the quantum of offset required by developments and a mechanism to determine the cost or monetary value of the "fund" deposit. These components are necessary as the offset metric "caps" the size of the offset required (in terms of area, type and condition of biodiversity). An assessment of the required fund deposit is also necessary to provide certainty to developers of the cost of offsetting using the AOF. Value setting mechanisms can relate to the cost of management of the offset over a set time period or an evaluation of the value of ecosystem services.

These weaknesses however should not be a barrier for the establishment of an AOF. As an interim measure, it is possible to utilise the existing administrative and governance components in place to establish offsets for the NNP1 Project. This would mean utilising the EPF as the primary vehicle to manage offset funds for identified candidate offset sites. Delivery of offset projects would fall to MoNRE/PoNRE who would tender NGOs to deliver offset management. Oversight would occur through a Provincial Government level Committee with representatives from NNP1PC.

If an AOF were to be established in Lao PDR, it is recommended that a formal framework be established that builds on the existing capacities and establishes mechanisms to measure the offset quantum and calculate costs. The ADB may be in a position to support this approach.

### *3.3.2 MoNRE Management of Offset and River Basin Activities*

Under his model, the Ministry of Natural Resources and Environment (MoNRE) would be responsible for the administration of biodiversity offset projects. This would be undertaken in accordance with the draft *River Basin Management Plan Guideline* currently being prepared by the agency. This includes utilising the existing Central, Provincial and Village government structures to manage the projects. This would integrate with the planning frameworks being developed at each level of government. See the outline of the draft structure as proposed by MoNRE at *Figure 3.2*.

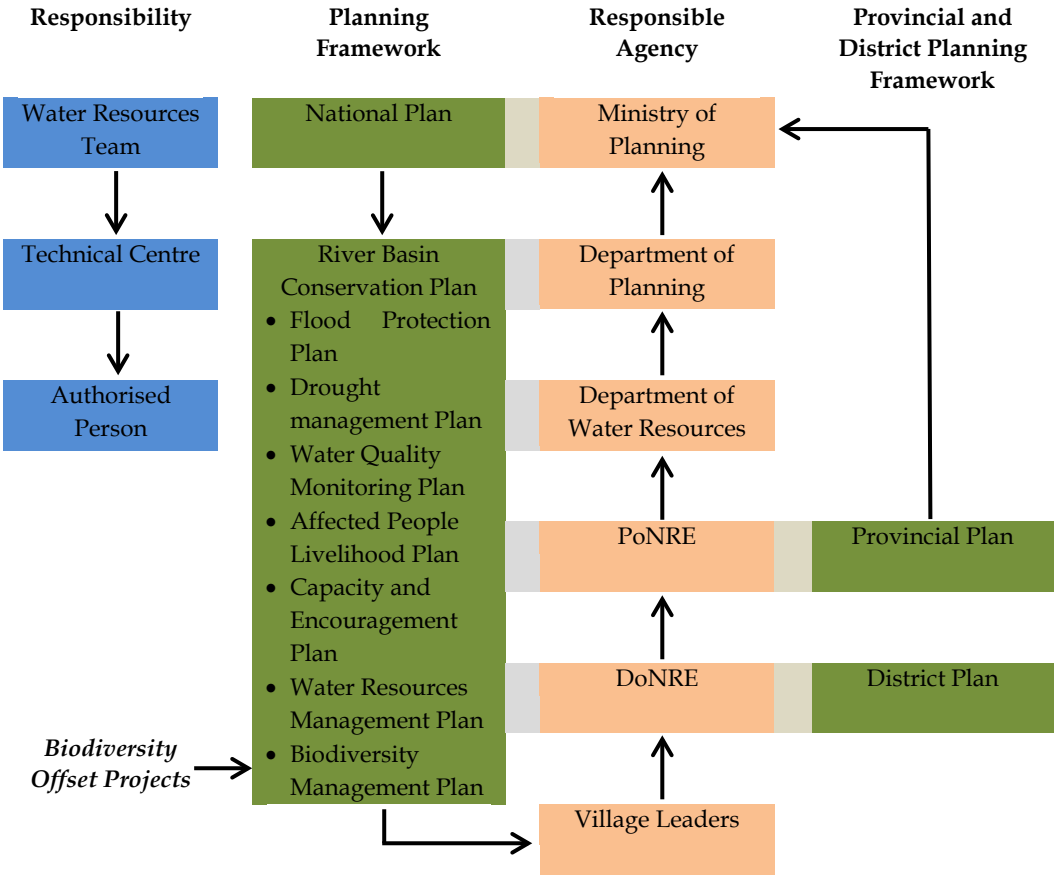
During consultation with MoNRE, representatives expressed preference to this model to administer watershed and biodiversity offset projects. They indicated that the approach better integrates with the management structures already in place and avoids duplication of governance frameworks. They expressed concern that a River Basin Committee or Watershed Management and Protection Authority resulted in duplication and could disenfranchise local officials.

Appropriate governance measures would however be required to be put in place so that accountability occurred over the expenditure of funds, at a central and provincial government level. This could be achieved through oversight by MoNRE and a Provincial Government level committee, with representatives from NNP1PC.

The governance model would administer biodiversity offset projects at the Provincial and District levels of government and fit within the River Basin Conservation Plan. Funding would be provided to MoNRE Central and Provincial offices (Provincial office of Natural Resources and Environment (PoNRE)) or through the Lao PDR Environment Protection Fund (EPF). Specific tied funding could be made to the EPF for specific projects as part of the biodiversity offset package.

*Figure 3.3* outlines the proposed governance structure provided by MoNRE as the preferred model to manage river basin management projects.

*Figure 3.3* *Draft MoNRE River Basin Management Plan Guideline Framework*




PoNRE – Provincial office of Natural Resources and Environment

DoNRE – District office of Natural Resources and Environment

### *3.3.3 Nam Ngiep River Basin Committee*

A River Basin Committee (RBC) could be established to oversee watershed management activities within the Nam Ngiep Watershed. The Committee would facilitate management of land, water and forest resources as part of the biodiversity offset package.

Funding would be provided directly by NNP1PC to MoNRE Central office or through the Lao PDR Environment Protection Fund (EPF) to establish the RBC. Monetary contributions from other hydro projects and other interests in the river basin could also be sought. Specific tied funding could be made to the EPF for projects as part of the biodiversity offset package over a 30 year period. These funds would be invested by the EPF to provide ongoing management payments for these projects.

Set up of the RBC would be required to be supported by the Ministry of Natural Resources and Environment (MoNRE) as part of the AusAID *Lao PDR National Integrated Water Resources Management Support Project*.

Specific projects as part of the biodiversity offset package could be funded directly by NNP1PC or by the EPF. The intent would be that these projects would be administered by the RBC to focus on protecting water resources entering into the Nam Ngiep Reservoir and biodiversity offset management.

During consultation, MoNRE expressed concern over using an RBC to administer biodiversity offset projects. They cited experience in the Nam Ngum watershed, saying that the structure duplicated effort and was not connected to existing government structures. They also expressed concern over the use of the EPF as the funding mechanism, preferring to receive direct payments at a Central and Provincial level.

### *3.3.4 Watershed Management and Protection Authority*

A Watershed Management and Protection Authority (WMPA) could be established by Prime Minister's Decree to manage the biodiversity offset package for the project. An Authority has been established for the Nam Theun 2 Watershed Management and Protection Authority in 2005 (Prime Minister's Decree 39/PM).

The WMPA could be used to administer the biodiversity offset package of the NNP1 project. Funding for the WMPA would be administered by NNP1PC or through the EPF through financial payments by NNP1PC over a 30 year period.

Operations of the WMPA would be undertaken under the provisions of a Prime Ministerial Decree. An *Environmental Management Framework and Operational Management Plan* would be required to describe and outline the specific activities of the WMPA.

During consultation with MoNRE, representatives expressed concern that WMPAs were too specific and did not service the needs of provincial and local governments. They expressed concern that they ceased to exist when the funding stopped and that the responsibility of management would then be passed to Provincial Governments without sufficient funding or historical knowledge of the projects.

### *3.3.5 Lao PDR Environment Protection Fund*

The Lao PDR Environment Protection Fund (EPF) could be used as a vehicle to deliver and manage funds as part of the biodiversity offset package. The EPF is untested in this regard and it would need to be supported to ensure adequate management and disbursement of funds as well as monitoring to determine outcomes. The EPF *Operations Manual* does however include requirements for an environmental and social safeguard framework; financial management; and monitoring and evaluation through the establishment of a Specialised Financial Window.

If the EPF was used to deliver funding for a biodiversity offset, the rules and standards that would apply to expending any funds would need to be carefully defined and drafted to ensure adequate expenditure of funds and management frameworks to deliver biodiversity conservation outcomes.

During consultation, mixed concerns were raised about the ability of the EPF to efficiently administer funds for the purposes of biodiversity offset management. There was an indication that the EPF had not managed specific tied funding in the past. There were also concerns that MoNRE was better placed to deliver value for money, removing unnecessary bureaucracy. The EPF and Ministry of Mines and Energy were however supportive of using the EPF as the primary vehicle to manage offset management funds.

## *3.4 CANDIDATE BIODIVERSITY OFFSET SITE OPTIONS*

### *3.4.1 Watershed Management Activities in the Nam Ngiep and Nam Xan Watersheds*

*Nam Ngiep Watershed*

There are opportunities to promote the management of biodiversity and water resources above the high water level of the inundation area of the NNP1 dam to act as an aquatic biodiversity offset. This would include all forested areas immediately adjacent to and within the watershed of the lake. Active management of Protection Forest in this area would aim to improve both aquatic and terrestrial biodiversity values.

Management of forestry activities and NTFP collection could also occur in areas retained as Production Forest. Local community engagement in managing threats (such as hunting) would also occur, as would manage use for the collection of non-timber forest products. Management of terrestrial biodiversity in this area would also have a direct benefit of reducing the potential for water quality impacts from sediment and erosion in the watershed. Facilitation of environmental programs (such as SuFoRD/SUPSFM or REDD+) could be undertaken to promote sustainable forestry operations and improve biodiversity management and watershed protection.

During consultation, the Department of Forestry Resource Management (DFRM) was supportive of this approach, citing joint benefits of improving forest management and watershed protection. They also said that there are no existing projects in this area for biodiversity or sustainable forest management, with the implication that management would not be additional to existing programs.

*Nam Xan Watershed*

There are opportunities to promote watershed management activities in the Nam Xan River watershed to act as an aquatic biodiversity offset. ERM identified a stretch of the Nam Xan River between Thasi to Ban Kheadong and Borikhan that is approximately 50km in length. This is a North-South flowing part of the Nam Xan River in the mid to lower reaches of the watershed. It is currently mostly vegetated with a relatively low population density, poor vehicular access, and steep riparian terrain. No hydro projects are proposed for this stretch of the watershed.

Whilst hydro schemes are likely to regulate the water resource within the Nam Xan River and development pressures remain (particularly forestry and agriculture), this section of the river would benefit from appropriate water shed management practices to maintain and improve the aquatic values of this stretch of the river and hence provide an appropriate offset. There is an opportunity to link into SuFoRD/SUPSFM or REDD+ projects to promote sustainable forestry operations within the watershed along this stretch of the Nam Xan River.

During consultation, there was concern raised by DFRM and MoNRE that it will be difficult to manage watershed activities that impact on water quality in the Nam Xan watershed. The forested areas adjacent to the river were mainly Production Forests; a new road had recently been built in the watershed and upstream development pressures from mining, agriculture and hydro projects would threaten watershed management activities. They also expressed the view that better managing the Nam Ngiep River below the dam wall may be more achievable.

### *3.4.2 Protected Areas*

*Nam Xan Valley*

During ERM's field visit in March 2013, portions of Production Forest in the Nam Xan watershed were identified that could be reclassified Protection Forest in Xieng Khouang Province and Bolikhamsay Province. These areas of forest may match "like for like" with the identified residual impacts from the inundation area of the watershed. These areas are currently utilised for Production Forest and are adjacent to existing Protection Forest within the watershed.

Compensation and management in the form of Payments for Ecosystem Services (PES) to MoNRE Forestry Department to better manage the timber resource and promote sustainable forest management in this area could also occur as part of the biodiversity offset. Links to REDD+ and SuFoRD/SUPSFM projects may also be considered to enhance management of remaining areas subject to forestry.

During consultation, DFRM indicated that they were unlikely to support reclassification of Production Forest in the Nam Xan watershed. They however express interest in PES programs and forest management activities.

*Nam Kading NPA*

Nam Kading NPA falls within Bolikhamsay Province and is considered to have some of the most important biodiversity values within Lao PDR. The NPA has similar biodiversity values as the NNP1 Project site and Nam Xan Watershed. There are already significant ongoing threats at the NPA including hunting and habitat loss. The NPA has seen many concerted efforts to improve conservation at the site and there are established programs for monitoring and management, currently managed by the WCS.

WCS has been involved in undertaking management at Nam Kading NPA since 2005 with successful management programs. There are opportunities to supplement the work that WCS are currently undertaking at Nam Kading NPA either by contributions to existing programs or the design of new distinct programs aimed at offsetting biodiversity values impacted by the NNP1 project. However, hydro power schemes are proposed for the NPA and would need to be considered to ensure that management to improve biodiversity values is not lost through future development.

During consultation, representatives from MoNRE and DFRM expressed that management activities already occurred within Nam Kading NPA and that the values represented were geographically removed from the impacted area. They were of the view that this restricted the ability of this area to be used as a biodiversity offset.

*Phou Khao Khouay NPA*

Phou Khao Kouay NPA (PKK) was also considered as a potential biodiversity offset option to improve biodiversity values through funding and management. Appropriate management of the protected area could also achieve a supplementary aquatic offset by improving the Nam Mang and Nam Leuk Rivers that flow through the NPA. However, similar to Nam Kading NPA, pressures from hydro schemes remain in this watershed and this would need careful consideration in terms of appropriate methods for delivery. Currently the NPA is managed by the local military that do not have the capacity or appropriate training to facilitate conservation as highlighted during the initial stakeholder engagement. Supporting an NGO such as the IUCN or WCS to work with the local military could may be considered to improve capacity.

During consultation, MoNRE and DFRM were supportive of providing funds to PKK NPA to improve and manage biodiversity values. They provided a management plan that was prepared for the NPA (No English translation available). They also expressed that insufficient funds currently exist to manage the NPA. They identified that managing ecotourism, access, NTFP collection and biodiversity enhancement works would be necessary.

*Huay Ngua Provincial Protected Area*

Huay Ngua Provincial PA lies East of the NNP1 project area and along the lower reaches of the Nam Ngiep River. The PA is currently degraded due to extensive logging activities and impacts from wildlife hunting. The area has the added potential of providing a buffer to reduce impacts to the resettlement area located to the South of the PA. Involvement of the community would be central to achieving offset gains at this site and the area has the added benefit as potentially acting as a biodiversity corridor between protected areas (PKK and Nam Kading NPAs).

MoNRE and DFRM were supportive of providing funds to manage the HN PA. They said that funds were not currently available to implement management practices as outlined in the PA. They expressed concern that the PA was small and was subject to substantial existing degradation. The proximity of the resettlement area was also raised as an issue, leading to impacts from NTFP collection and hunting. The proposed funding and management activities are recognised as a potential benefit and may assist in significantly reducing these identified impacts.

## *3.5 BIODIVERSITY OFFSET PROGRAM OPTIONS*

### *3.5.1 Payments for Ecosystem Services*

Payments for Ecosystem Services (PES) are an approach that could be used to provide funding to Lao PDR Government agencies and the community to compensate for losses of ecosystem services caused by the NNP1 project. Provisioning, regulating and cultural services would need to be assessed to determine the value that would require to be compensated. Provisioning ecosystem services would include: forest resources, water resources and fishing catch. Regulating services would include flood protection, carbon sequestration, water filtration and waste assimilation. Cultural values include recreation, aesthetics, landscape values and cultural uses.

Valuation techniques would need to be applied to each of the identified impacts and benefits on ecosystem services as a result of the construction of the NNP1 project. Any deficits in the final value would then be made as payments to affected persons, communities or to the Lao PDR government. These payments could be direct payments or payments into the EPF.

There is little experience in Lao PDR for the application of PES and its application remains relatively untested. DFRM did indicate during the stakeholder engagement that they had recently participated in a pilot program for PES from the Nam Ngum 3 Hydropower Scheme. DFRM were concerned however of the complexity of the approach and that it was untested. It was also expressed that it was a surrogate for direct payments to manage land for conservation that already existed but with a more complicated approach to determine financial values.

### *3.5.2 Contributions to Existing Conservation Programs*

There are opportunities to work with existing conservation programs to deliver biodiversity offsets for the NNP1 project.

These existing programs include:

- Convention on Biological Diversity (CBD) projects;
- Reduced Emissions from Deforestation in Developing Countries (REDD+) projects in Lao PDR;
- Sustainable Forestry and Rural Development (SuFoRD) project;
- IUCN Lao Illegal Wildlife Trade Action Group;
- IUCN Gibbon Conservation Action Plan; and
- KfW Entwicklungsbank Bank Forest Protection Program (*now defunct*).

During consultation with DFRM and MoNRE, they identified REDD+ and potential forestry related projects as potential supplementary mechanisms for biodiversity offsets. They discounted the current projects run by the IUCN as they are geographically removed from Bolikhamxay Province (although the models can be used). Also, CBD projects are currently being funded by other sources as of August 2013.

DFRM mentioned a new project funded by the World Bank and the Government of Finland in May 2013. It replaces SuFORD and is called the Scaling-Up Participatory Sustainable Forest Management (SUPSFM) Project. This project is aimed at implementing participatory approaches to sustainable forest management. It links into the current REDD+ to avoid the unnecessary loss of forests and increased carbon storage.

*Table 3.2 Biodiversity Offset Governance, Site and Program SWOT analysis*

| | Factors relevant to NNP1PC | | Relevant external factors | |
|---|---|---|---|---|
| **Mechanism** | **Strengths**<br>*Characteristics that give the option an advantage over others* | **Weaknesses**<br>*Characteristics that place the option at a disadvantage relative to others* | **Opportunities**<br>*Elements that are advantageous for the option* | **Threats**<br>*Elements that could constrain the option* |
| **Governance options** | | | | |
| Aggregate Offset Fund | Provides NNP1PC with a mechanism to manage biodiversity offsets.<br><br>Provides an administrative approach to enable offset package management beyond the concession agreement horizon.<br><br>Offset package delivery by government and NGO stakeholders who are better placed to manage biodiversity offset programs and sites. | The AOF has yet to be established and there are timing risks with ensuring that the legal and administrative procedures are in place to administer the offsets for the NNP1 project. | Provides Lao PDR with a consistent approach to manage biodiversity offsets through the AOF.<br><br>Allows engagement of NGOs to provide management of offset sites in Lao PDR and building capacity of the Lao PDR Government agencies (such as MoNRE and DFRM).<br><br>Provides a long-term sustainable funding mechanism for conservation management in Lao PDR. | Establishment of the AOF has not been completed; however the basic framework has been established and is in place.<br><br>Capacity of Lao PDR government agencies to manage the AOF in the short term will require support and capacity building.<br><br>Further work is required to develop the metric required to determine the offset quantum and the value of trust fund deposits for the AOF. |
| MoNRE Management through provincial government structures | Provides NNP1PC an existing mechanism to work with MoNRE to implement watershed and biodiversity offset management for the project.<br><br>Provides an administrative approach to enable offset package management beyond the concession agreement horizon.<br><br>Offset package delivery by MoNRE who have experience in managing offset management operations. | Lack of control in the management of specific projects to achieve the required biodiversity offset improvements. | Is compatible with Lao PDR Strategies for improving natural resource management.<br><br>Engages regional and local stakeholders in the management of water resources and the biodiversity offset package. | Development of the River Basin Management Guideline Process has not been completed.<br><br>Provincial and District level governments untested in managing and implementing biodiversity offsets, however they have had experience in administering programs for biodiversity protection (in conjunction with WCS). |

| | Factors relevant to NNP1PC | | Relevant external factors | |
|---|---|---|---|---|
| **Mechanism** | **Strengths**<br>*Characteristics that give the option an advantage over others* | **Weaknesses**<br>*Characteristics that place the option at a disadvantage relative to others* | **Opportunities**<br>*Elements that are advantageous for the option* | **Threats**<br>*Elements that could constrain the option* |
| River Basin Committee | Provides NNP1PC a mechanism to influence upstream management of water resources in the Nam Ngiep Watershed.<br><br>Provides an administrative approach to enable offset package management beyond the concession agreement horizon.<br><br>Offset package delivery by government and NGO stakeholders who are better placed to manage biodiversity offset programs and sites. | Lack of control in the management of specific projects to achieve the required biodiversity offset improvements.<br><br>Biodiversity offsets proposed for the Nam Xan watershed and PKK NPA would be outside the jurisdiction of the proposed RBC and would be required to be directly administered by NN1PC or the EPF rather than the RBC. | Provides a whole-of-river basin approach to managing offsets.<br><br>Is compatible with Lao PDR Strategies for improving water resource management.<br><br>Engages regional and local stakeholders in the management of water resources and the biodiversity offset package. | RBC not established in a timely fashion by the Government of Lao PDR.<br><br>Lack of engagement by stakeholders in the establishment of the RBC.<br><br>Insufficient funds are provided by the Government of Lao PDR and other interested parties to support the establishment of the RBC. |
| Water Management and Protection Authority | Provides an administrative approach to enable offset package management beyond the concession agreement horizon.<br><br>Offset package delivery by government and NGO stakeholders. | Approach does not enable a whole-of-river approach to the management of water resources and hence limits NNP1PC to influence the process and outcomes of the WMPA. | Provides a framework to directly manage the biodiversity offset package.<br><br>Approach is compatible with Lao PDR Strategies for improving water resource management.<br><br>Engages regional and local stakeholders in the management of water resources and the biodiversity offset package.<br><br>Enables the competitive tender of management of offset sites. This has advantages in terms promoting value for money for the management of offset sites. | WMPA not established in a timely fashion by the Government of Lao PDR.<br><br>Lack of engagement by stakeholders in the establishment of the WMPA. |

| | Factors relevant to NNP1PC | | Relevant external factors | |
|---|---|---|---|---|
| **Mechanism** | **Strengths**<br>*Characteristics that give the option an advantage over others* | **Weaknesses**<br>*Characteristics that place the option at a disadvantage relative to others* | **Opportunities**<br>*Elements that are advantageous for the option* | **Threats**<br>*Elements that could constrain the option* |
| Environment Protection Fund | Provides an established mechanism to administer funds for the biodiversity offset sites and programs.<br><br>Removes responsibility for financial management for offsets from the NNP1PC beyond the concession agreement horizon. | Removes control over the expenditure of funds by NNP1PC and hence direct influence on outcomes.<br><br>May increase costs of management through additional administrative requirements of the EPF. | The EPF allows Lao PDR Government to have control and administer the biodiversity offset package.<br><br>Establishes the EPF as a mechanism to manage biodiversity offsets in Lao PDR. | Lack of experience in the administration of the EPF for biodiversity offsets.<br><br>Capacity of the EPF to manage multiple biodiversity offset projects. |
| **Candidate Offset Site Options** | | | | |
| Nam Xan Valley | Equivalent "like for like" aquatic and terrestrial biodiversity values are present in the Nam Xan Valley to meet the obligations of NNP1PC. | Land tenure and existing resource use (forestry, water and minerals) constrain the ability of the watershed to be used for terrestrial and aquatic biodiversity offsets and hence the offsetting obligations of NNP1PC. | Opportunities exist to manage the section of river between Thasi to Ban Kheadong and Borikhan as an aquatic offset.<br><br>Some forested areas of Production Forest could be reclassified as Protection Forest in Xieng Khouang Province and Bolihanxay Province to form part of a terrestrial biodiversity offset. | Threats exist from existing hydro power projects in the upstream portion of the watershed.<br><br>Mining and forestry activities may impact on the aquatic and terrestrial biodiversity values that the offsetting is designed to protect and manage.<br><br>Currently no coordinated river basin wide approach to managing threats exists.<br><br>DFRM may not agree to reclassifying forest without compensation. |

| | Factors relevant to NNP1PC | | Relevant external factors | |
|---|---|---|---|---|
| **Mechanism** | **Strengths**<br>*Characteristics that give the option an advantage over others* | **Weaknesses**<br>*Characteristics that place the option at a disadvantage relative to others* | **Opportunities**<br>*Elements that are advantageous for the option* | **Threats**<br>*Elements that could constrain the option* |
| Nam Ngiep Valley | Equivalent "like for like" aquatic and terrestrial biodiversity values are likely present in the Nam Ngiep Valley that meet the requirements of the ADB.<br><br>Benefits from coordinated watershed management can meet biodiversity, aquatic and watershed protection outcomes for NNP1PC. | Continued upstream activities (forestry, hydropower and mineral development) constrain the ability of portions of the watershed to be used as suitable aquatic and terrestrial offsets.<br><br>Current land uses and tenure (mining, forestry, agriculture) constrain the ability of the area to be used for the purposes of biodiversity offsets. | Opportunities exist to manage the area of forest immediately adjacent to the reservoir and sub watersheds for aquatic and biodiversity related offsets.<br><br>Some forested areas of Production Forest could be reclassified as Protection Forest within the watershed to form part of the terrestrial biodiversity offset and assist in the management of watershed resources. | Threats exist from existing hydro power projects in the upstream portion of the watershed.<br><br>Agriculture, mining and forestry activities are also a primary threat to aquatic and terrestrial biodiversity values.<br><br>Currently no coordinated river basin wide approach to managing threats.<br><br>DFRM may not agree to reclassifying forest without compensation. |
| Nam Kading NPA | Significant biodiversity values are present in Nam Kading NPA that require management intervention to prevent degradation and loss that would benefit from management as an offset by NNP1PC. | Equivalent "like for like" biodiversity values may not be present in the Nam Kading NPA and hence might not meet the obligations of NNP1PC. | Existing management of the site by WCS provides an established framework to build on for management of biodiversity values.<br><br>Nam Kading NPA contains significant biodiversity values that would benefit from ongoing management funding and actions. | Threats from hydro power projects, management of poaching, pests and weeds are ongoing issues in the NPA that would require careful management. |

| | Factors relevant to NNP1PC | | Relevant external factors | |
|---|---|---|---|---|
| **Mechanism** | **Strengths**<br>*Characteristics that give the option an advantage over others* | **Weaknesses**<br>*Characteristics that place the option at a disadvantage relative to others* | **Opportunities**<br>*Elements that are advantageous for the option* | **Threats**<br>*Elements that could constrain the option* |
| Phou Khao Khouy NPA | Significant biodiversity values are present in Phou Khao Khouy NPA that would benefit from management intervention to prevent further loss of biodiversity values.<br><br>Equivalent "like for like" biodiversity values are present for some of the values required to meet the obligations of NNP1PC. | Not all equivalent "like for like" biodiversity values are present in the NPA.<br><br>No current management of biodiversity values exists for the NPA and hence no established framework is available to build upon. NNP1PC would need to establish a framework for management to occur. | Conservation gains by actively managing biodiversity values of the NPA would be beneficial given there is no current management. | The local military are the current custodians of the NPA. The ability for the local military to adequately manage the reserve for conservation purposes is unproven.<br><br>Threats from hydro power projects, management of poaching, pests and weeds are ongoing issues in the NPA that would require careful management. |
| Huay Ngua Provincial Protected Area | Significant biodiversity values are present at Huay Ngua Provincial Protected Area that would benefit from management intervention to present the further loss of biodiversity values.<br><br>Equivalent "like for like" biodiversity values are present in the PPA and would meet some of the values required to meet the obligations of NNP1PC.<br><br>Ability to engage affected communities in the management of biodiversity values given the proximity of the PPA to the resettlement site. | Not all equivalent "like for like" biodiversity values are present in the NPA.<br><br>No current management of biodiversity values exists for the PPA. A draft management plan exists but will need to be updated.<br><br>No established framework is available to build upon to administer the PPA. NNP1PC would need to establish a framework for management to occur. | Conservation gains by actively managing biodiversity values of the PPA would be beneficial given there is no current management.<br><br>Ability to engage the local community directly in management, including those who have been resettled as part of the project. | The PPA is located next to the resettlement site for the NNP1 project. Impacts from poaching, NTFP collection will need to be carefully managed. |

| | Factors relevant to NNP1PC | | Relevant external factors | |
|---|---|---|---|---|
| **Mechanism** | **Strengths**<br>*Characteristics that give the option an advantage over others* | **Weaknesses**<br>*Characteristics that place the option at a disadvantage relative to others* | **Opportunities**<br>*Elements that are advantageous for the option* | **Threats**<br>*Elements that could constrain the option* |
| **Program options** | | | | |
| Payments for Ecosystem Services | Enables NNP1PC to provide a payment for ecosystem service value to meet biodiversity offset obligations rather than physically managing offset sites and managing programs.<br><br>Obligations for management are undertaken by third parties who may be better placed to manage biodiversity offsets. | Comprehensive assessment of the ecosystem service values of the residual biodiversity values lost will need to be undertaken. This is likely to be costly and time consuming.<br><br>Quantifying losses and gains for the offset metric is problematic, hence achieving "no-net-loss" of biodiversity values will be difficult to quantify. | Conservation gains by paying existing resource managers (DFRM; MoNRE) to manage biodiversity values means that PES payments can build capacity of the agencies to deliver biodiversity protection. | DFRM expressed concern on the obligations imposed as a result of the Nam Theun 2 Project through PES payments.<br><br>Untested approach to delivering biodiversity offsetting within Lao PDR. |
| CBD Projects | Existing CBD Projects have been prepared by WCS. These projects are focussed on the management of biodiversity values in Nam Kading NPA. This may partially meet the offset obligations for NNP1PC.<br><br>Obligations for management are undertaken by third parties who may be better placed to manage biodiversity offsets. | The CBD projects are currently out-of-date and require further analysis before they would be ready to be funded.<br><br>The CBD projects do not adequately ensure a "like for like" biodiversity offset outcome as the offset sites do not match all of the residual biodiversity values required to be offset.<br><br>Quantifying losses and gains for the offset metric is problematic as assessments have not been undertaken for the areas covered by the CBD projects, hence achieving "no-net-loss" of biodiversity values will be unknown. | Builds on existing work being undertaken by WCS in enhancing the NPA network in Lao PDR. | Ongoing funding of projects beyond the 5 year horizon not outlined nor confirmed. Additional funding proposals would need to be prepared. |

| | Factors relevant to NNP1PC | | Relevant external factors | |
|---|---|---|---|---|
| **Mechanism** | **Strengths**<br>*Characteristics that give the option an advantage over others* | **Weaknesses**<br>*Characteristics that place the option at a disadvantage relative to others* | **Opportunities**<br>*Elements that are advantageous for the option* | **Threats**<br>*Elements that could constrain the option* |
| REDD+ and SuFORD Projects<br><br>(*Note SUPSFM has now replaced SuFORD*) | Existing REDD+ and SuFORD projects are undertaken in Lao PDR and could be used as mechanisms to deliver offset management programs within the Nam Ngiep and Nam Xan watersheds. (Note that SuFORD has now been replaced by SUPSFM as of May 2013). | REDD+ and SuFORD projects primary objectives are for carbon capture and sustainable forestry. Tangible outcomes for biodiversity values would be secondary outcomes. Ensuring biodiversity outcomes meet NNP1PC's obligations would need to be inbuilt into the project definitions.<br><br>Third parties would be responsible for the delivery of the REDD+ and SuFORD projects. These parties may not adhere to the biodiversity objectives explicit for achieving a biodiversity offset for the NNP1 project. | REDD+ and SuFORD projects have been extensively used in Lao PDR to manage forestry activities. This experience can be applied to the Nam Xan and Nam Ngiep watersheds to supplement biodiversity offsets through specific targeted projects. | Management of REDD+ projects is subject to the international trade in carbon permits. This market may not be stable and impact on offset management if carbon credits derived are not able to be traded.<br><br>The SUPSFM project is new and will require further analysis to determine its application to candidate offset areas. |
| IUCN Programs | Existing IUCN projects are undertaken in Lao PDR to manage Gibbons and the Illegal Wildlife Trade. These projects can be supported through an environmental contribution to supplement the biodiversity offset package. | The existing IUCN projects will only supplement the requirements for a biodiversity offset.<br><br>The IUCN projects are undertaken in a different geographic area in Lao PDR than the Nam Ngiep Project. This may not meet the "like-for-like" offset requirements. | Existing IUCN projects offer the opportunity build on capacity developed in species specific conservation management in Lao PDR. | Ongoing funding and support of these projects is required to ensure long term biodiversity gains. This funding and commitment is not guaranteed beyond the 5 year horizon. |

# 4 RECOMMENDED BIODIVERSITY OFFSET PACKAGE

The following biodiversity offset package has been derived based on the analysis of the options outlined in *Section 3* of this report.

Following discussions with the ADB and the IAP, it is recommended that currently available legal and administrative mechanisms be used to establish an Aggregate Offset Fund (AOF) in Lao PDR. This fund would be used to manage the proposed offset areas for the NNP1 Project as well as build capacity for ongoing offset management and conservation within Lao PDR. Further work (supported by the ADB) would be required to strengthen the capacity of the Lao PDR Government to enable appropriate governance and oversight of the AOF. Further policy work is also required to define an appropriate offset metric and a method to determine the value of trust fund deposits.

In relation to specific offsets for the NNP1 Project, it is recommended that offset areas include: forested and riverine areas of the Phou Khao Khouy NPA; and forested and riverine areas of the Nam Ngiep Watershed. These areas would be managed by a Provincial Offset Committee. It is anticipated that work on establishing offset sites for the NNP1 project would occur in parallel to setting up the AOF. This is necessary to ensure that appropriate offsets are established for the NNP1 project and are not delayed due to the time required to establish the AOF.

Funding would be provided by the existing negotiated concession agreement funds allocated to manage the offset package. Additional funds may be required to facilitate the establishment of the AOF from the ADB or other sources.

This section provides an overview of the legal, administrative, governance, monitoring and reporting requirements to establish an AOF within Lao PDR. Further discussion on the specific offsets required to be established for the NNP1 project are discussed at *Section 4.1.2*.

## 4.1 OUTLINE OF THE BIODIVERSITY OFFSET PACKAGE

### 4.1.1 Aggregate Offset Fund Overview

The purpose of the AOF will be to provide a vehicle to facilitate conservation management in Lao PDR through funds provided by developers to offset impacts on biodiversity from their developments. The core components of an AOF exist within Lao PDR, being: the EPF to manage funds for the purposes of environment protection; an assessment of conservation priorities to use as

offsets (through the UNDP PoWPA Program[2]); central, provincial and district level government bodies responsible for natural resource management and can administer offset management projects; an established (and relatively unfunded) protected area system; and an active NGO sector capable to deliver offset management activities.

As outlined in the SWOT analysis, appropriate governance and institutional strengthening will be required to ensure that the Lao PDR government agencies and the EPF are supported to deliver the proposal. It will be important to manage risks such as inappropriate resource allocation; financial waste and conservation outcome delivery.

Further policy work will also be required to develop an appropriate offset metric and a process to determine the fund deposit value. It is recommended that the approach used to determine the offset quantum be based on the BBOP "Habitat Hectares" model. An option for calculating the fund deposit could be the estimated future cost of implementing management actions over a 30 year period on a per hectare basis. This could be set at a variable per hectare rate adjusted based on the condition of the offset site. This value would need to take into account inflation and likely investment returns from the AOF trust fund to ensure adequate capital management and hence long-term financial stability.

*Legal Mechanisms to Establish the AOF*

Legal mechanisms will be required to be established to enable the implementation of the AOF. These relate to providing a legal framework for the AOF to operate within and the legal mechanisms required to secure and manage specific offset areas.

There are two levels of legal frameworks that would be required to be established to administer the AOF: the first being a Prime Ministerial Decree from the Prime Minister's Office to establish the overarching framework for the AOF; and the creation of a "Specialised Financial Window" under the provisions of the EPF Prime Ministerial Decree (146/2005) to enable the management of funds for the purposes of an AOF.

A Prime Ministerial Decree would provide an overarching framework that would outline the roles and responsibilities of government agencies (MoNRE; PoNRE; DFRM) and the EPF; define the processes required to administer the offset tendering process; and define the requirements for monitoring and evaluation.

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[2] Supporting Country Action on the CBD Programme of Work on Protected Areas (PoWPA) Project is run by the UNDP to strengthen protected area management in Lao PDR, including an assessment of conservation priority areas.

A Specialised Financial Window of the EPF would be established to manage funds for the AOF. This should include: specific objectives, targets and implementation procedures for operation of the AOF; description of the circumstances that the AOF would accept funds from developers for the purposes of biodiversity offsets; administrative procedures to disburse funds and requirements for reporting on fund expenditures; and review and audit procedures.

Establishing the Prime Ministerial Decree and the Specialised Financial Window will require engagement of GoL Government agencies (MoNRE; PoNRE; DFRM). Legal advice will also be required to develop the frameworks.

In relation to secure land tenure for offset areas, the *Forestry Law 1996*, *Land Law 1996* and in relation to Protected Areas, the *Prime Minister's Decree 164 on the Establishment of National Biodiversity Conservation Area, 1993* provide mechanisms to secure tenure. Prime Ministerial Decrees are also available to secure tenure and management if required. It is recommended that the legal mechanism used for offset areas be determined up-front for any candidate offset lands subject to funding of the AOF. This is essential to ensure the long-term feasibility of the offsets.

*Administration and governance mechanisms required to establish the AOF*

The administration of the AOF would be undertaken at 3 levels: EPF financial management (utilising the AOF Specialised Financial Window); Central Government level (MoNRE and DFRM) and Provincial Government level (PoNRE and a Provincial Offset Advisory Committee).

At the first level, the EPF would be responsible to manage funds deposited by developers in accordance with the EPF Operations Manual. The EPF would be responsible for managing these funds to receive returns on investments and to disburse funds to Central Government in accordance with the requirements of the Specialised Financial Window.

The second level would occur at Central Government level. The role of Central government would be twofold: determine the priorities for AOF expenditure within the protected area system/priority offset areas on private land; and the disbursement of offset funds from the AOF to Provincial Governments.

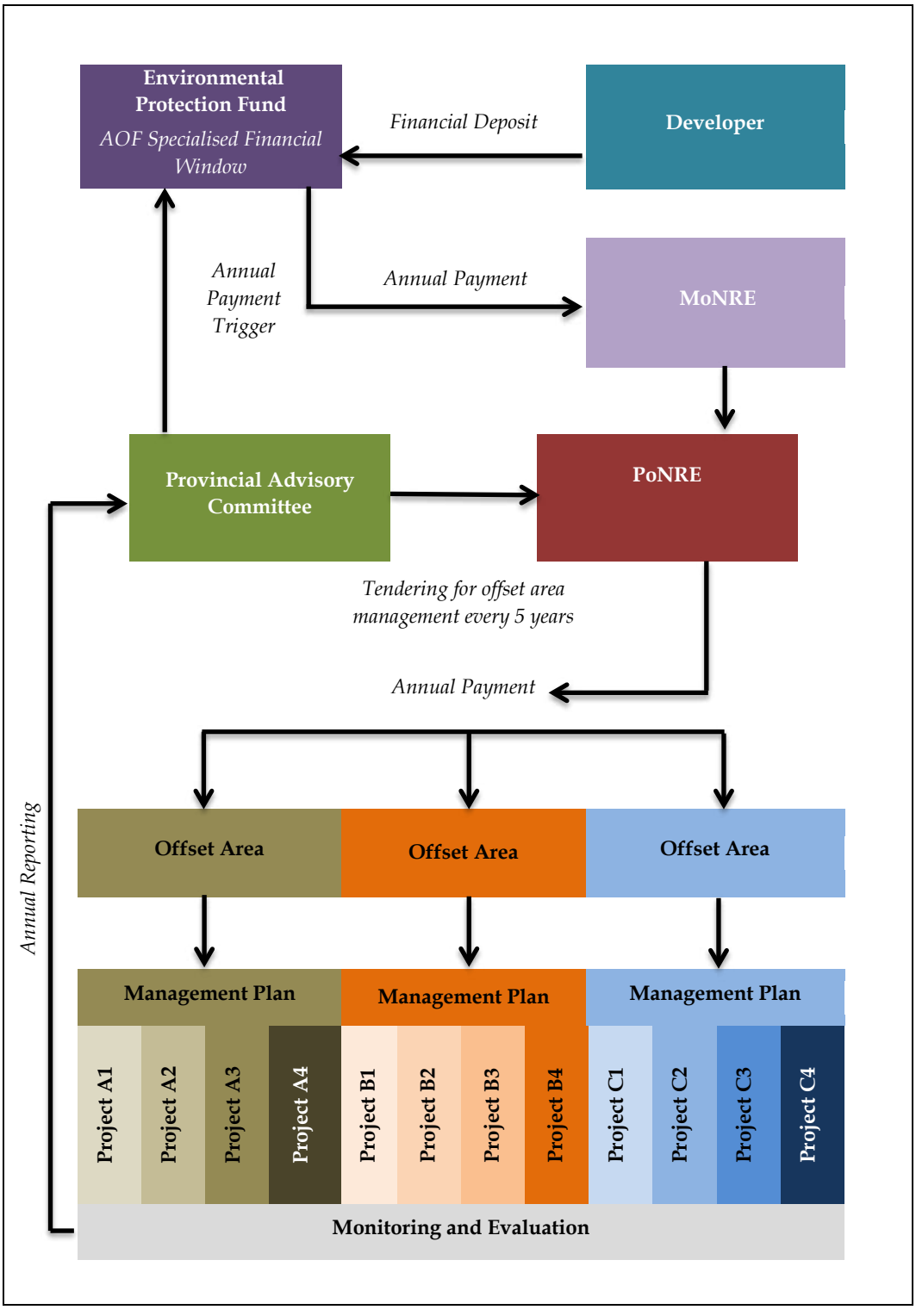
The third level would occur at the Provincial Government level. This would include the establishment of a Provincial Offset Committee to oversee tendering of offset management services (recommended on a 5 year rotational basis) and evaluate the implementation of offset management activities. This Committee should have representatives from PoNRE, the developer and community stakeholders. PoNRE offices would be responsible for the administration and support of the successful tenderer(s).

Completion of offset management activities by successful tenderers would trigger annual payments from the EPF after the submission of an annual report to the Provincial Offset Committee. The Committee would recommend release (or withholding) of funds to MoNRE and the EPF.

Governance to ensure adequate and efficient expenditure of funds will be required. The AOF would rely on the existing fiduciary standards outlined the EPF Operational Manual that require careful financial management. At the Central and Provincial government level, administrative costs should be capped as a percentage of the overall AOF fund deposit to be shared between the EPF, MoNRE and PoNRE (suggested to be between 3-5%). This will ensure that money allocated for conservation management is spent for that primary purpose.

*Figure 4.1* outlines the proposed structure of the approach.

*Figure 4.1 Overview of the proposed structure for the AOF*



### *4.1.2 NNP1 Offset Management Overview*

In order to deliver a biodiversity offset package for the NNP1 project, it is recommended that a package of offset areas be implemented whilst the AOF is established.

The recommended offset package consists of three components: the forested and riverine areas of the PKK NPA; forested and riverine areas of the Nam Ngiep Watershed; and watershed management activities within the Nam Ngiep watershed.

As an interim measure, it is recommended that NNP1PC hold and invest funds allocated for the offset until the AOF is established and operational. Investment returns would be used to fund offset management.

This section describes the legal, administration, governance, monitoring and reporting requirements to support the package.

*Legal Requirements*

Legal requirements for the establishment of the NNP1 offset package would be required that secure the land tenure for offsets to prevent further inappropriate development and to enable the administration and management of those areas.

It is considered that PKK NPA has a sufficient secure tenure as it is recognised under legislation as a protected area (under *Prime Minister's Decree 164 on the Establishment of National Biodiversity Conservation Area, 1993*). Also, DFRM is charged with managing the NPA in conjunction with the military under the *Regulation on the Management of National Protected Areas, Aquatic and Wildlife (2003)*. These mechanisms enable management plans to be prepared and implemented. The regulatory requirements of the legislation also restrict inappropriate activities such as hunting and timber harvesting (although not currently strictly enforced).

The Nam Ngiep watershed has a mix of land uses and tenures that authorise different activities (including forestry, mining concessions, agriculture and urban areas) that are generally incompatible with conservation of the area as a biodiversity offset. It is therefore recommended that a Provincial Government Decree be used to secure the Protection Forests of the Nam Ngiep watershed for the purposes of a biodiversity offset. This can be achieved under the provisions of the *Forestry Law 1996* by declaring the forested areas a "Total Protection Zone" [3] or "Controlled Use Zone"[4] under the existing Protection

[3] *Total protection zone* are the forest areas of which the slope is above 35 degrees, containing areas of water resources, forests along the rivers, roads and other areas with a high risk of environmental degradation. These areas must be strictly protected and it is prohibited to conduct activities such as shifting cultivation, cutting, destruction, burning, removing trees,

Forest classifications. The recommended offset area is within Vientiane, Xieng Khouang and Bolikhamxay Provinces. This would require two separate Provincial Government Decrees to secure this area as an offset.

The recommended offset area is also within three separate provinces: Vientiane, Xieng Khouang and Bolikhamxay provinces. The majority of the protection forest however is within Vientiane and Xieng Khouang Provinces. This would mean that two separate Provincial Government Decrees would be required to secure protection forest in the Nam Ngiep watershed as an offset.

*Administration and Governance*

To administer and govern the identified offset areas, it is recommended that an "NNP1 Offset Advisory Committee" be established. This Committee should be formed with membership from PoNRE, DFRM and NNP1PC. Given that the offset areas occur in three provinces, representatives from these provinces would also be invited to sit on the Committee as required. Other representatives would be invited to attend on an 'as needs' basis (such as the military commander responsible for the management of PKK PPA). The Committee would:

- Oversee the tendering process to third party providers for specific management of the watershed and offset areas. The Committee would decide (based on evaluation criteria) the successful tenderer(s) to undertake management. The tendering process would be repeated every 5 years;

- Review the annual report provided by the third party providers to determine the adequacy of management measures and recommend to PoNRE/MoNRE the release of funds from the capital invested for the offset on an annual basis;

MoNRE at the central level and PoNRE in each of the provinces would administer and implement the offset package:

- MoNRE would be responsible for liaison with NNP1PC (and later the EPF) and disbursement of funds to PoNRE;

- PoNRE would be responsible for direct management of the offset sites and provincial coordination between agencies (such as the Provincial Forestry Office, Water Resources Office and local military). PoNRE would run the

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collecting firewood, feeding animals, constructing houses or any other construction activities, including extraction of soil, stones, mining and ore and harvesting of NTFP with exceptional cases stated in *Articles 44* and *70* of the *Forestry Law*.

[4] *Controlled use zone* is the forest area without high risk of environment impacts. These areas must be protected similar to the total protection zone, but people are allowed to use wood and forest products according to the management plan.

tendering process and work directly with third party providers in delivery of offset management plans. PoNRE could participate in offset management to build capacity in natural resource management. District office liaison would also be the responsibility of PoNRE.

*Offset Site Management*

Offset site management is limited by the available funds allocated in the concession agreement. This constraint therefore requires careful consideration of the management actions required and the annual budget needed to implement those actions.

It is recommended that the tendering process require tenderers to outline recommended management actions and annual budgets required based on the offset profiles and standard management actions outlined at *Section 4.2* of this report. Three separate tenders would be contracted for the three offset management components (forested and riverine areas of the PKK NPA; forested and riverine areas of the Nam Ngiep Watershed; and watershed management activities within the Nam Ngiep watershed).

The NNP1 Offset Advisory Committee would evaluate the proposals based on set criteria including principles such as conservation outcomes and value for money.

*Monitoring and Reporting*

Annual review and reporting would be provided to the NNP1 Offset Advisory Committee by the successful tenderer on the success (or otherwise) of the offset management actions. Following verification of the report, the Committee would request NNP1PC to release funds for the next financial year to MoNRE and PoNRE. The process of reporting and verification would occur annually. Review of tenders would occur on a 5 yearly basis.

*Available offset management funds*

The Concession Agreement for the NNP1 Project allocates watershed and environmental management costs for the biodiversity offset package for the life of the concession agreement (over 27 years).

The line items in this budget require verification and reallocation to satisfy the required budget to manage the offsets. The concession agreement funds are outlined in *Table 4.1*. The suggested budget allocation is contained in

*Table* 4.2. The quantum of funding required remains the same as set in the concession agreement.

It is recommended that the total budget is invested by NNP1PC as an interim measure until the AOF is established. This would ensure preservation of the investment capital and therefore long-term management of the offset sites beyond the concession agreement horizon. An inflation adjusted investment return of 6% on $13.7 Million would be needed to yield approximately $825,000 per annum to allocate for offset management. The inflation in Lao PDR is currently running at between 3% and 6% per annum, meaning that the real investment return would be required to be between 9% and 12% per annum. The return on investment is expected to vary and hence the available returns for offset management would be required to be reviewed on an annual basis.

To cater for years of low investment returns, a minimum capital threshold should be considered for the fund. An appropriate level would be 90% of the original capital invested. This would mean that the minimum capital threshold would be set at $12.3 Million. Expenditure would cease when capital is reduced to this amount until investment returns restored the capital to the base amount ($13.7 Million). The difference between the original capital and the capital threshold would be equivalent to an average of 1.5 years of expenditure from the fund ($1.25 Million).

The discussion above is provided as a guide only and NNP1PC should seek professional financial advice on the likely investment returns from the capital investment and the thresholds required to preserve capital for the fund.

***Table 4.1 Available funds for biodiversity offsets as allocated from the Concession Agreement for the NNP1 Project***

| Item | Before COD | After COD | Total |
|---|---|---|---|
| Watershed Management Cost | $367,076 | $1,809,844 | $2,176,920 |
| Biodiversity Offset Cost: | | | |
| • Wildlife protection program | $356,000 | $432,000 | $788,000 |
| • Wildlife Conservation Awareness | $72,000 | $96,000 | $168,000 |
| • Wildlife Translocation | $90,000 | | $90,000 |
| • Forest Regeneration | $450,000 | $1,200,000 | $1,650,000 |
| • Survey and Monitoring of Aquatic Biota | $336,000 | $840,000 | $1,176,000 |
| EPF Deposit | $180,000 | $810,000 | $990,000 |
| Watershed Management Fund | $3,250,020 | $3,300,000 | $6,550,020 |
| Capacity Building for MoNRE | $165,000 | | $165,000 |
| **Total** | **$5,266,096** | | **$13,753,940** |
| *Note total costs are calculated over 27 years of the concession agreement* | | | |

*Table 4.2 Suggested Reallocation of funds from the Concession Agreement*

| Item | Description | Investment Allocation | Annual Return on Investment* |
|---|---|---|---|
| Administration (3-5% of total capital) | Funds allocated to MoNRE, PoNRE and the NNP1 Offset Committee to establish and administer the biodiversity offset. | $690,000 | $41,400 |
| Forested and riverine areas of the PKK NPA | Funds allocated to protect and enhance the biodiversity values of the NPA. | $4,355,000 | $261,000 |
| Forested and riverine areas of the Nam Ngiep Watershed | Funds allocated to protect terrestrial and aquatic biodiversity values of the watershed. | $4,355,000 | $261,000 |
| Watershed management activities within the Nam Ngiep watershed | Funds allocated to perform watershed management activities within the reservoir and below the dam wall. | $4,355,000 | $261,000 |
| | **Totals:** | **$13,755,000.00** | **$824,400.00** |

** Assumes an inflation adjusted 6% investment return per annum*

### *4.1.3 Summary of candidate offset sites*

The following biodiversity offset components are recommended:

- Forested and riverine areas of the Phou Khouy Khouy NPA;
- Forested and riverine areas of the Nam Ngiep Watershed (Protection Forest; and
- Watershed management activities within the Nam Ngiep watershed.

The management of the offset sites is integral to improving biodiversity values and achieving the offset required. Analysis of the offset standard management actions is outlined in *4.3 Biodiversity Offset Management Actions.*

### *4.1.1 Standard Management Actions*

The standard management actions have been designed to achieve gains in biodiversity values at offset sites. These actions are aimed to reduce further losses, mitigate against threats through positive management interventions.

*Table 4.3* outlines the standard management actions designed for terrestrial habitats. *Table 4.4* outlines the management actions required for species. Implementation of the management actions will be through specific projects designed for each offset site (*See Section 4.2).*

*Table 4.3 Biodiversity Offset Standard Management Actions (Habitats)*

| Management Action | Purpose | Description | Frequency |
|---|---|---|---|
| 1. Management Plan | Defines governance framework for management of offset projects. | The management plan is to provide the roles, responsibilities, accountabilities, actions, resources and budgets available to actively manage biodiversity offset sites. Clear goals and objectives linked to the monitoring and evaluation framework should be set. | Year 1<br>To be monitored and reviewed annually. |
| 2. Monitoring and evaluation | Defines approach to monitor the implementation of management actions | The monitoring and evaluation framework is to define an approach to determine the effectiveness of the management actions in achieving biodiversity conservation goals. The approach should look at the institutional, financial and governance frameworks applied as well as relevant biodiversity indicators (species richness, basal area). The monitoring and evaluation should directly relate to goals and objectives set for offset management. | Yearly and ongoing to year 30 |
| 3. Management of hunting | Manages threats to animals from illegal hunting and poaching. | The management of hunting should aim to monitor and enforce in conjunction with MoNRE and the community, activities that illegally hunt and poach wildlife within the offset site. The approach should include: patrols and surveillance for illegal hunting activities; education and awareness; and incentives. | Yearly and ongoing to year 30 |
| 4. Sustainable forestry management | Manages unsustainable and illegal use of timber. | Sustainable forestry management should focus on the ecologically sustainable harvesting of timber from the offset site for the use within the local community. The approach should restrict impacts on known habitats to threatened species; sustainable yield assessment and harvesting approaches; patrols and surveillance for illegal forestry activities; education and awareness and incentives. | Yearly and ongoing to year 30 |
| 5. Sustainable forest product use (NTFP) | Manages unsustainable NTFP use. | The sustainable use of NTFP should focus on documenting cultural and heritage usage of NTFP; analysis of sustainable yield for NTFP; identifying alternatives where sustainable collection is identified; and education and awareness on sustainable collection practices. | Yearly and ongoing to year 30 |
| 6. Management of weeds and pests | Manages threats to biodiversity from introduced weeds and pests. | Managing weeds and pets should: identify and monitor the distribution and abundance of weeds and pests in the area; identify appropriate controls at a spatial and temporal scale; define control techniques and actions. Actions may include active control of weeds or specific hunting programs for pest animals. | Yearly and ongoing. Alter if new weed or pest identified. |
| 7. Fire management | Manages impacts on biodiversity from inappropriate use of fire. | Managing fire should: identify historical fire regimes within the offset site at a spatial and temporal scale; determine ecological fire regimes based on intensity and frequency of fire; defining and map exclusion zones; consider threatened species responses to fire; and design ecological fire control methods. | Dependent on frequency of ecological fire regimes. |
| 8. Sediment and erosion control | Manages impacts on water quality and soil integrity from sediments and erosion. | Sediment and erosion control should focus on key sources of sediment pollution within the watershed. Mapping of soils and erosion sources should be undertaken; and targeted management actions should be designed to manage sediment sources (natural surface roads, areas of existing erosion). A detailed maintenance and monitoring regime should also be designed to ensure the effectiveness of management control measures. | Yearly and ongoing to year 30 |

| Management Action | Purpose | Description | Frequency |
|---|---|---|---|
| 9. Assisted natural regeneration | Promotes biodiversity where natural regeneration is constrained due to past land use or ecological factors. | Assisted natural regeneration should focus on the establishment of relevant plant stock to assist natural regeneration of disturbed areas. Assessment and mapping of areas identified as being suppressed or degraded; determination of suitable plant stock and planting regime; collection and propagation of plant stock; preparation and management of regeneration areas. Local community engagement in horticultural activities is recommended. | Years 1 to 5<br>Year 6<br>Maintenance monitoring ongoing. |
| 10. Habitat installation (eg. nest boxes) | Provides habitat for species where natural habitats have been removed. | Habitat enhancement should focus on restoring critical habitat features such nesting hollows that have been impacted or removed from the forest. An assessment should be undertaken of the presence of habitat features (such as nesting tree hollows, shelter and refuge sites) within the offset area. A program of habitat installation should occur to mimic the natural presence of these features within the landscape. An example is the installation of nest boxes for hollow dependant birds. | Year 1-2<br>Maintenance and monitoring ongoing. |
| 11. Community engagement and development | Provides consultative mechanisms and engages the community in active participation in biodiversity conservation. | Community engagement and development is designed to involve the local community in the management actions developed for each the offset sites. Consultation during the preparation of the management plans is required to ensure that the management actions and approaches are acceptable to the community. This can include direct engagement in undertaking actions (hunting patrols, employment at the nursery; manufacture of nest boxes). Community engagement is an essential component in determining the appropriateness and ensuring success of the sustainable forest practices and NTFP development. | Yearly and Ongoing to year 30 |
| 12. Education and awareness | Provides education and awareness for local communities to promote biodiversity conservation. | Education and awareness approaches are integral to the success of offset management. This should include community engagement surveys; education seminars; posters and flyers; identification of community champions and incentives. Each management action should include an education and awareness component. | Yearly and Ongoing to year 30 |

*Table 4.3 Management Actions Required for Species*

| | Species | Offset Management Required |
|---|---|---|
| *Category 1 Species* | | |
| Mammals | Asian small clawed otter | • Survey and monitoring of species presence within offset areas.<br>• Identification of core habitat and management of identified populations<br>• Species specific management actions identified to manage identified populations.<br>• Targeted campaigns to manage key threats (e.g. education and awareness activities for individual species; support for elephant conservation).<br>• Alignment of conservation priorities to National and International management requirements<br>• Monitoring the effectiveness of offset management activities on species populations |
| | Asian elephant | |
| | Smooth coated otter | |
| | Sunda pangolin | |
| | Leopard | |
| | Tiger | |
| | Fishing cat | |
| | Phayre's leaf monkey | |
| | White-cheeked gibbon | |
| Birds | Green peafowl | |
| Reptiles | Elongated tortoise | |
| | Big-headed turtle | |
| *Category 2 Species* | | |
| Flora | Dipterocarpus turbinatus | • Supplementary planting of individuals lost. |
| | Shorea roxburghii | |
| | Afzelia xylocarpa | |
| Mammals | Golden jackal | • Survey and monitoring of species presence within offset areas.<br>• Targeted survey for species not identified (particularly birds).<br>• Management of key threats.<br>• Identification of core habitat and management of populations<br>• Monitoring the effectiveness of offset management activities on species populations<br>• Alignment of conservation priorities to National and International management requirements |
| | Southwest China serow | |
| | Dhole | |
| | Sun bear | |
| | Bengal slow loris | |
| | Pygmy slow loris | |
| | Asiatic golden cat | |
| | Leopard cat | |
| | Sambar | |
| | Himalayan black bear | |
| Birds | Wreathed hornbill | |
| | Great hornbill | |
| | White winged duck | |
| | Greater coucal | |
| | Siamese fireback | |
| | Silver pheasant | |
| | Grey peacock pheasant | |
| | Red-breasted parakeet | |
| | Darter | |
| | Rufous necked hornbill | |
| | Crested argus | |
| | Spot-bellied eagle owl | |
| | Red-collared woodpecker | |
| | Hoopoe | |
| Reptiles | Reticulated python | |
| | King cobra | |

## 4.2 BIODIVERSITY OFFSET PACKAGE CANDIDATE AREAS

### 4.2.1 Phou Khao Khouy National Protected Area

Phou Khao Khouy NPA offers opportunities to be managed as a biodiversity offset. The NPA matches habitat types required to be offset, including coniferous forests. It currently has little funding available through MoNRE to assist in management (although a management plan exists) and has some unique threats from ecotourism development. There are opportunities to develop the capacity of MoNRE and the local military (who are currently the custodians of the NPA) in the management of biodiversity values. *Table 4.4* outlines the profile of the proposed offset component. *Figure 4.2* shows the location of Phou Khao Khouy NPA.

*Table 4.4 Phou Khao Khouy National Protected Area*

| Profile: Phou Khao Khouy National Protected Area | |
|---|---|
| Values | Phou Khao Khouay, or 'Buffalo Horn Mountain', is a Protected Area near Vientiane in central Laos. The area spans 2000 square kilometres over three provinces, with an elevation range of 200m - 1761m. The landscape ranges from sandstone cliffs and river gorges to rugged mountain slopes. Layered sandstones are visible as linear outcrops and large boulders along steep slopes. There are also flat uplands of exposed sandstones with little or no soil development (Salter & Bouaphanh, 1990). The PKK is dominated by natural habitat (73 per cent) which is a mixture of deciduous forest, evergreen forest, coniferous forest, mixed coniferous forest, scrub and bamboo. information regarding PKK has identified the following IUCN Red List species including ten mammal species (1 critically endangered, 4 endangered and 5 vulnerable). |
| Threats | The following threats to biodiversity values were identified at PKK NPA:<br>• Pressure from ecotourism;<br>• Illegal forestry activities;<br>• NTFP collection;<br>• Hunting;<br>• Feral animals and weeds;<br>• Erosion and sedimentation; and<br>• Fire intrusion. |
| Objectives of Management | The objectives of management will be to:<br>• Manage identified threats;<br>• Manage impacts from resettlement area;<br>• Improve habitat values; and<br>• Protect identified threatened species. |
| Projects | The proposed Project will implement the core components of the PKK NPA Management Plan, focussed on managing the key threats. |
| Management Actions | 1. Monitoring and evaluation<br>2. Management of hunting<br>3. Management of weeds and pests<br>4. Fire Management<br>5. Sediment and erosion control<br>6. Assisted natural regeneration<br>7. Community engagement and development<br>8. Education and awareness |
| Community Participation | There are opportunities to engage the local military and MoNRE in management. |

250000 260000 270000 280000 290000 300000 310000 320000 330000 340000

2070000 2060000 2050000 2040000 2030000 2020000 2010000

**Legend**

- Phou Khao Khouay National Protected Area
- Nam Ngiep Sub-catchment Boundary
- Watercourse
- Road
- City, Town or Village
- Lao PDR Boundary

**Nam Ngiep 1 Hydropower Project:**

- Inundation Area

N

0 2.5 5 7.5Km

1:250,000

**Basemap:** ESRI World Imagery
**Datum:** WGS84

Xiengmi
Nam Ngum Reservoir
Longxan
Nam Leuk reservoir
Nam Mang 3 Reservoir
Papek
Thabok
Nam Thon
Na
Nakhai
Nangommay
Mekong River
Ban Natan
Xienglaena
Hai
Nam Ngum River
Hay
Tha Ngon
Ban Na
Thatpini
Veunthan
Somsamay
Palai
Pakxapmai

| | | |
|---|---|---|
| Client: | Nam Ngiep Power Company Ltd. | |
| Drawing No: | 0185065b_OFFSETDES_G003_R0.mxd | |
| Date: | 17/01/2014 | Drawing Size: A3 |
| Drawn By: | TC | Reviewed By: DN |

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

**Figure 4.2 - Phou Khao Khouay National Protected Area**

Nam Ngiep 1 Hydropower Project
Biodiversity Offset Design Report

Environmental Resources Management ANZ

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### 4.2.2 *Protection Forest in the Nam Ngiep Watershed*

The management of protection and Production Forest in the Nam Ngiep watershed has the benefit of addressing offsets for both terrestrial and aquatic values.

The terrestrial biodiversity values of the forested areas are similar to the inundation area. The offset area also includes substantial areas of Protection Forest that can be managed for conservation.

Aquatic biodiversity values can be managed through watershed management activities.

*Figure 4.* outlines the location of the Protection Forest in the Nam Ngiep Watershed.

***Table 4.5 Protection Forest in the Nam Ngiep Watershed***

| | **Protection Forest in the Nam Ngiep Watershed** |
|---|---|
| Values | The biodiversity values of the Upper Nam Ngiep investigation area are similar to those described in the Nam Ngiep impact area.<br><br>Deciduous forest types were recorded during surveys and this vegetation is likely to be similar to the Upper Nam Ngiep. The deciduous forest types were present in terms of mixed deciduous forest and lower mixed deciduous forest.<br><br>Overall, the surveys identified:<br>• Twenty-one threatened mammal species (1 critically endangered, 7 endangered, 13 vulnerable);<br>• Six threatened reptile species (1 endangered, 5 vulnerable);<br>• Four threatened bird species (1 critically endangered, 1 endangered, 2 vulnerable); and<br>• No amphibian species. |
| Threats | The following threats to biodiversity values were identified within the Protection Forest of the Nam Ngiep Watershed:<br>• Illegal forestry activities;<br>• NTFP collection;<br>• Hunting;<br>• Feral animals and weeds;<br>• Erosion and sedimentation; and<br>• Fire intrusion. |
| Objectives of Management | The objectives of management for the Nam Ngiep Protection Forest would be:<br>• Manage identified threats;<br>• Manage impacts from resettlement area;<br>• Improve habitat values; and<br>• Protect identified threatened species.<br>The objectives of management for the Nam Ngiep Production Forest would be:<br>• Watershed management activities to protect water quality; and<br>• Sustainable forest management. |
| Projects | Two distinct projects are envisaged:<br>1. The management of habitat and watershed values of the Nam Ngiep Protection Forest; and<br>2. The management of sustainable forestry operations and watershed values in the Nam Ngiep Production Forest. |

| Protection Forest in the Nam Ngiep Watershed | |
|---|---|
| Management Actions | Protection Forest:<br>1. Management Plan<br>2. Monitoring and evaluation<br>3. Management of hunting<br>4. Sustainable forestry management<br>5. Sustainable forest product use (NTFP)<br>6. Management of weeds and pests<br>7. Fire Management<br>8. Sediment and erosion control<br>9. Assisted natural regeneration<br>10. Habitat installation (eg. nest boxes)<br>11. Community engagement and development<br>12. Education and awareness<br>13. Threatened species management<br>14. Management of fish habitat<br>15. Riparian area protection |
| Community Participation | It is intended that the local communities can be involved in the management of the Protection Forest for biodiversity and watershed values. |

### *4.2.3 Watershed Management Activities in the Nam Ngiep Watershed*

Watershed management activities above and below the Nam Ngiep Dam wall provide opportunities to improve the aquatic and riparian habitats of the watershed. Combined with the environmental flow regime, these management actions will have the objectives of:

- Improving knowledge of aquatic biodiversity values in Lao PDR;
- Engaging the community in watershed management;
- Managing key threats to water quality and aquatic habitats; and
- Monitoring and evaluating the effectiveness of management actions on water quality and aquatic habitats.

*Table 4.6* outlines the profile of the proposed offset component.

*Table 4.6 Aquatic Offset Watershed Management Activities*

| Activity | Actions |
|---|---|
| Management Plan | Each management plan prepared for offset sites will include specific requirements for aquatic habitat management. These actions will be targeted to improving and enhancing aquatic habitat values (such as riparian area protection and management of fish habitats). |
| Monitoring and evaluation | Monitoring and evaluation of the impacts on aquatic species and habitats will be undertaken. This will include:<br>• Research into the fishery health of the Nam Ngiep River;<br>• Analysis of the fishery yield of the Nam Ngiep River;<br>• Research into the lifecycle of CR and EN fish within the lower Nam Ngiep;<br>• Water quality monitoring;<br>• Watershed protection activities; and<br>• Watershed risk mapping. |
| Sediment and erosion control | Sediment and erosion control activities from natural surface roads, agriculture and developments in offset areas and the Nam Ngiep river will be targeted. This will include:<br>• education and awareness of best practices for sediment and erosion control;<br>• dissemination of best practice guides for sediment and erosion control;<br>• engagement with MoNRE regarding the design and maintenance of natural surface roads;<br>• engagement with DFRM on sediment and erosion control in Production Forests; and<br>• agricultural extension activities. |
| Riparian area protection | Targets the protection of riparian areas to enhance habitats and prevent degradation of water quality from overland diffuse sources of pollution. This will include river basin management activities that protect riparian habitat; management of diffuse and point source pollution; land use management activities; education and awareness; workshops and engagement with landholders to promote sustainable land use practices, including agricultural and forestry extension activities. |
| Management of fish habitat | Targets the management of fish habitat to protect and enhance habitat for species lifecycle. Management of fish habitat includes the preservation of in-stream habitat from clearance; active enhancement of existing habitats; river basin management activities to manage diffuse and point pollution sources; and sustainable fisheries management techniques. |
| Community engagement and development | Community engagement and development is key to improving watershed management and habitat quality. The diffuse nature of water pollution and its impact on water quality requires community extension activities aimed at:<br>• awareness of landuse activities on water quality;<br>• extension activities with major landuse activities (agriculture, forestry, hydro and mining developments); and<br>• Fisheries awareness and sustainable management. |

| Activity | Actions |
|---|---|
| Education and awareness | Education and awareness activities should be aimed at Government (MoNRE; PoNRE and DFRM); industry and the local community. Engagement of MoNRE and PoNRE through the administration of offsets will improve capacity and understanding of watershed management activities. At a local level, community engagement and development activities should be aimed at improving the knowledge and understanding of watershed management activities and key threats to aquatic ecosystems. |

310000 320000 330000 340000 350000

2120000 2110000 2100000 2090000 2080000 2070000 2060000 2050000

Xiangkhouang Province

Thathom

Vientiane Province

Ban Hat Gniun

Ban Thahuea

Ban Hatsaykham

Bolikhamsai Province

**Legend**

- Nam Ngiep Inundation Area
- Catchment Boundary
- Watercourse
- Road
- City, Town or Village
- Provincial Government Boundary

**Candidate Offset Areas:**

- Nam Ngiep Offset Area
- Huay Ngua Provincial Protected Area
- Phou Khao Khouay National Protected Area

**Forest Zone:**

- National Protection Forest
- Production Forest

N

0 2.5 5 7.5Km

1:200,000

**Basemap:** ESRI World Imagery

| | | |
|---|---|---|
| Client: | Nam Ngiep Power Company Ltd. | |
| Drawing No: | 0185065b_OFFSETDES_G004_R0.mxd | |
| Date: | 17/01/2014 | Drawing Size: A3 |
| Drawn By: | TC | Reviewed By: DN |

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

**Figure 4.3 - Production and Protection Forest in Nam Ngiep Catchment**

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# 5 BIODIVERSITY OFFSET RULES AND METRICS

The purpose of this *Section* of the report is to outline the offset calculation methods used to define the offsets required for the residual impacts on biodiversity values identified from the impact assessment process for the NNP1 project.

This *Section* satisfies *Step 5* of the BBOP Methodology: *Choose methods to calculate losses/gains and quantify residual losses of biodiversity values.*

ERM has used the approach as outlined by the Business and Biodiversity Offset Program (BBOP) (BBOP 2012a; BBOP 2012b).

Our approach includes:

- Defining the rules to achieve a no-net-loss of biodiversity for the project;
- Identification of an appropriate biodiversity offset metric; and
- Defining the approach to quantifying the losses and gains of biodiversity values.

## 5.1.1 Managing Uncertainty and Risk

There are inherent risks to analysing and designing biodiversity offsets due to the uncertainty in terms of matching what is lost and the risk of failure to secure and manage an appropriate offset (BBOP 2012a). *Table 5.1* outlines the likely uncertainties and risks associated with the offset analysis, approaches used to limit these risks and mechanisms used to manage the risk.

***Table 5.1 Risks associated with the offset analysis***

| Risk | Management Approach | Mechanism |
|---|---|---|
| Biodiversity losses are not all accounted for in designing and implementing the offset | No-net-loss rules and the offset metric have been designed to achieve like for like offsets. | No-net-loss rules |
| | Consideration has been made of the components of biodiversity impacted and offset (habitat and species). | Management framework |
| | Candidate offsets have been chosen based on their contribution to conservation criteria and the biodiversity values they contain. | |
| | Standard management measures have been identified for offset sites | |
| | Monitoring and evaluation is included in the offset package to determine responses to management measures. | |

| Risk | Management Approach | Mechanism |
|---|---|---|
| Impacts to biodiversity components cannot be offset | Assessment of impacts has not identified any critical habitat that will be impacted by the project (which cannot be impacted and hence offset)<br>Biodiversity baseline data has been collected to determine the conservation significance of the species and habitats present.<br>Careful selection of offset sites and environmental contributions will be undertaken to match the impacts on a like-for-like basis. | Offset metric<br>Management framework |
| Dissimilar biodiversity between impact and offset sites | The type and condition of land classes has formed the basis of the offset analysis to limit risks of offsetting dissimilar biodiversity values. | Offset metric |
| Uncertainty in offset performance | There is inherent risk in the performance and responses to management of the ecosystems for candidate offset sites.<br>Gains in condition from management have been conservatively set based on long management time frames (up to 30 years).<br>Recommendations on ongoing monitoring and evaluation have been included to determine the effectiveness of management measures.<br>Continual improvement mechanisms are to be included in management planning to account for the uncertainty of offset condition improvement performance. | Management framework |
| Uncertainty in the ecological system | Recommendations on monitoring and evaluation have been included to determine the effectiveness of management measures. This is in response to uncertainty in the ecological system on the impact and offset sites.<br>Continual improvement mechanisms are to be included in management planning. | Management framework<br>Offset metric |
| Uncertainty in offset implementation success | Gains in condition from management have been conservatively set based on long management time frames (up to 30 years).<br>Recommendations on monitoring and evaluation have been included to determine the effectiveness of management measures.<br>Continual improvement mechanisms are to be included in management planning. | Offset Metric<br>Management framework |
| Time delays in offset delivery | It is recommended that active management of offset sites start as soon as possible following project commencement. | Management framework |

## 5.2 *OFFSET RULES*

For the purposes of this offsetting analysis, the following no-net-loss biodiversity offset rules apply:

1. Offsets should be "like for like" where possible (trading is only allowed within the same land class type);
2. Environmental contributions for specific programs can be used to substitute for the direct management of biodiversity;

3. Incremental loss and fragmentation of biodiversity values should be avoided;
4. Management of offset sites can be used to improve biodiversity values however this should not take the place of actions that are already funded;
5. Areas with existing or potential land uses that are likely to be in conflict with biodiversity offsets will be avoided (mining, forestry leases, hydro power projects);
6. Location of offsets in the landscape that facilitate connectivity with adjacent habitats will be of preference;
7. Large offset sites that are connected to existing protected areas will be of preference;
8. Sites that are similarly used by comparable ethnic groups sharing similar cultural values will be of preference
9. Fairness and equity should be applied with affected stakeholders; and
10. Offsets chosen should be permanent and ongoing.

## *5.3 BIODIVERSITY OFFSET METRIC*

The biodiversity offset metric is based on the Habitat Hectare model (BBOP 2012a). This model captures the *type* (habitat and species), *amount* and *condition* of the biodiversity values present on the impacted site and candidate offset sites. The approach is designed to create a "*balance sheet*" to compare the biodiversity losses at the impact site with the gains available from candidate offset sites. The basis of the analysis is calculating the change in condition (*loss*) at the impact site compared to the change in condition (*gains*) at candidate offsets sites over time from management. The application of the offset rules (see *4.4 Offset Rules*) enables the most appropriate candidate offset sites to be chosen to achieve a no-net-loss of biodiversity values. Offset metrics have been designed for both terrestrial and aquatic biodiversity values using data on:

- disaggregated classification of land classes in the impacted area (*Type*);
- habitat type classification according to the classification of habitats under *IFC Performance Standard 6* (IFC, 2012) (*Type*);
- area of land classes from spatial analysis (*Amount*); and
- land class condition assessment from field data (*Condition*).

### *5.3.1 Terrestrial Biodiversity Offset Metric Formula (Impact Site)*

Using the "Habitat Hectares" model, the biodiversity offset metric formula creates a fungible currency to enable trading between the impacted and offset site(s) across the balance sheet. The number of Habitat Hectares represents the quantum of offset required based on the *Type, Amount* and *Condition* of the biodiversity values identified. Calculations are required for each land class type to satisfy the "like for like" offset rule.

Calculations of the quantum of biodiversity values requiring offsetting are calculated using the following formula for the impact site (*loss*):

**Land Class Condition (A) x Area of Land Class (B) = Habitat Hectares**

This formula assumes that all biodiversity values at the impact site will be lost, as it accounts only for the direct impacts of the Project. No "gains" in biodiversity values have been calculated as being attained from mitigation or management.

Definitions for the categories and classifications used in the formula are as follows:

*Land Class Condition (A)*

The condition assessment was undertaken using remote sensing of RapidEye satellite imagery (dated October 2012) to calculate a Normalized Difference Vegetation Index (NDVI) for the Project Area and candidate offset areas.

The NDVI was used to classify the forest cover according to the range of NDVI Index values. These values are outlined in *Table 5.2* and give an indication of "greenness" of the forest and hence relative density and health of vegetation (USGS 2013). Similar analysis of forest condition has been undertaken in Lao PDR by the University of Bern in Switzerland. This analysis used NDVI to determine the disturbance of forests by mapping forest succession stages using the NDVI reflective indices (Hett et al, 2011).

It should be noted that the RapidEye Satellite imagery was taken between October 2012 to February 2013 (dry season). The difference in NDVI indices due to seasonal changes in leaf phenology is 10% of the maximum NDVI value during this time of year (FAO, 2013). The NDVI values have been adjusted to reflect the seasonal change in NDVI value relative to the date the imagery was taken.

Using the DFRM 2010 mapping, only Current Forest types (See *Table 5.3*) were analysed using NDVI to determine their current condition (disturbance) as these forest types represent "natural" vegetation. All Potential Forest (old and new fallow agricultural land; slash and burn land) was categorised as low condition as a default.

Land class condition categories have been determined for the Current Forest types as mapped by DFRM within the study area and candidate offset sites using information from NDVI values.

*Table 5.2* outlines the condition classes, the NDVI ranges and the value used for condition (A) in the offset metric.

*Table 5.2 Land Class Condition Categories (A)*

| Condition | Definition | NDVI Value Range | Value |
|---|---|---|---|
| High | Represents high values of reflective greenness and hence a relatively intact canopy cover. | 0.6 to 0.8 | 0.8 |
| Moderate | Represents moderate reflective greenness, representing disturbed canopy cover | 0.4 to 0.6 | 0.6 |
| Low | Represents low reflective greenness and hence highly disturbed canopy cover. | 0 to 0.4 | 0.4 |
| Impacted | Urban land and barren land. | -ve to 0 | 0 |

**Area of land class (B)**

Land classes in the project area have been based on a dataset produced in 2010 supplied by DFRM. This data is based on classification of data at 5m resolution.

The potential impact of the project on forest and land use cover was analysed by overlaying the spatial data for the project components on the DFRM (2010) dataset. The two dimensional output provided the area in hectares of impact to each of the land use categories as a result of each of the Project components. This approach provides a snapshot of the direct impacts to the land use classifications as a result of the Project.

The land classes identified as part of this analysis are outlined in *Table 5.3*.

*Table 5.3 Land Class Classifications*

| Class Group | Class Items | Code |
|---|---|---|
| Current Forest | Evergreen Forest | EF |
| | Deciduous Forest | DF |
| | Mixed Evergreen/Deciduous Forest | MED |
| | Dry Dipterocarp Forest | DD |
| | Coniferous Forest | CF |
| | Mixed coniferous/Broadleaved Forest | MCB |
| | Evergreen Forest Plantation | EP |
| | Deciduous Forest Plantation | DP |
| Potential Forest | Bamboo | B |
| | Old Fallow Land | OF |
| | Young Fallow Land | YF |
| | Slash and Burn Land | SB |
| Other Wooded Area | Savannah/Open Woodland | SA |
| | Scrub, Heath | SR |
| Permanent Agriculture Land | Rice Paddy | RP |
| | Agriculture Plantation | AP |
| | Other Agriculture Area | OA |

| Class Group | Class Items | Code |
|---|---|---|
| Other Non-Forest Area | Grassland | G |
| | Swamp | SW |
| | Rock | RP |
| | Barren Land | BL |
| | Urban Area | A,U |
| Water | Water | W |
| Other Land | Other Land | O |
| Other | Cloud | CL |
| | Shadow | SH |

*Source: DFRM 2010*

### *5.3.2 Biodiversity Offset Metric Formulae (Candidate Offset Sites)*

The following formulae have been developed for the candidate offset sites to test their suitability to adequately offset the biodiversity values identified requiring offset from the impact sites.

Calculations are required for each land class type to satisfy the "like for like" offset rule.

Calculations of biodiversity offset values have used the following formulas for the candidate offset sites:

1. Calculation of Baseline Habitat Hectares:

**Candidate Offset Land Class Condition (A1) x Area of Land Class (B1) = Candidate Offset Habitat Hectares (W)**

2. Calculation of Habitat Hectare Gains:

**[Candidate Offset Land Class Condition (A1) + Candidate Offset Land Class Condition (Gain) (C1)] x Area of Land Class (B1) = Candidate Offset Habitat Hectares Gain (X)**

3. Calculation of Habitat Hectares:

**Candidate Offset Habitat Hectares Gain (X) - Candidate Offset Baseline Habitat Hectares (W) = Candidate Offset Habitat Hectares (Y)**

Definitions for the categories and classifications used in the formula are as follows:

**Candidate Offset Land Class Condition (A1) –** See *Table 5.2.*

**Candidate Offset Land Class Condition (Gain) (C1)**

The management of the offset site provides the ability to record biodiversity value "gains" and hence offset the impacts of the project (losses). This is calculated based on positive interventions from management actions at the offset site to improve biodiversity values.

*Standard Offset Management Actions*

For this analysis, the standard management actions outlined in *Table 5.4* are designed to improve biodiversity values at the candidate offset sites. These standard management actions have been derived based on work undertaken in Lao PDR by the Wildlife Conservation Society (WCS) (WCS, 2002; 2009) the SuFORD and FORCAP projects on sustainable forestry (Chanhsamone P et al, 2007); projects undertaken by MoNRE for species management (MoNRE, 2011) aquatic and Mekong River projects (Baird I 2007; Sharma N 1992; and MRC (MRC, 2011) and offset management approaches developed in Australia (DECCW 2007).

Further discussion on the management actions proposed for offset sites is discussed in *Section 4*.

***Table 5.4 Standard Offset Management Actions***

| **Standard Management Actions** | |
|---|---|
| *Terrestrial* | *Aquatic* |
| Management Plan | Management Plan |
| Monitoring and evaluation | Monitoring and evaluation |
| Management of hunting | Sediment and erosion control |
| Sustainable forestry management | Management of fish habitat |
| Sustainable forest product use (NTFP) | Riparian area protection |
| Management of weeds and pests | Community engagement and development |
| Fire Management | Education and awareness |
| Sediment and erosion control | |
| Assisted natural regeneration | |
| Habitat installation (nest boxes) | |
| Community engagement and development | |
| Education and awareness | |
| Threatened species management | |

*Offset gain score*

A condition improvement (gain) score has been applied for the application of management actions at the offset site. Given the limited evidence on the success or otherwise of existing conservation management actions undertaken on offsets in Lao PDR, a conservative approach has been used to measure the likely gain in terrestrial biodiversity values.

Information was available on active management of forests in Lao PDR undertaken by the Faculty of Forest Sciences, Southern Swedish Forest Research Centre for forested lands in Northern Lao PDR. This research provides evidence that restoration activity undertaken on diptocarp and mixed deciduous forests regenerating from previously logged forest (low condition) show a 29% improvement in species richness and an 18% increase in basal area over a 20 year period following active management (Sovu, M. 2011). This active management included assisted natural regeneration of regrowth forests.

The gains in condition value are relative to the existing condition of the site and the application of the management measures. Sites with an existing high condition are likely to mitigate future biodiversity losses and have an incrementally smaller improvement in biodiversity condition values through management. Sites with a lower baseline condition have a greater capacity to improve from conservation management (Sayer, J et al 2004).

Given the likely increase in biodiversity values through active management and the relative management gain available from existing low and moderate condition forests, offset land class condition gain values have been determined based on the information available. These values assume a conservative 20% gain in condition value over 20 years from low condition forest (based on gains in species richness and basal area). The relative gains in condition available over time from management outlined in *Table 5.5* are based on a proportional reduction in likely gain values at 10, 20 and 30 year intervals relative to the base condition value. Baseline condition values also influence the likely gain in condition values with higher condition forests deriving smaller responses to gain from management.

***Table 5.5 Candidate Offset Land Class Condition Gain (C1) Values***

| Existing Site Condition | Base Condition Value | Gain (10 Years) | Gain (20 years) | Gain (30 years) |
|---|---|---|---|---|
| Benchmark | 1 | 0 | 0 | 0 |
| High | 0.8 | 0.0844 | 0.1125 | 0.15 |
| Moderate | 0.6 | 0.1125 | 0.15 | 0.2 |
| Low | 0.2 | 0.15 | 0.2 | 0.275 |
| Impacted | 0 | - | - | - |

Increases in condition value are a crucial component to the offsetting metric. Inherent inaccuracies in predicted improvements in condition value need to be managed. Therefore, a robust management framework is essential to minimise the risk of management failure and hence further biodiversity decline.

Management of the offset sites, including appropriate monitoring, verification and continual improvements in management strategies is required. This management framework will limit risks if performance management failures are identified and management regimes altered to respond to these failures. The proposed management framework for implementing management actions at the candidate offset sites is discussed in *Section 4*.

### *5.3.3 Species offsets*

Offsetting impacts on the residual impacts on species require consideration of impacts on the available habitats for those species as well as species specific assessment of the impacts on the species lifecycle from the project and an analysis of the impacts remaining post mitigation.

Measuring losses and gains for species values is difficult without detailed population information on the species impacted and populations at candidate offset areas. Most information collected in the baseline data for the NNP1 project and offset areas related to presence of the species rather than detailed assessment of population sizes. This is therefore a constraint in designing an offset metric based on quantified losses and gains.

Distribution information however is available for the species identified. ERM have therefore classified the species that are candidates for offsets into two categories:

- Category 1 species are more restricted in their range or impacts on specific lifecycle elements indicate that the residual impacts remaining after mitigation on habitats for the species is likely to be more significant than for category 2 species.

- Category 2 species have a wide distribution and the residual impacts remaining after mitigation on habitats for the species from the project is a relatively small proportion of the total distribution of habitat for the species; and

Species specific offsets measures have therefore been chosen by a process of:

1. determining the known presence (or likely presence) of that species within an offset area;
2. design of management measures to recover and manage the populations identified;
3. monitoring and evaluation framework to determine the base population size and changes over time from management;
4. implementation of species specific management actions; and
5. continual feedback of the management approach to refine management methods.

### 5.3.4 *Aquatic Biodiversity Offsets*

There are a number of case studies undertaken by BBOP for the application of biodiversity offsets for aquatic ecosystems (BBOP 2012a). Further work has also been undertaken in South America on hydroelectric schemes to determine impacts and potential offsets (IAIA 2013). The literature search undertaken has highlighted that the design criteria and metrics to apply to aquatic ecosystems is not as advanced as those designed for terrestrial ecosystems.

Additionally, measuring gains from managing aquatic biodiversity values are not easily quantifiable. There is no current literature available for Lao PDR that indicates gains in biodiversity values from managing aquatic habitats. Field data also indicates that the condition of habitats in the Nam Ngiep River is relatively uniform along the length of the river. Using a metric designed to calculate offsets based on gains in biodiversity values available from management at a candidate offset site would not be robust or justifiable.

The residual impacts identified for aquatic habitats relate mainly to changes in fish migratory patterns from the dam wall and habitat changes from the impoundment lake. Environmental flows restored in the lower Nam Ngiep will likely mitigate impacts derived from the river flow regime.

Offsets therefore are proposed based on the management of aquatic habitats to enhance biodiversity values through watershed management activities and environmental flows. It is also recommended that a monitoring regime be implemented to determine the impact on aquatic biodiversity values on habitats and species to better inform offset decision making.

Applying an evaluation framework to this approach will be essential given the uncertainty in proving gains in biodiversity values from these management actions. Threats to the biodiversity values from other point and non-point pollution sources that are within the watershed will need to be considered during offset design.

### 5.3.5 *Human Use and Cultural Value Offsets*

The environmental assessment observations indicate that the Project will not result in the loss of biodiversity with significance for human use and cultural value that is highly irreplaceable (ERM 2013a). The Project will impact only common human use practices involving terrestrial and aquatic species that are broadly available throughout the region. This being said, provisioning elements of the forest ecosystems are important for local-level subsistence and income generation, and for the maintenance of cultural traditions. These will require an offset measured in equivalence in type and location if the impact produces residual losses after mitigation measures are applied.

A 'like for like' calculation will be used to identify human use and cultural value offsets between the Project impacts and candidate offset sites. For example, loss of human access to a certain species at the Project site, if not provided elsewhere such as at the relocation site, will be preserved at an offset site. Measurement of the effectiveness of the offset would be undertaken by regular assessment of continued human access to and abundance of the resource at the offset site. Specific measurements of gains in offset site communities could be taken against such indicators as: increased participation in cultural practices with a dependence on ecosystem goods and services; changes in health seeking behaviour in which ecosystem goods and services play a primary role; or quantifiable developments in the commercialisation of ecosystem goods and services.

Quantification of residual impacts on biodiversity human use and cultural values is challenging, especially in the context of community resettlement. The approach will therefore need to take account of losses due to impacts within the immediate project area but also the relocation site(s). The ESIA and ERM observations indicate that there are two primary types of biodiversity at risk of impact in this Project: (1) tangible human use provisioning services (i.e. terrestrial and aquatic products) and material cultural artefacts; and (2) intangible cultural values.

Tangible human use for provisioning services is typically characterised by non-timber forest products (NTFP) used in subsistence and income generation activities. This includes usage of aquatic and terrestrial species for traditional practices, medicines and housing materials. Moveable cultural artefacts are also included in this type as they are often derived from or sourced within nearby or distant ecosystems. The primary measure for quantification is dependence for human livelihoods. Dependence is measured by the degree to which the ecosystem product or service can be substituted by another in the sustenance of livelihoods.

Intangible cultural values are typically characterised by sites and areas that are valued for the sacred or spiritual significance, enjoyment for recreation or role in the inter-generational transmission of traditional knowledge. It may not be possible to achieve no net loss with regards to such sites and areas due to their high irreplaceability. Indeed, some cultural values will be immeasurable and will therefore be unable to be included in any calculation of offsetable impacts. Nonetheless, the primary measure for quantification is dependence for human cultural continuity. Cultural continuity is measured by the vulnerability of a cultural practice to extinction due to its direct dependence on a specific ecosystem good or service.

The approach to offsetting the human and cultural residual "losses" will be undertaken in the balance sheet analysis. This will include defining the use and cultural values at the impact site as they relate to the places and values that will be impacted (residual values) by the project.

# 6 APPLICATION OF THE BIODIVERSITY OFFSET METRIC

## 6.1 RESIDUAL BIODIVERSITY VALUES REQUIRED TO BE OFFSET

The revised Environmental Impact Assessment (EIA) undertaken on the NNP1 project (ERM 2013) has identified the following residual biodiversity values impacted following the application of the mitigation hierarchy:

- Inundation area of the main dam;
- Transmission line;
- Re-regulation dam and facilities; and
- Minor clearing for the access road.

These activities will have a direct impact on biodiversity values and it is anticipated that the values will be altered in these areas following construction of the project. Hence, it is not necessary for the biodiversity offset metric to consider the condition of biodiversity values remaining following construction as little, if any of these values will remain.

## 6.2 APPLICATION OF BIODIVERSITY OFFSET METRIC – IMPACT SITE

### 6.2.1 Habitat Values

*Table 6.1* outlines the combined Habitat Hectare Calculations for the biodiversity values of the impact sites.

**Table 6.1 Impact Site Habitat Hectare Calculations**

| Land Class type | Land Class Condition (A) | Area of Land Class (C) | *Residual Impact Habitat Hectares* |
|---|---|---|---|
| Deciduous Forest | High | 1,456.1 | 1,164.9 |
| Deciduous Forest | Moderate | 1,137.6 | 682.6 |
| Deciduous Forest | Low | 162.8 | 65.1 |
| Evergreen Forest | High | 183.7 | 147.0 |
| Evergreen Forest | Moderate | 266.3 | 159.8 |
| Evergreen Forest | Low | 37.8 | 15.1 |
| Bamboo | Moderate | 373.5 | 224.1 |
| Grassland | Moderate | 108.3 | 65.0 |
| Old Fallow Land | Low | 1,488.8 | 595.5 |
| Young Fallow Land | Low | 1,117.7 | 447.1 |
| Rice Paddy | Impacted | 122.8 | - |
| Rock | High | 1.3 | 1.1 |
| Slash and Burn Land | Low | 347.7 | 139.1 |
| Shadow | High | 16.5 | 13.2 |
| Urban | Impacted | 38.2 | - |
| Water | - | 368.2 | - |
| Cloud | High | 5.0 | 4 |
| | **Total** | **7,595.91** | |

### 6.2.2 *Species Values*

The residual values on species are outlined in T*able 6.2*. These residual values have been identified from the application of the mitigation hierarchy in the project EIA.

***Table 6.2 Species values requiring offsets***

| | **Species** | |
|---|---|---|
| Category 1 species where the species are more restricted in their range or specific lifecycle elements indicate that the residual impacts remaining after mitigation on habitats for the species is likely to be more significant than for Category 2 species. | | |
| Mammals | Asian small clawed otter | Tiger |
| | Asian elephant | Fishing cat |
| | Smooth coated otter | Phayre's leaf monkey |
| | Sunda pangolin | White-cheeked gibbon |
| | Leopard | |
| Birds | Green peafowl | |
| Reptiles | Elongated tortoise | Big-headed turtle |
| Category 2 species have a wide distribution and the residual impacts remaining after mitigation on habitats for the species from the project is a relatively small proportion of the total distribution of habitat for the species | | |
| Flora | Dipterocarpus turbinatus | Afzelia xylocarpa |
| | Shorea roxburghii | |
| Mammals | Golden jackal | Pygmy slow loris |
| | Southwest China serow | Asiatic golden cat |
| | Dhole | Leopard cat |
| | Sun bear | Sambar |
| | Bengal slow loris | Himalayan black bear |
| Birds | Wreathed hornbill | Red-collared woodpecker |
| | Great hornbill | Hoopoe |
| | White winged duck | Grey peacock pheasant |
| | Greater coucal | Red-breasted parakeet |
| | Siamese fireback | Darter |
| | Silver pheasant | Rufous necked hornbill |
| | Spot-bellied eagle owl | Crested argus |
| Reptiles | Reticulated python | King cobra |

### 6.2.3 *Aquatic Biodiversity Values*

The residual impacts to aquatic biodiversity relate to the loss of lotic habitat (flowing water) which is transitioned to lentic habitat (relatively still water) and barrier to aquatic fauna movement as a result of the dam walls. The Baseline Biodiversity Report identified a number of migratory aquatic species that inhabit the Nam Ngiep River and migrate to upstream reaches for spawning and other behaviours. Interruption of this important lifecycle component has potential to lead to population declines locally and in the downstream watershed. The impact of barrier to movement cannot be

quantified rather it is a residual impact to an ecosystem function that has potential to interrupt the lifecycle for aquatic biota. These impacts are permanent and ongoing and will impact on the lifecycle of aquatic species within the Nam Ngiep watershed.

### *6.2.4 Human and Cultural Values*

It is evident that villagers in the Project area regularly use local terrestrial and aquatic biodiversity – e.g. as a food source – largely for subsistence purposes. However, the dependence on natural resources varies by village and is primarily associated with accessibility. For example, remote villages tend to rely more heavily on biodiversity (e.g. medicinal plants as access to pharmaceuticals is limited).

Development of the project will likely impact the ability of villagers to access both tangible human use provisioning services. This includes:

- Hunting, gathering and fishing. This typically includes small animals, such as squirrels and rats, and flora species, such as bamboo and mushrooms. The flora and fauna are primarily consumed within the household;
- Collection and use of medicinal plants;
- Use of waterways, for activities such as navigation, household drinking water, and bathing;
- Cultural heritage, such as cemeteries. In most cases, villagers did not identify intangible cultural heritage values, which may be attributed to relatively recent settlement of the local villages; and
- Collection of timber products to be used as fuel or in construction.

## 6.3 APPLICATION OF BIODIVERSITY OFFSET METRIC - OFFSET SITES

### 6.3.1 Habitat Values

*Table 6.3* outlines the habitat values available at Phou Khao Khouay NPA from application of the offset metric. *Table 6.4* outlines the habitat values available in the Protection Forest Areas of the Nam Ngiep Watershed from the application of the offset metric.

***Table 6.3 Habitat Values Available at Phou Khao Khouay NPA***

| Land Class Type | Candidate Offset Land Class Condition (A1) | Area of Land Class (C1) | *Candidate Offset Habitat Hectares (W)* | Candidate Offset Land Class Condition (Gain) (D1) | *Candidate Offset Habitat Hectares Gain (X)* | *Candidate Offset Habitat Hectares (Y)* |
|---|---|---|---|---|---|---|
| Evergreen Forest | High | 4498.2 | 3598.6 | 0.15 | 4273.3 | 674.7 |
| Evergreen Forest | Moderate | 1141.0 | 684.6 | 0.2 | 912.8 | 228.2 |
| Evergreen Forest | Low | 0.2 | 0.1 | 0.275 | 0.1 | 0.1 |
| Deciduous Forest | High | 21.8 | 21.8 | 0.15 | 20.7 | 1.1 |
| Deciduous Forest | Moderate | 73.8 | 73.8 | 0.2 | 59.0 | 14.8 |
| Deciduous Forest | Low | 14.8 | 14.8 | 0.275 | 10.0 | 4.8 |
| Coniferous Forest | High | 329.2 | 263.4 | 0.15 | 312.8 | 49.4 |
| Coniferous Forest | Moderate | 502.0 | 301.2 | 0.2 | 401.6 | 100.4 |
| Coniferous Forest | Low | 468.5 | 187.4 | 0.275 | 316.2 | 128.8 |
| Mixed coniferous/ Broadleaved Forest | High | 34272.0 | 27417.6 | 0.15 | 32558.4 | 5140.8 |
| Mixed coniferous/ Broadleaved Forest | Moderate | 6647.1 | 3988.2 | 0.2 | 5317.7 | 1329.4 |
| Mixed coniferous/ Broadleaved Forest | Low | 0.4 | 0.1 | 0.275 | 0.2 | 0.1 |
| Bamboo | Low | 1938.8 | 775.5 | 0.275 | 1308.7 | 533.2 |
| Old Fallow Land | Low | 438.9 | 175.5 | 0.275 | 296.2 | 120.7 |
| Young Fallow Land | Low | 26.4 | 10.5 | 0.275 | 17.8 | 7.3 |
| Slash and Burn Land | Low | 2551.9 | 1020.8 | 0.275 | 1722.6 | 701.8 |
| Scrub, Heath | Moderate | 31139.5 | 18683.7 | 0.2 | 24911.6 | 6227.9 |
| Rice Paddy | Impacted | 7862.3 | 0 | 0 | 0 | 0 |

| Land Class Type | Candidate Offset Land Class Condition (A1) | Area of Land Class (C1) | *Candidate Offset Habitat Hectares (W)* | Candidate Offset Land Class Condition (Gain) (D1) | *Candidate Offset Habitat Hectares Gain (X)* | *Candidate Offset Habitat Hectares (Y)* |
|---|---|---|---|---|---|---|
| Agriculture Plantation | Impacted | 116.6 | 0 | 0 | 0 | 0 |
| Grassland | Moderate | 482.1 | 0 | 0.2 | 96.4 | 96.4 |
| Swamp | Moderate | 1809.1 | 0 | 0.2 | 361.8 | 361.8 |
| Rock | Moderate | 2500.1 | 0 | 0.2 | 0 | 0 |
| Barren Land | Impacted | 1821.2 | 0 | 0 | 0 | 0 |
| Urban Area | Impacted | 5364.5 | 0 | 0 | 0 | 0 |
| Water | Impacted | 51692.8 | 0 | 0 | 0 | 0 |
| Other Land | Impacted | 22195.2 | 0 | 0 | 0 | 0 |
| Cloud | High | 197.4 | 158 | 0.15 | 187.6 | 29.6 |
| Shadow | High | 2642.6 | 2114.1 | 0.15 | 2510.5 | 396.4 |

*Table 6.4 Habitat Values Available in the Protection Forest Areas of the Nam Ngiep Watershed*

| Land Class Type | Candidate Offset Land Class Condition (A1) | Area of Land Class (C1) | *Candidate Offset Habitat Hectares (W)* | Candidate Offset Land Class Condition (Gain) (D1) | *Candidate Offset Habitat Hectares Gain (X)* | *Candidate Offset Habitat Hectares (Y)* |
|---|---|---|---|---|---|---|
| Evergreen Forest | High | 14676.6 | 4373.2 | 0.15 | 5193.2 | 820.0 |
| Evergreen Forest | Moderate | 10364.0 | 1192.8 | 0.2 | 1590.4 | 397.6 |
| Evergreen Forest | Low | 734.0 | 80.3 | 0.275 | 135.5 | 55.2 |
| Deciduous Forest | High | 14755.2 | 14772.8 | 0.15 | 17542.6 | 2769.9 |
| Deciduous Forest | Moderate | 5730.6 | 6013.1 | 0.2 | 8017.5 | 2004.4 |
| Deciduous Forest | Low | 456.3 | 186.4 | 0.275 | 314.6 | 128.2 |
| Bamboo | Low | 2933.4 | 510.2 | 0.275 | 860.9 | 350.8 |
| Old Fallow Land | Low | 4125.6 | 2753.7 | 0.275 | 4646.9 | 1893.2 |
| Young Fallow Land | Low | 1650.3 | 109.1 | 0.275 | 184.1 | 75.0 |
| Slash and Burn Land | Low | 681.6 | 180.8 | 0.275 | 305.1 | 124.3 |
| Grassland | Moderate | 507.2 | 0.0 | 0.2 | 0.0 | 0.0 |
| Rock | Moderate | 145.1 | 0.0 | 0.2 | 261.4 | 261.4 |
| Barren Land | Impacted | 0.0 | 0.0 | 0 | 0.1 | 0.1 |
| Urban Area | Impacted | 6.6 | 0.0 | 0 | 0 | 0 |
| Water | Impacted | 62.0 | 36.7 | 0 | 43.6 | 6.9 |
| Other Land | Impacted | 0.0 | 4373.2 | 0 | 5193.2 | 820.0 |
| Cloud | High | 4.5 | 1192.8 | 0.15 | 1590.4 | 397.6 |
| Shadow | High | 92.7 | 80.3 | 0.15 | 135.5 | 55.2 |

### 6.3.2 *Species Values*

*Table 6.5* outlines the presence of species values within offset sites and the management program required for those species to manage and recover those populations. It should be noted that species presence is based on results of literature and surveys undertaken for this report. The likelihood of habitat for species not identified through literature search or survey is also noted in the table.

***Table 6.5 Species Presence within Offset Sites***

| | Species | PKK NPA | Nam Ngiep | Offset Management Required |
|---|---|---|---|---|
| Category 1 | | | | |
| Mammals | Asian small clawed otter | * | ✓ | • Survey and monitoring of species presence within offset areas.<br>• Identification of core habitat and management of identified populations<br>• Species specific management actions identified to manage identified populations.<br>• Targeted campaigns to manage key threats (eg. education and awareness activities for individual species).<br>• Alignment of conservation priorities to National and International management plans and requirements<br>• Monitoring the effectiveness of offset management activities on species populations |
| | Asian elephant | ✓ | ✓ | |
| | Smooth coated otter | ✓ | ✓ | |
| | Sunda pangolin | ✓ | ✓ | |
| | Leopard | * | - | |
| | Tiger | * | ✓ | |
| | Fishing cat | * | ✓ | |
| | Phayre's leaf monkey | ✓ | ✓ | |
| | White-cheeked gibbon | ✓ | ✓ | |
| Birds | Green peafowl | * | * | |
| Reptiles | Elongated tortoise | * | * | |
| | Big-headed turtle | * | ✓ | |
| Category 2 | | | | |
| Flora | Dipterocarpus turbinatus | - | ✓ | • Supplementary planting of individuals. |
| | Shorea roxburghii | - | ✓ | |
| | Afzelia xylocarpa | - | ✓ | |
| Mammals | Golden jackal | * | * | • Survey and monitoring of species presence within offset areas.<br>• Targeted survey for species not identified (particularly birds).<br>• Management of key threats. |
| | Southwest China serow | - | ✓ | |
| | Dhole | ✓ | ✓ | |
| | Sun bear | * | ✓ | |
| | Bengal slow loris | ✓ | ✓ | |

| | Species | PKK NPA | Nam Ngiep | Offset Management Required |
|---|---|---|---|---|
| | Pygmy slow loris | * | ✓ | • Identification of core habitat and management of populations<br>• Monitoring the effectiveness of offset management activities on species populations<br>• Alignment of conservation priorities to National and International management plans and requirements |
| | Asiatic golden cat | * | * | |
| | Leopard cat | * | * | |
| | Sambar | * | ✓ | |
| | Himalayan black bear | ✓ | ✓ | |
| Birds | Wreathed hornbill | * | * | |
| | Great hornbill | * | * | |
| | White winged duck | * | ✓ | |
| | Greater coucal | * | * | |
| | Siamese fireback | * | * | |
| | Silver pheasant | * | * | |
| | Grey peacock pheasant | * | * | |
| | Red-breasted parakeet | * | * | |
| | Darter | * | * | |
| | Rufous necked hornbill | * | ✓ | |
| | Crested argus | * | * | |
| | Spot-bellied eagle owl | * | * | |
| | Red-collared woodpecker | * | * | |
| | Hoopoe | * | * | |
| Reptiles | Reticulated python | * | * | |
| | King cobra | * | ✓ | |

✓ - Denotes survey or literature has identified the presence of the species

* - Denotes likely habitat present for the species

### *6.3.3 Aquatic Biodiversity Values*

Aquatic biodiversity offsets will be managed through a framework designed to improve watershed management activities across the Nam Ngiep watershed (above and below the dam wall) and offset management sites.

The main components of the watershed management activities are outlined in *Section 4*. These include:

- Research;
- Management planning;
- Monitoring and evaluation;

- Sediment and erosion control;
- Riparian area protection;
- Management of fish habitat;
- Community engagement and development; and
- Education and awareness.

Monitoring and evaluation of the effectiveness of these activities will be essential to adjust techniques based on the threats identified.

### *6.3.4 Human Use and Cultural Values*

The following section provides an overview of the tangible human use provisioning services and intangible cultural heritage values that exist within the potential offset sites. This summary is based on field surveys of local villages and markets.

*Hunting and Gathering*

Hunting and gathering occurs in the offset areas. Hunting is generally done for household consumption; while any surplus is sold to intermediaries. It is typically the smaller species that are consumed within the household, while the larger animals are sold.

Frequently caught species include small animals such as squirrels, birds, bamboo rats and the lesser mouse deer; however, once in a while larger animals such as the Rusar Unicolor, Southern Red Munjak and Pangolin are caught. According to villagers, the most prized mammal species is the Pangolin. This is because of its rarity and medicinal uses – it is believed to have sexual stimulation powers.

In addition to fauna, a variety of flora species are collected, including mushrooms and bamboo shoots. Flora species were, again, primarily used for household consumption with surplus being sold to intermediaries. Instead of selling the materials collected, females typically engage in other activities, such as rice or textile production, in order to provide family income.

*Fishing*

Fishing occurs in the offset areas. The majority of fish caught are consumed within the household. Only surplus or the prized species are sold to intermediaries. Hence, family income derived from selling fish is relatively low.

Females indicated that they go fishing more often during the rainy season as species that dwell in Mekong River flow downstream to the Nam Ngiep and Nam Xan rivers during this period. In other words access during the rainy season is important.

*Cultural Services*

Cultural heritage values exist within the offset sites. Villagers identified two specific cultural aspects - village temples and cremation sites. However, in relation to intangible cultural heritage values, no significant sites were identified. This is partly due to the fact that the village residences were largely lowland Laos who are Buddhist; accordingly, religious ceremonies are conducted in village temples. Another possible underlying factor is that the villagers did not settle in the area until after the Laotian Civil War (1953 – 1975).

The summary indicates that the ecosystems services provided by the candidate offset areas largely align with those that will be impacted at the project site. However, villagers indicated that future access to these services may be an issue, due to declining presence of flora and fauna.

The management frameworks to offset impacts on human cultural and heritage values are outlined in *Section 4*.

*Issues to Consider*

The offset sites appear to meet existing demands. However, during the survey, villagers expressed concern about declining numbers and future availability of fauna and flora species.

Villagers also noted that the local population has experienced a number of changes – e.g. through the Lao PDR government's decision to consolidate villagers. In some instances, this has meant an increase in the village population, while in other instances there has been a decrease in population. An increase in population can increase pressure on the surrounding natural environment.

The village consolidation has been done, in part, to enhance the provision of services available to villagers. The Project area surveys indicate that an improvement in service availability can (but not always) lead to a decrease in dependence on ecosystem services (such as medicinal plants).

In addition, villagers engaged as part of the survey indicated a strong preference for Lao PDR government involvement in any decision-making and management of offsets.

## 6.4 BIODIVERSITY OFFSET PACKAGE BALANCE SHEET ANALYSIS

*Table 6.6* summarises the results of the application of the biodiversity offset metric for the impact site and candidate biodiversity offset sites in relation to habitat. Habitat hectare values are able to be offset for all of the values lost, enabling a no-net-loss to be achieved for all land classes impacted.

***Table 6.6 Biodiversity offset balance sheet analysis (Habitats)***

| | | Candidate Offset Sites (Available Gains) Habitat Hectare Values | | |
|---|---|---|---|---|
| **Land Class** | **Impact Site (Loss)** | **Phou Khao Khouay NPA** | **Protection forest in the Nam Ngiep Watershed** | **Loss/Gain** |
| Evergreen Forest | 321.9 | 903 | 3473.1 | +4054.2 |
| Deciduous Forest | 1,912.6 | 20.7 | 4487.9 | +2596 |
| Coniferous Forest | - | 278.6 | - | +278.6 |
| Mixed coniferous/ Broadleaved Forest | - | 6470.3 | - | +6470.3 |
| Bamboo | 224.1 | 661.2 | 1146.1 | +1583.2 |
| Old Fallow Land | 595.5 | 533.2 | 125.5 | +63.2 |
| Young Fallow Land | 447.1 | 120.7 | 806.7 | +480.3 |
| Slash and Burn Land | 139.1 | 7.3 | 1134.5 | +1002.7 |
| Scrub, Heath | - | 701.8 | - | +701.8 |
| Grassland | 65.0 | 6227.9 | 453.8 | +6616.7 |
| Swamp | - | 96.4 | - | +96.4 |
| Rock | 1.1 | 361.8 | 187.4 | +548.1 |
| Cloud | 4.0 | 29.6 | 0.8 | +26.4 |
| Shadow | 13.2 | 396.4 | 13.9 | +397.1 |

In relation to species values, it is noted that not all species are currently surveyed as present within the offset sites. These species are outlined in *Table 6.7*. Habitat for these species is likely present for these species in the offset areas and their presence is required to be confirmed.

As a contingency measure, it is recommended that if these species are not found present in the offset areas within the first two seasons of monitoring, further assessment and allocation of resources is required to identify the location of the species in alternative offset sites and the development of management actions and allocation of funding required for those species.

*Table 6.7 Species not currently surveyed as present within offset areas*

| | Species | PKK NPA | Protection Forest Areas of the Nam Ngiep Watershed |
|---|---|---|---|
| Category 1 | | | |
| Birds | Green peafowl | * | * |
| Reptiles | Elongated tortoise | * | * |
| Category 2 | | | |
| Mammals | Golden jackal | * | * |
| | Asiatic golden cat | * | * |
| | Leopard cat | * | * |
| Birds | Wreathed hornbill | * | * |
| | Great hornbill | * | * |
| | Greater coucal | * | * |
| | Siamese fireback | * | * |
| | Silver pheasant | * | * |
| | Grey peacock pheasant | * | * |
| | Red-breasted parakeet | * | * |
| | Darter | * | * |
| | Crested argus | * | * |
| | Spot-bellied eagle owl | * | * |
| | Red-collared woodpecker | * | * |
| | Hoopoe | * | * |
| Reptiles | Reticulated python | * | * |

* Denotes likely habitat for the species but the species has not been identified by survey

# 7 NEXT STEPS

The implementation of the biodiversity offset package requires two separate work streams to occur. One to establish the AOF and the other to establish the NNP1 offset package.

Proposed work sequences are outlined in *Tables 7.1* and *7.2*.

***Table 7.1 Work Sequence for the Establishment of the AOF***

| | Aggregate Offset Fund Development and Implementation | 2014 | 2015 |
|---|---|---|---|
| 1. | Seek endorsement from the Lao Government on the proposed AOF approach | March | |
| 2. | Policy work to define the core components of the AOF, including roles and responsibilities, financial, legal and governance requirements | March-June | |
| 3. | Consultation with Lao Government and stakeholders on the proposed outlined. | June-August | |
| 4. | Legal advice on AOF framework outline | September-October | |
| 5. | Financial advice on AOF framework outline | September-October | |
| 6. | Finalise policy advice on administrative and governance procedures for the AOF | September-October | |
| 7. | Development of Prime Ministerial Decree to provide the legal structure for the development of the AOF | November | |
| 8. | Development of EPF Specialised Financial Window to provide the administrative and financial procedures for the AOF | November | |
| 9. | Final consultation with Lao Government and stakeholders on the final AOF framework | December | |
| 10. | Implementation and trial of the AOF | | January-March |
| 11. | Review of the first 6 months of implementation | | October |

***Table 7.2 Work Sequence for the Establishment of the NNP1 Offset Package***

| | NNP1 Offset Package Implementation | 2014 | 2015 |
|---|---|---|---|
| 1. | Consultation with Lao Government (MoNRE. PoNRE and DFRM) and stakeholders (NGOs) | March | |
| 2. | Refinement of Offset Package | March | |
| 3. | Endorsement of the Lao Government | Late March | |
| 4. | Community Consultation | April | |
| 5. | Financial advice requested for NNP1 Offset Fund | April | |
| 6. | Legal advice for offset area establishment | April | |
| 7. | Drafting of Provincial Government Decree(s) for Nam Ngiep Watershed | May-June | |
| 8. | Drafting terms of reference for NNP1 Offset Advisory Committee | May-June | |
| 9. | Investment of Offset Capital | May | |
| 10. | Invite Members for NNP1 Offset Advisory Committee | May | |
| 11. | Establishment of NNP1 Offset Advisory Committee | August | |

| NNP1 Offset Package Implementation | 2014 | 2015 |
|---|---|---|
| 12. Drafting of administrative procedures for NNP1 Offset Advisory Committee | August-September | |
| 13. Meeting of NNP1 Offset Advisory Committee | October | |
| 14. Support from NNP1PC and Advisory Committee for PoNRE on tendering process | October-November | |
| 15. PoNRE Tendering process for offset management | December | |
| 16. Evaluation of tenders by NNP1 Offset Committee | | January |
| 17. PoNRE appoint successful tenderers | | February 2015 |
| 18. First Management Payment from NNP1 Trust Fund | | February 2015 |

The following work sequences (outlined in *Tables 7.3* and *7.4*) are proposed for offset management between years 1 - 5 and years 1 – 30. These work sequences would be refined based on the proposed work programs by successful tenderers.

***Table 7.3 Work Sequence for Offset Management Years 1 to 5***

| Years 1-5 Offset Management Action Sequence | 2015 | 2016 |
|---|---|---|
| 1. Receive Management Payment | February | |
| 2. Engage with PoNRE | March | |
| 3. Engage with the Community | March | |
| 4. Determine Conservation Priorities | April | |
| 5. Determine Species Specific Management Actions | April | |
| 6. Determine Habitat Specific Management Actions | April | |
| 7. Determine Management Logistics and Costs | April | |
| 8. Develop Management Plan | May-June | |
| 9. Undertake Baseline Survey(s) | June - July; December – January 2016 | |
| 10. Submission of Management Plan to NNP1 Offset Advisory Committee | August | February |
| 11. Review of Management Plan | September-October | March |
| 12. Implement Management Actions | From November and ongoing to year 5 | |
| 13. Annual Monitoring Surveys | | June - July; December - January 2017 and every year until year 5 |
| 14. Annual Submission of review | | January and ongoing and every year until year 5 |
| 15. Annual Review of tender performance | | January-February and every year until year 5 |
| 16. Management Payment | | February and every year until year 5 |
| 17. Review of Tender | | Year 5 (2020) |

*Table 7.4 Work Sequence for Offset Management Years 1 to 30*

| | Management Action | Years 1-5 | Years 6-10 | Years 11-15 | Years 16-20 | Years 21-25 | Years 26-30 |
|---|---|---|---|---|---|---|---|
| 1. | Develop Management Plan | Year 1 | | | | | |
| 2. | Determine Baseline Biodiversity Values | Year 1 | | | | | |
| 3. | Establish Permanent Monitoring | Year 1 | | | | | |
| 4. | Determine Conservation Priorities | Year 1 | | | | | |
| 5. | Determine Species Specific Management Actions | Year 1 | | | | | |
| 6. | Determine Habitat Specific Management Actions | Year 1 | | | | | |
| 7. | Implement Habitat Specific Management Actions | Annual | Annual | Annual | Annual | Annual | Annual |
| 8. | Implement Species Specific Management Actions | Annual | Annual | Annual | Annual | Annual | Annual |
| 9. | Report on Performance | Annual | Annual | Annual | Annual | Annual | Annual |
| 10. | Review Monitoring results | Year 5 | Year 10 | Year 15 | Year 20 | Year 25 | Year 30 |
| 11. | Review Management Plan | - | Year 6 | Year 11 | Year 16 | Year 21 | Year 26 |
| 12. | Review Habitat Specific Management Actions | - | Year 6 | Year 11 | Year 16 | Year 21 | Year 26 |
| 13. | Review Species Specific Management Actions | - | Year 6 | Year 11 | Year 16 | Year 21 | Year 26 |
| 14. | Review of Tender | Year 5 | Year 10 | Year 15 | Year 20 | Year 25 | Year 30 |
| 15. | Issue of New Tender | - | Year 6 | Year 11 | Year 16 | Year 21 | Year 26 |

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Annex A

# Results of Consultation

## *A.1 RESULTS OF STAKEHOLDER ENGAGEMENT*

ERM conducted stakeholder engagement with Regional Agencies, Lao PDR Government Departments, local officials and Non-Government Organisations (NGO) from 20 – 21 February and 26 February – 1 March 2013. A follow up consultation was undertaken between 11 November and 16 November 2013 to discuss the proposed offset framework.

The consultation occurred in Vientiane as well as villages within the Nam Ngiep (impacted area) and the Nam Xan catchment.

The following individuals and organisations were involved in the stakeholder engagement:

*Independent Advisory Panel*

- Ms Kathy MacKinnon
- Dr Charly Mehl

*Non-Government Organisations*

- Mr Alex McWilliam and Mr Troy Hansel, Wildlife Conservation Society (WCS) (Lao PDR Program)
- Mr Vene Vongphet, International Union for the Conservation of Nature (IUCN) (Vientiane Office)

*Regional Administrative Agencies*

- Mr Amphavanh Sisouvanh, Mr Simon Krohn, Mr Piseth Chea, and Mr Henrik Larsen Mekong River Commission (Vientiane Office)

*Lao PDR Government Departments*

- Mr Viengkeo Souksavadty, Deputy Director General, Ministry of Information, Culture and Tourism (MICT)
- Outakeo Keoduangsing, Director of Legal Division, Investment Promotion Department, Ministry of Planning and Investment (MPI)
- Mr Saysomone Phothisat Deputy Director General and Mr Lampanh Kommadam Director of Conservation Forest Management, Department of Forest Resource Management (DFRM)
- Mr Aengphone Phaengsuwan, Director of Centre – EIA Review of Hydropower Projects, DESIA and Peter G. Jensen, Chief Technical Advisor, Ministry of Natural Resources and Environment (MoNRE)

*Local Officials*

- Phou Khao Kouay NPA, Lieutenant Colonel That Keoathone

Discussions were also held with the following individuals:

- Mr Robert Allen, Theun-Hinboun Power Company Ltd
- Mr Martin Hollands, Conservation Policy and Practice Ltd. (Former Lao PDR Program Manager, WWF)
- Ms Marion Ravenscroft, Lao National Museum (see MICT section)

The following agencies declined or were not available for interview:

- World Wide Fund for Nature, Vientiane Office
- IUCN Regional representatives in Bangkok
- Lao PDR Department of Minerals and Energy

## *A.2 APPROACH*

ERM designed the stakeholder consultation approach in accordance with guidance from the *Business and Biodiversity Offset Program* (BBOP) (BBOP 2009).

The structure of the interviews was informal meetings according to the topics as outlined in *Table B.1.* A range of questions were asked in accordance with the themes and questions as outlined in *Annex X* (see ERM 2013). Particular lines of questions were modified based on the conversations, focussing on relevant topics.

The conversations that occurred with stakeholders were recorded through handwritten notes and emails. This data was transcribed, collated and analysed. The results are presented below and serve as a representation of the views and opinions of stakeholders.

***Table A.1 Outline of key topics for discussion***

| Topic | Outline |
|---|---|
| Legal | Relevant International and Lao PDR Laws and regulations in relation to:<br>• environment protection;<br>• biodiversity conservation;<br>• forestry;<br>• water and water resources;<br>• land use and planning;<br>• human rights; &<br>• legal arrangements for securing biodiversity conservation on public and private land. |

| Topic | Outline |
|---|---|
| Institutional | Roles and responsibilities for land use and biodiversity conservation of:<br>• international agencies and bodies;<br>• Lao PDR Government Departments;<br>• agencies;<br>• NGOs; &<br>• local Governments and officials. |
| Financial | Financial mechanisms to support biodiversity conservation, including:<br>• market mechanisms;<br>• monetary values of natural resources and ecosystem services;<br>• financial trusts for biodiversity conservation;<br>• funding arrangements for biodiversity conservation and NBCAs; &<br>• NGO funding arrangements. |
| Management arrangements | Current management arrangements for land use planning and biodiversity conservation for:<br>• mining concessions;<br>• private lands;<br>• public lands (other than NBCAs);<br>• conservation community partnerships;<br>• forestry;<br>• NBCAs;<br>• existing biodiversity offsets;<br>• fisheries; and<br>• water resources. |
| Current and future land uses | Land uses, including potential encumbrances to biodiversity offset establishment, including:<br>• mining concessions;<br>• hydro-schemes;<br>• industrial and commercial development;<br>• villages;<br>• farming and agriculture;<br>• cultural significance;<br>• forestry;<br>• tourism;<br>• additionality (current biodiversity offsets); &<br>• land capability |
| Threats | Any threats to biodiversity offset establishment, including:<br>• environmental threats (weed and pests);<br>• natural disasters;<br>• climate change;<br>• socio-economic;<br>• agricultural expansion;<br>• illegal forestry; &<br>• illegal land uses. |

## *A.3 RESULTS*

The following sections document the results of discussions with stakeholders based on their responses during interviews, emails, telephone conversations and written responses.

### *A.3.1 Independent Advisory Panel (IAP)*

The IAP provided comments on the ERM inception report (ERM 2013). These comments provided are summarised as follows:

*Institutional and Management Arrangements*

- **Scope of the study.** The scope should be expanded to include identification of some existing protected areas in place of Nam Xan River.

- **Like for like offsets.** "Fish for fish" or "river for river" biodiversity offset does not seem viable, since there are no pristine rivers in the country. Nam Xan River catchment already has 3 small hydropower projects planned - and there is mining, logging, and considerable other human activity, including some resettlement sites. Trying to use this or any other river in the country, as a biodiversity offset would be throwing away money. Therefore, the ADB concept of offset as "site for site" or "river for river" is not standard practice and may well not be practical.

- **New protected areas.** Establishment of a new conservation area in natural forest adjacent or connected to secure protected natural forest should be considered as an option. The expansion of existing conservation areas and/or establishment/protection/reforestation of forest corridors between conservation areas and standing forest to allow wildlife movement.

- **Strengthen existing protected area management.** Options to strengthen protection and management of existing conservation areas, which currently lack staff, capacity and resources. Houy Ngua already has a management plan with proposed activities prepared in 2011. Phou Khao Khoay is managed by the Ministry of Defence.

*Financial*

- **Environmental contributions** to a conservation fund to support management of existing conservation areas (DFRM-MONRE are already considering a sinking fund for this purpose).

- **Establishment of a biodiversity offset fund.** DG of DFRM has clear ideas for the establishment of a biodiversity offset fund, which would be used for the support of existing protected areas throughout the country.

### *A.3.2* Non-Government Organisations

*Wildlife Conservation Society (WCS)*

The research team met with Mr Troy Hansel, WCS Lao PDR Program Director and Mr Alex McWilliam, Operations Manager for WCS on 22 February 2013. A second meeting with Mr Alex McWilliam was held on 27 February 2013.

*Legal*

The team discussed with WCS the range of legal mechanisms available in Lao PDR in relation to the discussion topics. We discussed:

- **Forest protection law.** The discussion highlighted forestry activities that occurred in the Nam Ngiep and Nam Xan catchments and the creation of the forest zoning system. WCS identified that the Protected Area network is the primary legal mechanism for conservation management in Lao, as designated under the Forestry Law. The lack of funding and institutional capability in Lao PDR is an ongoing concern and a major threat to biodiversity security, despite the designation of NPAs and conservation forest. Mr McWilliam discussed the potential for changing forest zoning to facilitate conservation.

- **Legal mechanisms to secure offsets.** The discussion highlighted a lack of legal mechanisms to secure offsets in Lao PDR. The projects which are currently known to have biodiversity offsets in Lao include Nam Theun 2, Nam Theun Hinboun Expansion, Sepon Mine (MMG) and Nam Leuk Dam, although there's no transparency with Nam Leuk and no information is forthcoming. WCS indicated their involvement in the current offset strategies being developed by MMG Sepon and Theun-Hinboun Power Company. Mr McWilliam discussed the importance of having a secure legal mechanism to provide clarity on the actions required. He also discussed ensuring that the legal, financial and governance arrangements were included as part of the legal agreements.

- **Forest Law Enforcement, Governance and Trade** (FLEGT) project being conducted in conjunction between the government of Lao PDR and the European Union to develop a Voluntary partnership Agreement that licences the legality of timber entering the European Union from Lao PDR. WCS mentioned that this project operated successfully in the Southern provinces of Lao PDR.

*Institutional and Management Arrangements*

The team discussed with WCS the range of institutional and management arrangements used by WCS and the Government of Lao PDR in relation to the discussion topics. We discussed:

- **Current mechanisms used by WCS to manage conservation offsets**, including focussing on conservation planning, landuse planning, monitoring and indicators, community engagement and management of non-timber forest products.

- **Governance and accountability of projects run by WCS.** This included reports on achieving milestones for offset projects, including those currently being undertaken for MMG Sepon and Theun-Hinboun Power Company.

- **Long term view on the management of protected areas.** Discussed the underfunding of reserve management in Lao PDR and the requirements to boost funding to achieve conservation outcomes.

- **Benefit sharing and community engagement.** We discussed the importance of engaging the community in conservation and building capacity within the local communities. It was suggested by WCS that any proposed offset involving conservation of cultural values be framed as developing people's adaptive capacity and focussed on measures that do not limit the progress of rural people.

- **NGO involvement in offsets.** WCS have been involved with the Nam Theun 2 project, Nam Theun Hinboun project, and MMG's Sepon Mine, all of which have had biodiversity offsets considered. WCS supported the NT2 project on the basis of the offset strategy which included an annual $1M of funding for the Watershed Management Planning Authority (WMPA). WCS are actively engaged with MMG to support the offset development in Laving Lavern NPA which was upgraded from PPA to NPA as a result of the process. There is a lack of certainty about long term management of all of these offsets beyond the 25 year commitment of most projects, which is a concern for WCS.

*Financial*

The team discussed with WCS the current financial arrangements that in Lao PDR that are available in relation to the discussion topics. We discussed:

- **Laos PDR Environment Protection Fund.** We discussed the importance of the Environment Protection Fund in providing a resource to facilitate conservation. Mr McWilliam discussed the lack of appropriate governance mechanism to support the Fund as an issue that restricted its use. This fund is currently administered by MoNRE.

- **Sustainable Forestry and Rural Development (SuFoRD) project.** We discussed this project that aimed to support sustainable forestry management. The project is a joint project with the World Bank and the government of Finland.

- **Convention on Biological Diversity (CBD) projects.** We discussed current CBD focal point projects currently costed for protected area management proposed by WCS in Bolikhamxay Province and the Nam Kading NPA. WCS has facilitated these projects but no funding has been forthcoming and proposed projects are now around 4 years old and would require updating.

*Current and Future Land Uses*

The team discussed with WCS the current and future land uses in relation to the discussion topics. We discussed:

- **Forestry activities.** We discussed forestry activities within Lao PDR and the involvement of local and international logging companies in forest resource management. Mr McWilliam discussed anecdotal evidence of the considerable amount of timber harvested from production forests and its impacts on biodiversity.

- **Mining.** We discussed current mining concessions within Lao PDR. However, WCS were not aware of any current conflicts between mining concessions and biodiversity protection within the Nam Ngiep or Nam Xan catchments.

- **Hydropower schemes.** We discussed current conflicts with current and proposed hydroelectric schemes, especially within the current protected area system. We discussed the need to ensure that future management of offsets and reserves is not compromised by hydroelectric schemes.

- **Development in protected areas.** WCS indicated that if managed appropriately, there does not appear to be any activities which would be incompatible with a conservation area. As long as the appropriate management measures are put in place, it is conceivable that hydropower projects and mining projects would be compatible in a conservation area.

*Threats*

The team discussed with WCS the current and future likely threats in relation to the discussion topics. We discussed:

- **Threats to biodiversity.** We discussed current threats to biodiversity from pests, hunting and wildlife trade. WCS was aware of current laws that prohibit trading in wildlife but recalled that localised threats from hunting and wildlife trade exist. WCS consider the major threats to biodiversity in Lao to be harvesting of timber, wildlife and NTFPs. There is a very large and active wildlife trade industry which is a major threat. WCS consider the northern Annamite range as a key area for biodiversity conservation, but it is not necessarily linked to the NNP1 values. A number of prioritisation systems have been used in the past but all have limitations. Without the funding and resources provided by organisations such as NGOs and development organisations in Lao, biodiversity conservation of key areas could not be achieved at this stage.

- **Lack of local capabilities.** The major threats to biodiversity conservation in Lao revolve around are a severe lack of funding, a lack of institutional capability and a lack of enforcement capability to ensure that NPAs are managed effectively. WCS operates many on-ground programs to achieve

conservation objectives. They partner with GoL to deliver conservation, to capacity build, to educate and to raise awareness of conservation issues in Lao.

*International Union for the Conservation of Nature (IUCN) (Vientiane Office)*

The research team met with the IUCN Protected Area Coordinator, Mr Vene Vongphet in the IUCN Vientiane office on 28 February 2013.

*Legal*

The team discussed with IUCN the range of legal mechanisms available in Lao PDR in relation to the discussion topics. We discussed:

- **Law enforcement.** We discussed the issue of law enforcement in Lao PDR and projects run by IUCN to build capacity to halt wildlife trade and forest protection in NPAs. IUCN commented that these activities were ongoing and required financial commitments.

*Institutional and Management Arrangements*

The team discussed with IUCN the range of institutional and management arrangements in relation to the discussion topics. We discussed:

- **ASEAN Centre for Biodiversity Ecotourism.** We discussed the framework provided and the opportunities to promote ecotourism through ASEAN. This was seen as a way to improve incomes and facilitate conservation.

- **Environment Protection Fund.** We discussed the role of the EPF in facilitating conservation and the requirements for improved governance arrangements to be designed to improve how the fund operates.

- **National Protected Area Management Plans**. We discussed the current management planning framework and the requirement to update management plans for the existing NPAs to ensure that future funding and management was appropriately targeted.

- **Current conservation initiatives of the IUCN**. We discussed the current focus of the IUCN in delivering management on the ground, including Gibbon conservation and law enforcement activities at Nam Ha NPA. IUCN highlighted that these conservation activities had been successful but required ongoing funding. IUCN also expressed interest in undertaking future management of biodiversity from developer contributions to offset impacts of development.

- **Military management of Phou Khao Khoay NPA.** IUCN commented that the military managed the reserve for the purposes of military operations and were not funded to manage the NPA for conservation.

*Financial*

The team discussed with IUCN the current financial arrangements that in Lao PDR that are available in relation to the discussion topics. We discussed:

- **Lack of funding for the National Protected Areas**. We discussed the general issue of funding for NPA management and that this was not available. Discussion focussed on potential sources, including working with WCS and developers to pay for improved management of NPAs.

- **Joint Flora and Fauna International Funding.** We discussed the jointly funded projects between IUCN and FFI, including the community conservation in Phou Hin Phou NPA focussed on preserving the southern white cheeked crested gibbon. FFI and IUCN are also working on a Gibbon Conservation Action Plan for Lao PDR.

- **Opportunities for funding through REDD+.** We discussed the current opportunities to link carbon and forestry activities under the REDD+ mechanism. IUCN was aware that the Lao Biodiversity Association was active in this area.

*Current and Future Land Uses*

The team discussed with IUCN the current and future land uses in relation to the discussion topics. We discussed:

- **Hydro-electric projects.** We discussed the current pressures with NPAs with current and future hydro schemes proposed within the NPA network, including at Nam Kading and Phou Khao Khouy NPAs. This was seen as a threat to the integrity of these NPAs.

*Threats*

The team discussed with IUCN the current and future likely threats in relation to the discussion topics. We discussed:

- **Wildlife trade and poaching.** We discussed the current threats to biodiversity from wildlife trade and poaching. We discussed links between officials and illegal trades, especially within NPAs. This was perceived by the IUCN as a major impediment to conservation of birds and mammals.

### *A.3.3 Regional Administrative Agencies*

*Mekong River Commission (Vientiane Office)*

The research team met with Mr Amphavanh Sisouvanh, Mr Simon Krohn, Mr Piseth Chea, and Mr Henrik Larsen Mekong River Commission from the Mekong River Commission's Vientiane office on 1 March 2013.

*Legal*

The team discussed with MRC the range of legal mechanisms available in Lao PDR in relation to the discussion topics. We discussed:

- **MRC Jurisdiction.** We discussed the legal responsibilities of member countries of the MRC. The MRC has an influencing role but implementation of management and development decisions is the responsibility of member countries. MRC provides comments on hydro-electric schemes proposed along the main channel of the Mekong River and can only influence project outcomes through member countries.

*Institutional and Management Arrangements*

The team discussed with MRC the range of institutional and management arrangements in relation to the discussion topics. We discussed:

- **Discussion with member countries on biodiversity management.** We discussed the role of the MRC in biodiversity management. The MRC's role is primarily management of the main channel of the Mekong River. Tributaries are the jurisdiction of member countries. However, the MRC has started dialogue with member countries on biodiversity management.

- **Promotion of watershed management.** We discussed the role of the MRC in promoting watershed management. The MRC is interested in managing activities within watersheds to improve water quality. This involves providing comments on development proposals (including hydroelectric schemes) on tributaries of the Mekong.

- **Data accessibility.** We discussed the availability of data and whether the MRC could have access to information from the proposed Nam Ngiep Project.

- **Payment for Ecosystem Service (PES) case study.** We discussed that the MRC would be interested in undertaking a PES case study for activities undertaken as part of the biodiversity offset for the Nam Ngiep project**.**

*Financial*

The team discussed with MRC the current financial arrangements that in Lao PDR that are available in relation to the discussion topics. We discussed:

- **Benefit Sharing between jurisdictions.** We discussed benefit sharing between institutions and the ability for Lao PDR Government agencies to learn and build upon the work being undertaken. This involved sharing the financial burden to improve the capacity of NGOs and Lao PDR Government agencies.

*Current and Future Land Uses*

The team discussed with MRC the current and future land uses in relation to the discussion topics. We discussed:

- **Cumulative impacts from developments.** We discussed the cumulative impacts from a rapidly changing environment. Pressure from numerous hydroelectric schemes, mining, agriculture and other human population pressures were having a cumulative impact on water flows and quality within the Mekong and its tributaries.

*Threats*

The team discussed with MRC the current and future likely threats in relation to the discussion topics. We discussed:

- **Agriculture.** We discussed the density of agricultural activities in the catchments and the impacts on downstream water quality, mainly from erosion and sedimentation.

- **Transport**. We discussed river transport and the impacts on banks of rivers (although this mainly applies to the mainstream of the Mekong River).

- **Habitat fragmentation**. We discussed that development was fragmenting habitats across the landscape and without appropriate corridors, wildlife would be restricted in their movement within the landscape.

*Ministry of Information, Culture and Tourism (MICT)*

The research team meet with Mr Viengkeo Souksavatdy, Deputy Head of the Archaeology Department, MICT on 28 February 2013. Early in the meeting, Mr Souksavatdy revealed that he had personally undertaken an archaeological investigation as part of the impact assessment process for the Project. He was able to supply the team with a draft version of the report he wrote in October 2007.

*Legal*

The team discussed with MICT the range of legal mechanisms available in Lao PDR in relation to the discussion topics. We discussed:

- **Jurisdiction**. The Department of Heritage within the MICT is responsible for the management and preservation of physical cultural heritage in Lao PDR. Any offset that would include preservation of physical cultural heritage would require the department's input.

- **Protection of cultural values**. The Law on National Heritage (2005) is the primary legislative instrument for the protection and preservation of tangible and intangible cultural heritage and values. This law also covers natural heritage that has scientific or ecological value (*see articles 47-56*).

*Institutional And Management Arrangements*

The team discussed with MICT the range of institutional and management arrangements in relation to the discussion topics. We discussed:

- **Past precedent.** Mr Souksavatdy could not recall any past biodiversity offset projects that involved offsetting national cultural heritage.

- **MMG Sepon model**. Mr Souksavatdy suggested that the research model developed by MMG at its Sepon gold mine approximated the type of activity a cultural heritage offset might look like, though he acknowledged that this was in place as an impact mitigation measure. The model includes a research agreement with funding between the company, the department and a research team from James Cook University (Australia). MMG Sepon has also funded and built a small cultural heritage museum on behalf of Sepon District, which will be used to display artefacts excavated from the mine site.

*Financial*

The team discussed with MICT the current financial arrangements that in Lao PDR that are available in relation to the discussion topics. We discussed:

- **Limited operational budget**. The department has a limited operational budget, which is focussed primarily on meeting staffing requirements. Any additional projects, such as that by MMG, need to be funded from external sources.

- **National Heritage Fund**. The Law on National Heritage allows for the establishment of a National Heritage Fund, which would be administered by the MICT. Sources for this fund include compensation from activities that affect the national heritage.

*Current And Future Land Uses*

The team discussed with MICT the current and future land uses in relation to the discussion topics. We discussed:

- **Sites and artefacts are regularly discovered due to developments**. As found at Sepon and elsewhere in the country, sites and artefacts of national importance are regularly discovered, especially during construction activity for major projects. Mr Souksavatdy's investigations in 2007 found that sites of significance will be lost due to the Project and recommended appropriate mitigation and management measures. There was no suggestion however that current and future developments in both the Nam Ngiep and Nam Xan catchments were about to jeopardise or destroy cultural site types or values that were only located in these areas.

*Threats*

The team discussed with MICT the current and future likely threats in relation to the discussion topics. We discussed:

- **Scope of cultural heritage offset should be clearly defined so as to avoid threats**. Mr Souksavatdy stated that should it be assessed that an offset is required to compensate for loss of irreplaceable cultural values, whatever is proposed should be clearly defined, concrete and not be overly ambitious. He suggested that supporting the Office of Information and Culture of Borikhan District in intangible and tangible cultural heritage preservation activities would be an appropriate starting point.

In addition to Mr Souksavatdy time was spent with Ms Marion Ravenscroft, Director of Conservation at the Lao National Museum. Ms Ravenscroft provided personal insights based primarily on her experiences as a consulting archaeologist over two decades in-country.

- **Legal mechanisms unclear but conservation is practiced by some developers**. Ms Ravenscroft was unaware of any mechanisms that might aid in securing biodiversity offsets in the country but noted positively the tangible and intangible cultural heritage conservation programs at Sepon (MMG), Nam Theun 2 (NTPC), Theun Hinboun (THPC) and Phu Bia Mining's operations at Phu Kham and Ban Houayxai.

- **Offset measure should directly benefit PAP**. Ms Ravenscroft questioned the viability of offsetting any loss of cultural heritage in one area in another, suggesting that any conservation measure should directly benefit project-affected people (PAP). To her, the concept of offsetting like-for-like did not fit well with socio-cultural values in Lao PDR, especially in light of the country's ethnic diversity. Instead, given that the majority of PAP are Hmong, she suggested that Kansai could work with the Japan International Cooperation Agency (JICA) to fund a cultural centre at the district level.

- **Offset measure should account for unknown yet expected losses**. While cultural heritage investigations to date have focussed primarily on tangible heritage, objects shown to investigators are common throughout the country. Ms. Ravesncroft suggested however, that it is highly likely that any construction work will unearth artefacts of national significance. This likelihood assessment is based on her past experience, especially at Sepon. Therefore any proposed offset should include a measure to account for the likelihood of as yet undetermined tangible heritage of national significance.

*Department of Environmental and Social Impact Assessment (DESIA), Ministry of Natural Resources and Environment (MoNRE)*

The research team met Mr Aengphone Phangsuwan, Director of Centre – EIA Review of Hydropower Projects, and Mr Peter Jensen, Chief Technical Advisor, Environmental Management Support Programme (seconded to MoNRE from Danish engineering company Grontmij) on 28 February 2013.

*Legal*

The team discussed with DESIA representatives the range of legal mechanisms available in Lao PDR in relation to the discussion topics. We discussed:

- **Annex.** We discussed the NNP1 Project conditions which outline the Environmental and Social obligations for the NNP1 Project. It also specifies that a biodiversity offset will be required to compensate for the impacts of the Project, potentially including Nam Xan River.

- **Lack of legal mechanisms.** We discussed a lack of legal mechanisms in place to manage offsets in Lao PDR. The NNP1 project is the first project which will require an offset as a condition of the Project approval, according to DESIA.

- **Offsets in development.** We discussed the other projects in Lao PDR which are pursuing offsets as a requirement/component of their funding arrangements with either the IFC or ADB. These include Phou Bia Mine, Sepon Mine and Nam-Theun 2 Project.

*Institutional And Management Arrangements*

The team discussed with DESIA the range of institutional and management arrangements in relation to the discussion topics. We discussed:

- **Management Options.** We discussed the diversity of options that should be considered as constituting an "offset". Components included Protected Area management, research funding, education programs, captive breeding and release programs and ecotourism programs. Mr Aenphone and Mr Jensen agreed that all of these options could be considered appropriate and that a combination of each of these measures would be preferable if applied correctly. They confirmed that while developers must propose offset options, the final decision would be made by government.

- **Local knowledge and global expertise.** We discussed the need to bring global standards to the development of the offsets, but that local knowledge will be required for successful implementation of the offset. Provinces, Districts and Villages will all need to be consulted during development of the offset. Mr Jensen stated that it was essential that any proposed offset benefit people directly affected by the Project.

*Financial*

The team discussed with DESIA the current financial arrangements that in Lao PDR that are available in relation to the discussion topics. We discussed:

- **Lack of financial structures.** We discussed a lack of financial mechanisms in Lao PDR in place to adequately manage offsets in the long term. There was no discussion of the Lao PDR Environmental Protection Fund during this meeting.

*Current And Future Land Uses*

The team discussed with DESIA the current and future land uses in relation to the discussion topics. We discussed:

- **NTFPs.** We discussed the current status of land use in the Project Area as subsistence farming and the importance of NTFPs in maintaining local livelihoods.

- **Regional Biodiversity Planning.** We discussed range of current and future land use projects and groups including The Agrobiodiversity Initiative (TABI), the Biodiversity Conservation Corridor Project (BCC) administered by the ADB, the Lao Aquatic Resources Research Centre (LARRC) and the National Protected Area (NPA) system. Mr Jensen indicated that the Project may benefit from partnering with these initiatives to achieve the offset requirements of the Project.

*Threats*

The team discussed with DESIA the current and future likely threats in relation to the discussion topics. We discussed:

- **Biodiversity threats.** There was brief discussion of the biodiversity threats in Lao PDR, which were broadly identified as a result of a lack in coordinated management and poor funding circumstances.

*Department Of Forest Resource Management (DFRM)*

The research team met with Mr Saysomone Phothisat Deputy Director General and Mr Lampanh Kommadam Director of Conservation Forest Management, Department of Forest Resource Management (DFRM). Mr Khamphanh Nanthavong, Director General of DFRM was unavailable. The meeting occurred on 28 February 2013.

*Legal*

The team discussed with DFRM the range of legal mechanisms available in Lao PDR in relation to the discussion topics. We discussed:

- **Forest Law.** We discussed the application of the Lao PDR Forest Law. This included the ability to change forest classifications from "Production Forest" to "Protection Forest". This is allowed by the legislation under Article 44. The Prime Minister of Lao PDR can approve the change in classification.

*Institutional And Management Arrangements*

The team discussed with DFRM the range of institutional and management arrangements in relation to the discussion topics. We discussed:

- **Forest resource access.** We discussed the process for access to resources. This involves a public tender process on a rotation of 25 years to private companies. This involves the government determining the yield (volume) and auctioning the volume of timber. There is local and regional participation in the tender process.

- **Environment Protection Fund.** We discussed the application of the Fund and its administration. DFRM are of the view that improvements need to be made in the administration and governance of the fund to make it effective.

- **Water Shed Management Committees.** We discussed how these Committees operate to improve water quality protection. DFRM work with these Committee to protect forest and ensure the adequate management of soil and water resources.

- **Compensation for impacts on forest resources.** We discussed the compensation requirements for impacts on forest resources due to developments. This included both payments and additional areas from developers due to a reduction in the productive area of forests. This process also involved ensuring that forestry activities also removed resources from areas to be impacted (such as inundation areas from hydroelectric dams).

- **Sustainable Forestry and Rural Development (SuFoRD) project.** We discussed the SuFoRD program and ongoing projects. DFRM mentioned there was an ability to create new sustainable forestry projects as part of the SuFoRD package of activities.

- **Phou Khao Khoay NPA Management.** We discussed the ongoing management of PKK by the military. This included the ability of the military to manage the protected area with their limited resources and conflicts between military use and conservation. DFRM cooperates with the army to deliver management of the protected area.

*Financial*

The team discussed with DFRM the current financial arrangements that in Lao PDR that are available in relation to the discussion topics. We discussed:

- **Payment for Ecosystem Services.** We discussed the pilot project for PES for Nam Ngeum 3 Hydropower Scheme. DFRM expressed that this project was a pilot and payments had been made to facilitate forest conservation. DFRM expressed the view that they would like to see the outcomes of the PES pilot project prior to committing to future projects.

- **KfW Entwicklungsbank Bank Forest Protection Program.** We discussed the current work being undertaken by KfW Bank in terms of supporting rural development and aiding climate relevant environment and resource management in Lao PDR. KfW Bank has also worked with DFRM to cooperate and assist in the management of protected areas in Lao PDR.

*Current And Future Land Uses*

The team discussed with DFRM the current and future land uses in relation to the discussion topics. We discussed:

- **Hydropower Schemes**. We discussed the impacts on forest resources from hydropower schemes and the reduction in available production forest. DFRM expressed the view that adequate compensation was necessary equivalent to the likely impact on forest resources.

*Threats*

The team discussed with DFRM the current and future likely threats in relation to the discussion topics. We discussed:

- **Ongoing funding for NPAs.** We discussed the lack of resources (both in terms of manpower and finances) to support the protected area system. DFRM acknowledged this as an issue and highlighted that they sought partnerships with WCS and IUCN to deliver on the ground management of protected areas.

### *A.3.4 Local Officials*

*Phou Khao Kouay (PKK) National Protected Area Management*

The research team met with Lieutenant Colonel That Keoathone at the Phou Khao Khouay (PKK) NPA on 22 February 2013.

*Legal*

The team discussed with the PKK management the range of legal mechanisms available in Lao PDR in relation to the discussion topics. We discussed:

- **PKK NPA.** We discussed the NPA and its management structure, and briefly touched on the NPA system as a whole. Lt Col. Keoathone was not aware of any other legal mechanisms available for conservation management in Lao PDR.

- **Role of the military.** We discussed the role of the military in conservation. Lt. Col. Keoathone indicated that while conservation was not the primary aim of the military, it was a secondary mission which was considered important in managing PKK NPA and Phou Phanang NPA to the west. This was particularly important during non-war times, when the military had the man power to contribute to protected area management. He referred to the military's conservation management role at PKK as a pilot project. It is possible that the presence of the military serves a strategic defence purpose, though this was not discussed with Lt. Col. Keoathone.

*Institutional and Management Arrangements*

The team discussed with PKK management the range of institutional and management arrangements in relation to the discussion topics. We discussed:

- **NPA Management.** The military is responsible for management of the NPA, as advised by the NPA Management Committee. The committee is made up of representatives from the NPA, Province, District, DFRM (MoNRE) and the village organisation administration.

- **NPA Staff capabilities.** There are approximately 170 military officers involved in management of the 200 000 hectare NPA. Their roles are primarily related to manning the gates (called sub-stations) and border patrol, although the latter border patrol is not undertaken regularly enough to have a significant impact on poaching and wildlife harvesting.

- **The NPA Management Plan and current activities.** An NPA Management Plan has been prepared (with the support of the IUCN in 2010) and the boundary of the NPA has been surveyed. Approximately 10% of the boundary markers have been put in place to date. There has been a baseline biodiversity study undertaken for the park, and WCS have been involved in this initial study. Lt. Col. Keoathone confirmed that his staff conducts enforcement activity against illegal logging and poaching, though prosecution of violators is managed by civil authorities. He added that they also conduct some training in bordering villages about conservation values

*Financial*

The team discussed with PKK management the current financial arrangements that in Lao PDR that are available in relation to the discussion topics. We discussed:

- **Lao PDR Government Funding.** PKK NPA receives 100 M LAK (Lao kip) in annual funding which is approximately equivalent to $12,700 USD. The funding is considered insufficient to make any substantial inroads into the NPA Management Plan.

- **Military support.** We discussed the role of the army in providing financial support. Lt Col. Keoathone said that the military provided vehicles, and salaries for the 170 officers.

- **Additional support.** PKK NPA is understood to be entitled to additional funding from offset packages from Nam Leuk hydropower project, and potentially from the Lao PDR Environmental Protection Fund. However, Lt. Col. Keoathone stated that he was unaware of any funding from these sources.

*Current And Future Land Uses*

The team discussed with PKK management the current and future land uses in relation to the discussion topics. We discussed:

- **Current villages.** We discussed the current population within and around the park. Lt. Col. Keoathone said that there were 72 villages in or near the NPA, including 2 villages within the NPA, and 7 villages on the border.

- **Hydropower.** We discussed the presence of two hydropower projects which have recently been constructed, or are under construction in the NPA. These include large dams on the Nam Mang and Nam Leuk rivers. The project on the Nam Leuk and its associated roads have changed the PKK's elephant habitat, pushing the elephants outwards towards villages and rice paddies in search of food (noted in threats below).

- **Sections of the NPA.** The NPA is divided into 7 sections, each within a separate province and/or district. Of note were two sections: Section 6, which involves a growing ecotourism operation at Tad Xat waterfall including tours and homestays; and Section 7, which is undertaking reforestation projects for conservation.

*Threats*

The team discussed with PKK management the current and future likely threats in relation to the discussion topics. We discussed:

- **Hunting and poaching of wildlife.** We discussed the major threat to biodiversity in the NPA as being hunting from illegal poachers who target large fauna and transport the meat to markets in Vientiane. The hunters are generally not local villagers according to Lt. Col. Keoathone. The major highway, which passes close to the NPA, and easy road access into the centre of the NPA facilitate poaching and hunting.

- **Illegal timber harvesting.** We discussed the significance of illegal timber harvesting in PKK NPA as being a major priority for addressing biodiversity conservation.

- **Local elephant population.** There is a local elephant population within PKK which has been displaced by one of the hydropower developments within the NPA. The Elephants have moved to a patch of habitat closer to the border of the NPA which renders them more susceptible to poaching and other threats. This is considered to be a conservation priority for the NPA by Lt Col. Kheoathone.

- **Orchid populations.** Lt Col. Keoathone indicated that a population of threatened Orchids that were being impacted by one of the hydropower developments are due to be relocated to an area near the Nam Mang (river) within PKK NPA. Unfortunately no additional information could be gained on the species or its location during the meeting.

### *A.3.5 Other Stakeholders*

*Theun-Hinboun Power Company Ltd*

The research team met with Mr Robert Allen, Theun-Hinboun Power Company Ltd on 27 February 2013.

*Legal*

The team discussed with Theun-Hinboun Power Company the range of legal mechanisms available in Lao PDR in relation to the discussion topics. We discussed:

- **Requirements for approvals and offsets in Lao PDR**. We discussed the triggers that required the creation of compensatory measures for biodiversity offsets for the impacts from the development of the Theun-Hinboun project. Robert commented that the main requirements were set by Laos PDR. He said that he had a good working relationship with government agencies.

- **Contractual arrangements**. We discussed the contractual arrangements set with WCS to deliver offsets. This included reporting on performance and measuring biodiversity gains. Robert commented that Theun-Hinboun project had decided to manage WCS directly rather than use the Environment Protection Fund or involve MoNRE or DFRM. This was a conscious choice so that there was greater control over the contractor and the outcomes delivered.

*Institutional and Management Arrangements*

The team discussed with Theun-Hinboun Power Company the range of institutional and management arrangements in relation to the discussion topics. We discussed:

- **Role of WCS in supporting the Theun-Hinboun Power Company**. We discussed the delivery of management by WCS, including the work undertaken on ground. WCS was chosen to support the project on a fee for service basis. Management plans for biodiversity have been prepared, including criteria and indicators and management measures. Management focuses on the Nam Gnouang South Protected Forest Area. The work undertaken by WCS also includes a reforestation program along the edges of the reservoir. Long-term conservation initiatives are planned, including human-elephant conflict, forest protection, enhanced patrolling and road check points, community education, sustainable forestry and data collection.

*Financial*

The team discussed with Theun-Hinboun Power Company the current financial arrangements that in Lao PDR that are available in relation to the discussion topics. We discussed:

- **Mechanisms for financial support for biodiversity offsets.** We discussed the financial support for the work of WCS in biodiversity conservation. Theun-Hinboun Power chose to fund the work directly rather than contribute money to the Lao PDR Government for offsetting.

*Current And Future Land Uses*

The team discussed with Theun-Hinboun Power Company Ltd the current and future land uses in relation to the discussion topics. We discussed:

- **Use of areas surrounding the hydroelectric dam for biodiversity (Nam Gnouang Reservoir).** We discussed land uses and the opportunities to achieve biodiversity offsets. Theun-Hinboun Power recalled that they had chosen areas around the reservoir as an offset site as it would have the added benefit of providing watershed protection to the dam.

*Threats*

The team discussed with Theun-Hinboun Power Company the current and future likely threats in relation to the discussion topics. No threats were identified and discussed.

*Mr Martin Hollands, Conservation Policy and Practice Ltd.*

Mr Martin Hollands, Conservation Policy and Practice Ltd. (Former Lao PDR Program Manager, WWF)

*Legal*

The team discussed with Martin the range of legal mechanisms available in Lao PDR in relation to the discussion topics. We discussed:

- **Environment Protection Fund**. We discussed the suitability of this fund to facilitate conservation. Martin mentioned that the administrative structure of the fund required support to ensure that environmental outcomes can be delivered and measured on the ground.

- **Forestry Operations.** We discussed the legal requirements for forestry operations and the quota system designed to distribute logging quotas to private companies. Martin discussed that this system may make it difficult to secure changes in forest classification to create protected areas or protection forests.

*Institutional and Management Arrangements*

The team discussed with Martin the range of institutional and management arrangements in relation to the discussion topics. We discussed:

- **WCS and IUCN management of protected areas**. We discussed the merits and outcomes achieved through privately contracting conservation activities to manage offsets. Martin described the importance to oversee and have clear objectives, funding and governance. We discussed the issue of what happens in the long term once funding runs out and the lack of government funding to support conservation.

- **Funding of protected areas.** We discussed ongoing funding of protected areas and the need to ensure that the funding was focussed and was not compromised by future developments or reductions in funding. We also discussed knowledge sharing and responsibilities with the private sector doing the work of DFRM in facilitating protected area management. This may cause longer term problems if private sector funding isn't forthcoming,

- **Operation of Lao PDR Government agencies.** We discussed communication between Lo PDR government agencies and the relative "silo" nature of their operation. This was seen as a challenge to facilitate communication and collaboration on conservation.

- **Involvement of the local community.** We discussed the importance on involving the local community in conservation, to improve engagement but also to enable them to become custodians of natural resources and reduce pressures those resources.

- **Importance of data.** We discussed the importance of making decisions using good data and the need to make sure that there was ongoing monitoring to test assumptions and adjust management techniques.

- **Strategic approach to district forest protection**. We discussed the importance of approaching protection forest management in a regional sense given the small amounts of forest reserved within the forestry estate. This would create economies of scale to manage these smaller patches of land.

*Financial*

The team discussed with Martin the current financial arrangements that in Lao PDR that are available in relation to the discussion topics. We discussed:

- **Protection Forest Decree.** We discussed the *Protection Forest Decree* by the Prime Minister of Lao PDR that proposed a way forward to provide economically viable funding for protection forests. The decree sets a 1% fee on commercial users of Protection Forest Services. Martin commented that this was not yet happening.

- **Payments for Ecosystem Services and REDD+.** We discussed the availability of new approaches to fund conservation, mainly through PES and REDD+. We discussed that there were opportunities to support these approaches and had the ability to facilitate sustainable financing of conservation and offsetting.

- **Linking fees to conservation.** We discussed the ability to direct mining fees and income from forestry operations to supplement funding of the protected area system. We discussed the ability of offsetting funds (such as environmental contributions from offsetting) to also contribute financially to conservation.

*Current and Future Land Uses*

The team discussed with Martin the current and future land uses in relation to the discussion topics. We discussed:

- **Hydropower Schemes.** We discussed the current hydro power schemes in Lao PDR and the pressure that this will have on river basins. This includes changes in hydrology, biodiversity impacts and the pressure to include offsets as part of development consents. Martin saw the requirement for offsets as a positive.

- **Forestry.** We discussed the impacts on forestry activities on the impacts on biodiversity. This was seen as a major current threat. Current projects however were trying to improve the sustainability of forestry operations (such as the SuFoRD project). Martin mentioned that these projects were successful but needed ongoing support to DFRM to make them successful.

*Threats*

The team discussed with IUCN the current and future likely threats in relation to the discussion topics. We discussed:

- **Wildlife poaching.** Martin mentioned that wildlife poaching was an ongoing issue that needed to be managed appropriately. This included the work that IUCN had been doing to support forest guards at various NPAs.

- **Human pressures.** We discussed ongoing human pressures on the Lao PDR environment, mainly through increased development and population growth. This was seen as the major driver to changes in the environment and impacts on biodiversity. We discussed ensuring a robust reserve system as the major way to improve the conservation of biodiversity and the role that effective offsets have in contributing to conservation.

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