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# Livelihoods and Resource Management Survey on the Mekong between LouangPhabang and Vientiane Cities, Lao PDR





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This report is a summary of Conserving Biodiversity and Sustaining Livelihoods along Mekhong River in LoungPhabang, Xaingabouli and Vientiane Provinces. By undertaking an integrated landscape approach for specific CEPF Priority Species, it is thought that community resources will be secure and this will strengthen governance capacity for river management.

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**Livelihoods and Resource Management  
Survey on the Mekong between  
LouangPhabang and Vientiane Cities,  
Lao PDR**

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## **Glossary of important Lao terms**

Ban:	Village
Don:	Island
Houay:	Small stream
Luang:	Big stream, bigger and larger than a Houay
Pha:	Rocky mountain

# 1. Executive Summary

The Mekong stretch between Louangphabang remains one of the least studied parts of Lao, both in terms of biodiversity as well as in terms of livelihoods dependant on natural resources. This is an astonishing fact, given the huge national and regional importance of this area for provision of protein resources, mainly fish, as well as for hosting many species that are globally threatened. At the same time, the area is subject to massive infrastructural investments, namely the Xaignabouli Dam, and a number of other Mekong dams that are under discussion.

Without knowing the livelihood and biodiversity features, it is impossible to know how these developments will influence the region in that regard and where biodiversity conservation activities still make sense. For this reason, IUCN funded by CEPF undertook a set of biodiversity surveys from 2011 to 2012. A large number of new species were found and species were re-recorded that have not been seen in Lao for a long time. The project team identified a set of biodiversity hotspots, critical for conservation of these typical Mekong species.

Apart from infrastructure development livelihoods dependent on natural resources pose the biggest challenge for biodiversity conservation. Since basic socioeconomic historical developments remain unknown for the region, especially the extent of dependency on natural resources, a livelihood survey was undertaken to confirm and provide further details of the knowledge on biodiversity hotspots where future conservation may occur. At first, a complete rapid village assessment was undertaken, covering all 97 target villages between Louangphabang and Vientiane, but excluding these two bigger cities and Paklay. After that, group discussions and household interviews were conducted in 14 focus villages near the biodiversity hotspots to identify potential conservation requirements and opportunities. The results give a clear picture on the drivers of historical and recent settlement. The numbers of villages have largely increased since the year 1300, and as a result the population has also dramatically increased. For reasons related to historical settlement, the villagers mainly mentioned good access to natural resources. Amongst the more current factors, resettlement of Khmu and Hmong populations to newly funded villages or to existing villages of Lao Loum ranks very high. As a consequence, population size has also risen dramatically, and has increased the stresses on natural resources; both in terms of the expansion of agricultural land for rice production and other crops and also in terms of the harvesting of wild species from the Mekong and its surrounding habitats.

Apart from a very few exceptions, almost all species recorded are consumed and traded by the village populations, depending on market access which is rapidly improving due to road infrastructure investment. The main wildlife resources consumed and traded are fish, birds, reptiles, amphibians and crabs. The income deriving from these resources is most often around 30% to 50% of the total income. Also, traders for wildlife and other wild species from Laos and the neighboring countries contribute to that income generation and find their way even into the more remote villages. Another change in the land use challenging habitats are new and emerging demands for new agricultural products. Examples include Job's Tear and different kinds of plantation wood. As a response to the increased demand for fish, the villagers have changed their harvesting practices; including dynamite, poison and smaller nets to compensate for the decreased catch amounts. This leads to a clear downward spiral of fish availability below the carrying capacity. The same holds true for birds and forest animals that are hunted with more efficient technologies; such as small nets, guns and glue.

Only a few past and current management efforts that go beyond traditional practices of conservation were recorded; for example at sacred river sections where catch is not allowed during spawning seasons or at village spirit forests where logging and hunting is not allowed.

The few donor and state-led conservation efforts in co-management with the villagers, for example for forests or fish conservation zones, are barely enforced. Only a few alternative livelihood projects in the areas of rice irrigation or animal-raising were mentioned by the villagers as to having been partially successful. But the low geographical and target group coverage of these projects has not lead to a significant decreasing dependency on wild species in the target region as a whole.

However, many village decision makers and resource user group members expressed their willingness to be involved in future conservation activities accompanied by alternative livelihood development for their compensation.

Using data gathered from the biodiversity report<sup>1</sup>, communities located in proximity to areas of higher biodiversity or habitat for endangered or CEPF priority species were targeted for further, more in-depth analysis during the assessment. The goal of this was to see how much local livelihoods depended on these resources of local and sometimes global conservation significance.

Being located on the Mekong, which has one of the highest diversity of fish species in the world, fish conservation is certainly one of the priorities of this project as a whole. As the most important species, two CEPF priority species of *Probarbus* (*Probarbus jullieni* and *Probarbus labeamajor*) were identified. Though the survey found important new reproductive grounds for the species, interviews with fishermen confirmed that species of *Probarbus* were in decline in this study area just as they were in the rest of their range.

While all 14 villages targeted for a more thorough livelihood analysis listed fish as one of their most important resources and income sources, only 10 directly mentioned the presence of *Probarbus*, with interviewees making similar statements to those in the biodiversity survey (see footnote 1) that the population was declining. While the population and yearly catch of *Probarbus* in the area remains unknown, the qualitative data gathered can be used to direct future action on conservation of species and for declining fish stocks in general.

Reptile hunting/collecting was identified as an important activity in six villages. The livelihood survey did not focus on individual species due to time constraints and because the biodiversity survey had already documented captive specimens or remains of specific species at several sites. The harvesting of CEPF priority species, such as the Asiatic soft-shell turtle (*Amydactylus*), and the Impressed Tortoise (*Manouria impressa*) as well as other species such as the Keeled box turtle (*Cuoramouhotii*) were documented during the biodiversity survey. Future projects targeting areas with known habitat and reliance on reptile harvesting for income will guide future CEPF conservation projects.

Bird hunting was said to be important for 6 out of the 13 villages. During the biodiversity survey, it was determined that the study area did not hold much in the way of CEPF priority species, so it can be assumed that the species being harvested in these communities are not of global conservation significance. Local names for different bird species tend to differ between communities, so getting clear data at species-level was difficult during the livelihood survey. Whether or not CEPF priority species are especially vulnerable does not change the fact that bird populations certainly appear to be lower in the study area and are in general decline; most likely due to the human-caused threats of hunting, habitat destruction, and nest predation by domestic animals.

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<sup>1</sup> IUCN (2013): Ecological surveys of the Mekong between Louangphabang and Vientiane cities, 2011-2012.



Crabs were listed as important resources by two communities. Unfortunately, despite the insistence of the communities that it was an important resource and in need of the management of projects, specimens were unable to be obtained by the livelihood assessment team and therefore species' names and what their conservation significance would be are hard to determine at this point. Future teams will attempt to answer these questions and discuss management projects with local communities.

Several other species or resources such as the locally called "Por Sa" (mulberry), mushrooms, riverweed, insects, amphibians, and gold mining were mentioned as important resources for local livelihoods. None of these species are of particular conservation concern, so they will not be the focus of future biodiversity conservation projects. However, the promotion of the sustainable harvest of these resources as income replacement for activities harmful to biodiversity makes this information potentially valuable for future CEPF projects.

The challenges for conservation that villagers have identified refer mainly to the open access regimes that until now are common regarding most resources. This means that any future conservation efforts have to take into account that users of more than one village, often located in different districts, access the sites where harvesting is practiced. This is especially a problem for fish conservation, since fishermen from Thailand and Lao access the same sites, while the demand for popular but threatened species such as *Probarbus jullieni* is steadily increasing. Another challenge to future conservation action is the fact that parts of the agricultural area of many villages will be flooded due to dam construction, which will increase agricultural pressures on uphill secondary forests.

Regarding future fish availability, the villagers came up with the surprising perception that higher water levels would increase fish stock; although we know that interruption of migration routes, changed ozone levels in the water or siltation patterns may more likely decrease fish stock and fish biodiversity as a whole.

Apart from animal-raising, tourism development is perceived as one of the biggest opportunities and there indeed exist a large number of attractive potential tourism sites of natural beauty and cultural heritage such as caves, islands, waterfalls, temples and other religious sites. Also animal watching, home stays and guided tours covering the interesting local history could be offered. But there are currently no tour operators working in the area and it would take a lot of time and investment to potentially establish something like Mekong Ecotourism River cruises that local populations could benefit from.

The discussion on conservation and alternative livelihood opportunities could not be concluded following that survey. Special workshops were conducted to find out more details leading to future management and action plans. The workshop results will be published in three separate reports in September 2013<sup>2</sup>. Overall, it can be concluded that although the ongoing mainstream development trends in the region do not favour biodiversity

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<sup>2</sup> Leslie, S. (2013): Workshop report on Project Development for Biodiversity Conservation and Livelihood Improvement, Vientiane, Lao PDR (work document).

Leslie, S. (2013): From Plans to Action: Workshop report on Improving Livelihoods and Conserving Biodiversity along the Mekong in Vientiane, Xaiyaboury, and Louangphabang Provinces. Workshop Report, Vientiane, Lao PDR (work document).

Ounmany, S. (2013): Workshop report on drafting village regulations on crab, *Probarbus jullieni*, Reptile and Amphibians, Tadjao spirit forest and Don Hon conservation, Vientiane, Lao PDR (work document).

conservation, small windows of opportunity could be identified to slow down the process of biodiversity loss.

## 2. Introduction

The project “Conserving Biodiversity and Sustaining Livelihoods along the Mekong River in Louangphabang, Xaignabouli and Vientiane Provinces, Lao PDR” is supported by the Critical Ecosystem Partnership Facility (CEPF) under its Indo-Burma Biodiversity Hotspot focus. The project duration is five years, with CEPF funding for the initial two years, from March 2011 to mid-2013. IUCN Lao PDR is implementing this project in collaboration with relevant government agencies and natural resource management and research institutions, with a particular emphasis on the provincial and district-level agencies in the targeted project areas of Vientiane Capital, Vientiane, Xaignabouli and Louangphabang Province.

Furthermore, the Faculty of Forestry was a technical partner during phase 1 and phase 2 of the project. The project has a strong survey focus complemented by conservation action planning with local communities and authorities for the conservation of biodiversity along this stretch of the Mekong River towards enhancing biodiversity resource management and sustaining local livelihoods. By undertaking an integrated landscape approach for specific CEPF Priority Species, it is thought that community resources will be secure and this will strengthen governance capacity for river management. More importantly, the project will utilize proven approaches for water and wetland management in Lao PDR, which are supported by the government and communities, such as co-management of local fisheries. It will also initiate a number of ‘firsts’ for the study area, including nest protection programmes and a vertebrate monitoring program along the Mekong. As such, it will provide new lessons and models to benefit the management of freshwater resources elsewhere in the Mekong Basin.



Landscape of Mekong River

The project has **three phases** which are designed to focus efforts on sites and management issues of the highest priority. The first two phases - Phases 1 and 2 - will be entirely conducted within the CEPF project and are the focus of most requested CEPF funds. Phase 3 will begin in mid-2012 and continue for at least 3.5 years (till the end of 2015). There will

be a period of about a one-year overlap between the start of Phase 3 (July 2012) and the closure of CEPF funds (August 2013).

The focus of **Phase 1** is on surveys of birds, large mammals, fish, amphibians, reptiles, aquatic invertebrates and flora. Surveys were led by specialists and comprised of two site visits. The survey team consisted of up to five specialists, each accompanied by at least one government counterpart, a Lao science student and a local guide.

IUCN's partner organizations were the Faculty of Sciences of the National University of Laos, the Living Aquatic Resources Research Centre (LARReC), the Lao Biodiversity Association (LBA) and international experts including staff from the University of North Carolina (USA) and the University of Chiang Mai (Thailand).

Surveys were conducted by boat and focused on CEPF Priority Species and species/assemblages of regional significance. Surveys comprised of rapid field assessments followed by more intensive survey efforts in sites of high conservation value. Outputs of Phase 1 were:

- A report describing status, distribution and abundance of target species, threats to biodiversity, recommendations, and a preliminary monitoring methodology for priority taxa.
- Clarification of whether the boundaries of the existing Important Bird Area (IBA) should be extended.
- Local agencies received field training in survey techniques.
- Survey results were disseminated to relevant agencies and incorporated into regional databases and development planning. Results will be published in scientific journals.

**Phase 2** deals with engaging local communities and provincial and district government agencies of the concerned provinces and districts in planning conservation actions conducive to conservation and protection of the biodiversity of this stretch along the Mekong River in support of enhancing sustainable local livelihoods. During phase 2 Fishbio supported the project as an additional technical partner.

The objectives of this phase are to (a) document use of community resources and other social/economic data critical for guiding development of conservation actions, (b) create a strong framework of community support for the project, to achieve participation of local communities at the outset of the project and strengthen their role in Phase 3 (implementing conservation actions). Activities include literature desktop review, rapid field assessments, selection of a subset of villages to work with, participatory village workshops, and the formation of local management groups. Local government agencies are involved throughout the process. Outputs of this phase are:

- A report of location and population size of permanent settlements in the study area, communities closest to sites of high biodiversity value, and results of community workshops.
- Priorities for natural resource management based on local knowledge are identified.
- Workshop findings are disseminated to relevant agencies (such as MAF, PAFO, DAFO, MONRE, PONRE, DONRE, RBCs, Lao Women's Union, Lao Youth Union and forestry inspection office etc.)

**Phase 3** (carried out between year 2 to 5), will implement conservation actions to address the threats and management priorities documented in Phases 1 and 2. This is the longest phase of the project (3.5 years). The first 9 months overlap of phases 2 and 3 will be an

important period to consolidate the successes of Phase 1 and 2, and begin the planning and implementation of Phase 3.

This report summarizes the main findings of phase two.

### **3. Objective of the study**

It is the first time in Lao PDR that a detailed livelihood assessment for the river stretch between Louangphabang and Vientiane was conducted. This is an interesting fact, given the importance of the Mekong as a transboundary resource and given the recent development trends along that stretch; particularly hydropower and other infrastructure development as well as agricultural expansion. For the CEPF project, this meant that except from some general poverty-related data at district-level, no livelihood information was available with regard to resource use. Also scientific data in that area is lacking and original data gathering was thus required. The objectives of the study were to find out:

- To what extent local people depend on which natural resources?
- What are the historical and recent changes regarding the value chains of those resources?
- Which of those resources are amongst endangered species?
- What past and current management efforts did and do exist and how successful were/are they regarding these species?
- Are people willing to better protect endangered species in case income/subsistence alternatives are provided?
- What are the target groups' perceptions on the probability of the success of future conservation efforts, given the current local pressures and ongoing mainstream development (such as hydropower)?

Most questions were answered through the survey. Questions about past, recent and future conservation management required extra attention. IUCN conducted community workshops with the villagers. With the perspective to establish conservation activities, the results of these workshops are documented in three separate reports (see footnote 2).

## **4. Methodology**

### **4.1 Survey design and data collection**

The survey is comprised of three parts complementing each other:

1) A rapid assessment focusing on settlement and population dynamics as well as resource use in 97 villages (see maps in Annexes 4-11) between Louangphabang and Vientiane (both not included as target settlements) (see questionnaire in Annex 1).

2) Group discussions with local decision makers and stakeholders in 14 potential target villages involved in target resources management (see questionnaire in Annex 3).

3) Household interviews in the same 14 villages on the same issues to cross-check the data obtained from the other two parts of the survey (see questionnaire in Annex 2).

The survey team consisted of a livelihood expert, a biodiversity expert, two students, a government official of the respective district, and a member of the Lao biodiversity association. Two survey trips were conducted. During the first travel of 15 days by boat, 97 villages were covered, with 5-7 covered per day. The survey team conducted the trip by boat and was mostly split into two groups so as to be able to cover the large number of villages.



Interviews with local decision makers on settlement history and dynamics as well as on livelihood resources, including important wild species, were conducted.

The second trip was conducted by car with occasional boat rides to remote villages and was dedicated to group discussions and household interviews with local decision makers and user group members. In each village, 1-2 group discussions involving between 1-7 people (male and female) were conducted. After this was completed, 2-6 interviews were conducted in those households (including male and female interviewees), that are involved in harvesting of the respective focus resource(s) of the village. Although we had aimed to focus on one resource of high conservation value per village, information was gathered for up to three focus resources per village. This step was necessary, since results from the village survey indicated that there is more than one focus resource with high conservation value which contributes significantly to local incomes in many of the potential target villages.

In addition, we aimed at gaining deeper insights on how locally important high conservation value resources contribute as a whole to local incomes in order to be able to analyze what amounts of money and contributions to local food consumption would need to be compensated for when introducing sustainable harvesting of high conservation value resources through biodiversity management plans.

In addition, many management options such as forest conservation through land use planning benefits the conservation of various resources. The table below shows potential target villages, the initial resources we were looking at and the additional high conservation value resources data was gathered on. The villages were selected due to the fact that both the biodiversity surveys as well as the livelihood survey indicated that species of high conservation value occur there and are harvested as a livelihood resource and also that village decision makers showed a positive attitude towards future conservation measures.

As stated above, the latter finding was subject to a further series of local conservation workshops to find out if commitment to conservation was really the case.

**Table 1: Names and locations of potential target villages and their main resources of high conservation value (see map in Annex 12)**

<b>Village</b>	<b>Province</b>	<b>District</b>	<b>High conservation value resource</b>
Ban Ou	Louangphabang	Louangphabang	Crabs
Ban Paksi	Louangphabang	Louangphabang	Crabs
Ban Pak Neun	Louangphabang	Nan	Various forest wildlife species, reptiles
Ban Thadeua	Xaignabouli	Xaignabouli	Various forest wildlife species, forest
Ban Houaykhoulouang	Xaignabouli	Xaignabouli	Fish species, reptiles
Ban Khokfak	Xaignabouli	Xaignabouli	Fish species
Ban Nongkhai	Xaignabouli	Paklay	Various wildlife species at Don Hon Island
Ban Donxaingam	Vientiane	Met	Various wildlife species Don Hon Island
Ban Phaliap	Xaignabouli	Paklay	Various forest wildlife species
Ban Houaylay-noy	Xaignabouli	Paklay	Various forest wildlife species
Ban Don Men	Xaignabouli	Kenthao	Fish species, turtles, birds
Ban Houayla	Xaignabouli	Kenthao	Fish species, turtles, birds
Ban Phalat	Vientiane	Sanakham	Fish species, birds

Village	Province	District	High conservation value resource
Ban Donkangkhong	Vientiane	Sangthong	Birds

Source: IUCN/CEPF livelihood village survey (2012)

As mentioned, the different survey elements did not aim to give a detailed poverty analysis of the target villages. Thus poverty issues such as wealth rankings, total household income, and social capital of households or poverty in regard to Millennium Development Goal (MDG) targets such as gender equality, education and health were not covered. The limited time was rather used to get as much information as possible regarding resources use, income contributions and management options.

The semi-standardized questionnaires contained mainly closed questions. This approach was chosen to allow easier data entry and analysis. The open questions asked were later merged into so-called variables with according value labels in the data entry and analysis software “Statistical Package for the Social Sciences” (SPSS). If for example the question is “Do you practice fishing”, then the variable would be “Practice fishing” and the value labels would be “Yes” and “No”. If a question on main income sources is asked, the pre-given value labels could be “1” for rice, “2” for domestic animals, “3” for fish and so on. Since the survey team had no time to pre-test questionnaires, additional variables were required to match information given by the villagers. This was most often the case regarding the occurrence of wildlife or Non timber Forest Products (NTFPs) we had not thought of according to the results of the biodiversity surveys. Examples include sweet vegetables, elephants and black bears.



Survey Boat



Group discussion

The interviews were conducted for a period ranging between half to one and a half hours. Generally, the villagers were very open to the research initiative. Although district officials accompanied the survey team, we did not have the impression that there was much bias in the information gathered. First of all, the use of the resources we asked for is in most cases not considered as critical by villagers, even if official restrictions (e.g., on fishing) might exist but are not enforced. Further, we left out critical issues, such as illegal logging, since those issues can only be covered by a more qualitative approach which will be adopted during the management workshops. In addition to the information we asked for in our questionnaires, we received a lot of interesting information on issues such as resettlement in connection to the Xaignabouli Dam. From the beginning of our survey, we made it clear that the project

aims at biodiversity conservation and needs information about these major development trends only to figure out if the future management options to be identified with the villagers might be effective or not with regards to major development trends.

In some cases, the district officials did not only ensure access to the local stakeholders by explaining the aim of the project, but also took an active role during the interviews and were in many ways trained in hands-on participatory data collection to a certain extent. This will allow their future involvement in participatory management workshops as a preparation of the third phase and facilitate their role in supervising future management actions and contracts between the CEPF project and the villagers.

## 4.2 Data analysis

After entering the data into SPSS, the results were compared amongst each other and also with the additional qualitative information we gathered during the two survey phases. The data was then processed into tables, graphs and figures, and is hereby interpreted in this report. It needs to be mentioned that the data from the village survey is statistically representative for the settlement along the whole stretch between Louangphabang and Vientiane, since 95% of the villages were covered. The data from the group discussions and household interviews cannot claim representativeness since the group discussions were designed as a qualitative research step and for the household surveys; the sample size was too small. However the triangulation of results and comparison with additional data from literature, the biodiversity surveys, and future management workshops draws quite a holistic picture of the importance of wildlife and other wild species for local livelihoods.

## 5. Settlement and population dynamics

Since demography and associated human settlements are the major drivers of pressure on natural resources and land use change, the survey started with analyzing historical settlements and population dynamics. The oldest village's foundation dates back to around 1312 and the study area has experienced a steady growth in terms of the number of settlements during all the settlement periods until now, as shown in the following table and the maps in Annexes 14-19.

**Table 2: Village Foundations 1300 - 2012**

Settlement period	1300 – 1700	1701 – 1800	1801 – 1900	1901 – 1945	1946 - 1975	1975 – 2012
Number of villages founded	16	22	25	7	5	22
Total number of villages	16	38	63	70	75	97

Source: IUCN/ CEPF livelihood village survey (2012)

Most of the villages reported an abundance of agricultural land and natural resources, mainly fish and wildlife, as the main reason for settlement. Regarding historical settlement, additional political-administrative reasons for settlement peaks around 1712 (11 villages founded) and 1812 (10 villages founded) might have occurred, but were not reported by older villagers and other local decision makers. Since the Indochina war, these types of reasons for settlement became more important. As an example, one village was established as a leper colony by the French in 1945, which was kept as such after 1975 under the rule of Pathet Lao. , No new patients were sent to the village until the early 1990s, yet the village

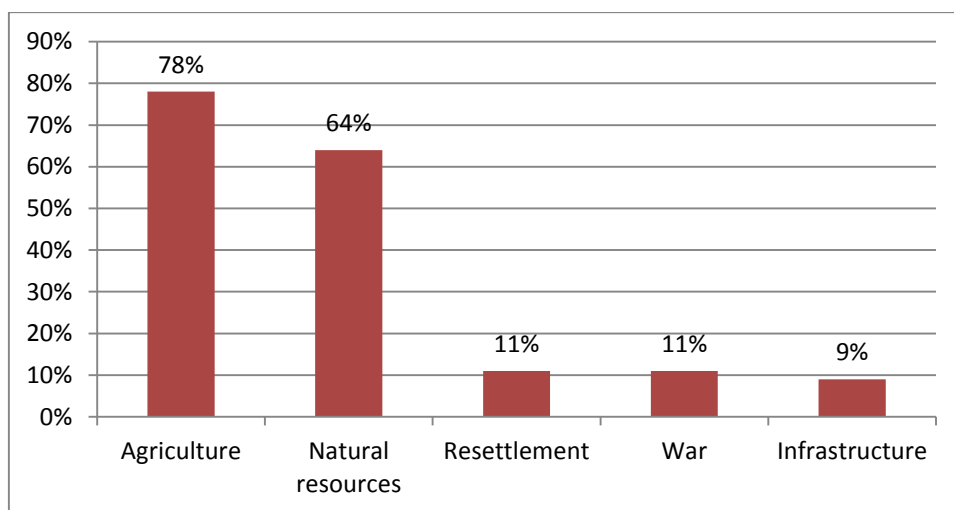
still exist today. The resettlement and regrouping of villages into clusters led by the government became much more important. This is still going on today due to infrastructure development along the Mekong; such as road access, electricity, the Xaignabouli Dam and other dams (see maps in Annexes 26-31) .



Xaignabouli Dam

The lack of electricity, road infrastructure and other socio-economic infrastructure is a strong incentive to abandon remote villages. The migration from these more isolated locations is not always enforced by the state as it also occurs voluntarily according to information gained from villagers. However, in most cases, such as with migration associated with the building of the Xaignabouli Dam, the out-migration is led by the government, which claims to provide support to migrants in terms of land and socioeconomic infrastructure in the new settlement areas.

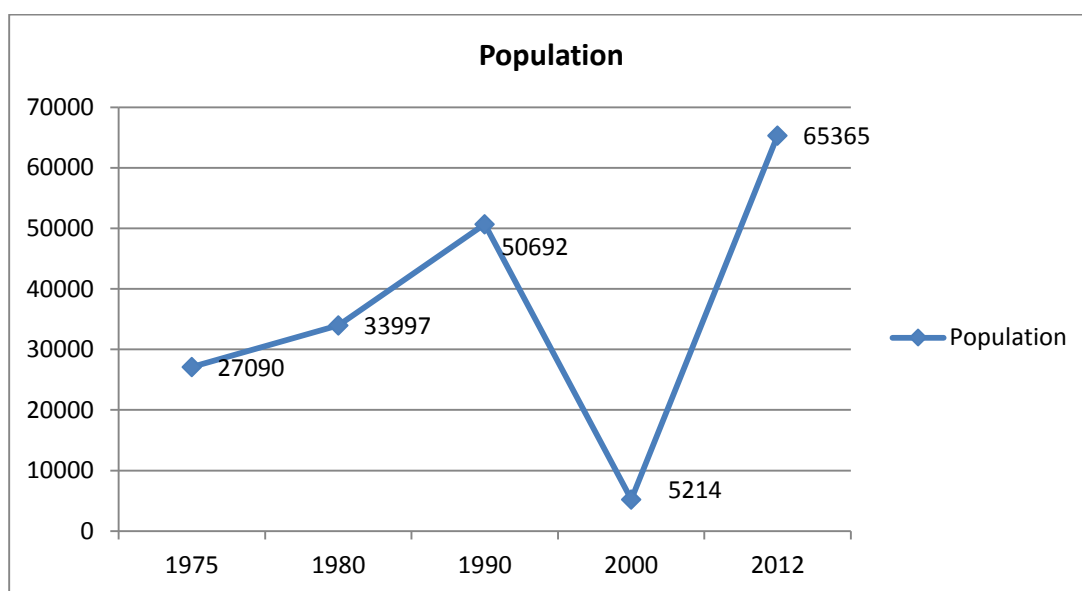
**Graph 1: Major settlement reasons**



Source: IUCN/CEPF livelihood village survey (2012)

Along with the increasing number of villages in the study area, a major population increase has occurred. If we take into account that a total number of around 10 villages have been removed to outside the study area<sup>3</sup>, a population increase of almost 250% since 1975 is still impressive (see maps in Annexes 14-19). Chief reasons for this large population increase were the resettlement of Khmu villages from mountainous areas to the study region and natural population growth. The results indicate that 11 out of 21 villages founded after 1975 was established due to relocation. All over, 46 out of 89 villages have received state-led or forced migration of Khmu populations. Future resettlement will occur in 13 cases (see maps in Annexes 26-31), 8 of which are due to dam construction, while the rest are due to the government policy of establishing village clusters to enable easier access to state services and infrastructure.

**Graph 2: Population trend in the study area between 1975 and 2012**



Source: IUCN/CEPF livelihood village survey (2012)

The distribution of ethnic groups amongst the population in the study area<sup>4</sup> is shown in table 3 and the ethnic group majorities per village are shown in maps contained in Annexes 20-25.

**Table 3: Populations size per ethnic group in the study area**

Ethnic Group	Lao Loum	Khmu	Hmong	Other <sup>5</sup>
Population size 2012	56,370	8,509	194	43

Source: IUCN/CEPF livelihood village survey (2012)

Although the vast majority of the population are Lao Loum and significant differences regarding the use of rare species and wildlife were not identified during the village survey, special attention needs to be given to Khmu and the few Hmong populations when

<sup>3</sup> The study focused on the Mekong mainstream and natural habitats within this mainstream or adjacent to it. In some specific cases the study area has been extended to up to 2 km from the mainstream itself, because of major natural features which justified further assessments (e.g. main tributaries of the Mekong, well preserved forests or wetlands).

<sup>44</sup> These figures do not include the towns of Louangphabang, Pak Lai and Vientiane.

<sup>5</sup> "Other" was identified as Chinese and Vietnamese traders, not any other members of Lao ethnic groups.

respecting social and ecological safeguards while designing alternative income opportunities serving conservation purposes for the following reasons:

1. The quantitative survey is not the right approach to identify differences regarding resource use. Other in-depth livelihood studies point to the fact that differences do exist, for example that Khmu traditionally practice more hunting and less fishing<sup>6</sup>.

2. Also these studies revealed that the adaptation of livelihood patterns to the resource availability of the host region (e.g., after resettlement) led to the newcomers being less aware of traditional resource management practices, such as controlled NTFP harvesting, which could lead to a more depleting resource use pattern as compared to that practiced by the host ethnic group.

3. The resettled communities often face land scarcity or lack of other livelihood options which put additional pressure on other natural resources.

**Table 4: Wild species and utilization trends**

Resource (and use type)	Consumption (%)	Only Sales (%)	Consumption and sales (%)	Existing but not utilized (%)	Disappeared or heavy depletion (%)	Missing values (%)
1.Land (rice cultivation)	21.6	0	78.4	0	0	0
2. Land (tree plantations)						
3. Land (other cash crops)	0	70.1	29.9	0	0	0
4. Domestic animals	2.1	0	88.7	0	1	8.2
5. Birds	61.9	2.1	26.8	8.2	1	0
6. Bird eggs/nests	38.5	0	2.1	14.6	44.8	0
7. Deers	7.2	0	3.1	17.5	44.3	27.8
8. Monkeys	28.9	1	8.2	29.9	30.9	1
9. Wild pigs	18.6	0	51.5	9.3	10.3	10.3
10. Black Bears	3.1	0	2.1	19.6	5.2	70.1
11. Porcupines	8.2	0	13.4	2.1	0	76.3
12. Muntjacdeers	15.2	0	19.6	10.3	6.2	48.5
13. Pangolins	1	18.6	17.5	2.1	4.1	56.7
14. Civets	8.2	0	14.4	5.2	27.8	72.2
15. Elephants	0	0	0	9.3	0	90.7
16. Serows	7.2	0	1.0	8.2	1.0	82.5
17. Mice and rats	48.5	0	50.5	1	0	0
18. Squirrels	46.4	0	38.1	7.2	8.2	0
19. Bats	45.4	1	28.9	5.2	19.6	0
20. Otters	1	2.1	0	17.5	79.4	0
21. Turtles (Mekong)	1	0	1	0	24.7	73.2
22. Turtle eggs (Mekong)	0	0	0	0	26.8	73.2

<sup>6</sup>Chamberlain, James R.; National Statistics Centre Asian Development Bank; editors (2007): Participatory Poverty Assessment II: Lao People's Democratic Republic. Vientiane.



Resource (and use type)	Consumption (%)	Only Sales (%)	Consumption and sales (%)	Existing but not utilized (%)	Disappeared or heavy depletion (%)	Missing values (%)
23. Soft shell turtle (Mekong and bigger tributaries)	30.9	3.1	37.1	6.2	19.6	3.1
24. Soft shell turtle eggs (Mekong and bigger tributaries)	9.3	0	0	0	87.6	3.1
25. Turtles (tributaries)	33.0	0	37.1	4.1	24.7	1
26. Turtle eggs (tributaries)	10.3	1	1	1	85.6	1
27. Varanids and large lizards	24.7	0	70.1	2.1	3.1	0
28. Varanids and large lizard eggs	24.7	1	9.3	2.1	61.9	1
29. Snakes	48.5	1	47.4	2.1	1	0
30. Snake eggs	21.6	0	1	10.3	67	0
31. Geckos	10.3	35.1	15.5	39.2	0	0
32. Amphibians	17.5	0	81.4	1	0	0
33. Fish (general <sup>7</sup> )	3.1	0	96.9	0	0	0
34. Fish (Probarbus jullieni)	11.3	0	52.6	6.2	28.9	1
35. Aquatic insects	76.3	0	21.6	0	2.1	0
36. Snails and mussels	66	1	27.8	0	5.2	0
37. Shrimps	47.4	0	51.5	0	1	0
38. Crabs	41.2	0	58,8	0	0	0
39. Large trees natural	33	0	56.7	1	8.2	1
40. Plantation trees	2.1	5.2	83.5	1	0	0
41. Shoots	44.3	0	54.6	0	1	0
42. Mushrooms	25.8	0	72.2	2.1	0	0
43. Tubers	42.3	2.1	55.7	0	0	0
44. Worms	50.5	0	29.9	6.2	13.4	0
45. Insects	40.2	0	54.6	2.1	3.1	0
46. Aquatic plants	47.4	0	46.4	2.1	3.1	1
47. Riparian Plants	64.9	1	30.9	0	2.1	1
48. Paper mulberry	2.1	53.6	3.1	2.1	0	39.2
49. Broom tree	8.2	12.4	24.7	1	0	53.6
50. Gold mining	0	8.2	0	0	0	91.8

Source: IUCN/CEPF livelihood village survey (2012)

The most notable result of this table is that almost every edible species of wild animal or plant are consumed and traded by the local population. As a consequence, the resource pressure, indicated in the last and the second to the last column, is very high. The high percentages in the last column were due to the open question “which other species do you use”. This means that where high percentages of missing values<sup>8</sup> occur, it indicates that the

<sup>7</sup> This refers to all available fish species except from Probarbus.

<sup>8</sup> Missing value means that no answer was given.

respective species/resource use disappeared from this location already or is heavily depleted (or the use of non-wild species as resources is not practiced, as with number 48 Paper mulberry above). High resource pressure is also indicated by the very rare cases of answers under the category “existing, but not utilized”. Only very few species receive percentages of more than 10%, such as otters. Bad smell and taste was reported as a reason for not consuming this species. For some of the other high rankers under this category, such as black bear (10) or monkey (8), the answers given might be due to existing government hunting restrictions and as such do not actually reflect the reality. Also it remains unclear if the habitats of these species really are located within the study area or rather outside it; with species regularly migrating inside the study area and if the local observations made might be of a rather historical nature.



Dead monkey

Overall, the results confirm and to a certain extent modify the findings of the biodiversity surveys. If we again merge the results given under “disappeared or heavy depletion” with “missing values”, then we come to the conclusion that the following species are under high pressure or have disappeared in most locations with added percentage rates of the second to the last and the last column of around 20% and more: Deers (7), Monkeys (8), Wild pigs (9), Black bears (10), Porcupines (11), Munjacdeers (12), Pangolins (13), Civets (14), Elephants (15), Serows (16), Bats (19) Mekong Turtles (21), Fish turtles (23) and *Probarbus jullieni* fish (34). If we additionally take into account the occurrence of eggs of other species, which would indicate a healthy population, then also birds (6 for bird eggs), varanids (28 for eggs), large lizards (28 for eggs) and snake species (30 for eggs) can be considered as being under high pressure from consumption and sale.

Abundance of species according to the results of the livelihood survey can only be reported for mice and rats (17), squirrels (18), geckos (31), amphibians (32), fish “general” (33) (see footnote 7) , aquatic insects (35), snails and mussels (36), shrimps (37), crabs (38, not including “big” Mekong river crab<sup>9</sup> which is under heavy depletion or has disappeared almost everywhere), shoots (41), mushrooms (42), tubers (43), worms (44), insects (45), aquatic plants (46) and riparian plants (47). Regarding the latter two species, it can be expected that

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<sup>9</sup> The survey team was unfortunately not able to identify the species, which was described by the villagers as the “big Mekong crab”.



changing water levels due to dam building will influence resource abundance negatively. The future effects of dam building on fish population remain unclear. It has been documented that dams have negative effects on migration by blocking the migration path for many species and changing the seasonal flow of the river, which is often the trigger for migration/spawning. They can also have a direct impact on spawning for some species by increasing siltation in spawning grounds upstream and downstream of the dam. Changes in water temperature can be expected also, with an average annual water temperature around the dam increasing and then causing a decrease in oxygen level. It can also contribute directly to water quality degradation in the reservoir and immediately downstream. Nevertheless, some villagers themselves expect higher water levels from the dam and thus an increase in fish population.

The importance of wild species and NTFPs for overall village domestic consumption and incomes was, with the exception of fish, not sufficiently reflected during the village survey.

**Table 5: Most important resource uses**

<b>Ranking importance</b>	<b>1 (%)</b>	<b>2 (%)</b>	<b>3 (%)</b>	<b>4 (%)</b>	<b>5 (%)</b>
<b>Resource</b>					
<b>Land (rice)</b>	68	25.8	1	3.1	0
<b>Land (cash crops)</b>	30	56.7	7.2	2.1	2.1
<b>Land (tree plant)</b>	0	1	2	13.4	17.5
<b>Fish</b>	1	7.2	15.5	48.5	11.3
<b>Domestic animals</b>	1	7.2	62.9	10.3	5.2
<b>Gold mining</b>	1	1	2.1	1	1
<b>Shoots</b>	0	0	0	1	1
<b>Trees secondary forest</b>	0	0	0	7.2	9.3
<b>Mushrooms</b>	0	0	0	1	3.1
<b>Insects</b>	0	0	0	0	0
<b>Aquatic plants</b>	0	0	0	0	5.2
<b>Other resource uses</b>	0	0	9.3	12.4	44.3

Source: IUCN/CEPF livelihood village survey (2012)

However, the appearance of mushrooms, shoots, aquatic plants and insects in the ranking shown in table 5 lead to the conclusion for a need to go into further detail on this issue during household interviews and group discussions. Also notable is the fact that local extractive industries such as gold mining (in 9 villages) play an important role for local incomes.

An analysis featuring trends and pressures regarding major resource uses revealed the following results:

**Table 6: Trends regarding resource use**

<b>Resource use</b>	<b>Increasing trend (%)</b>	<b>Stable (%)</b>	<b>Decreasing trend (%)</b>
Land (rice)	58	4.3	37.7
Land (cash crops)	87.2	0	12.8
Land (tree plantations)	70.3	22.2	7.4
Domestic animals	61.9	9.5	28.7
Fish	72.2	11.4	13.4

Source: IUCN/CEPF livelihood village survey (2012)

58% of the answers indicated more rice production was due to the following reasons: expansion of upland rice fields (out of the 58%, 22.1% were reported as due to government extension programs, 3.1% due to organic fertilizer, 3.1% due to new seed varieties, 3.1%<sup>10</sup> due to lowland rice field expansion, 7.2% due to better climatic conditions, 4.2% due to “reason for increase not further specified” and 10.5 % due to better market access and prices). The expansion of upland rice farming especially causes severe resource use conflicts regarding biodiversity conservation. The expansion of these upland rice fields occurs mainly on areas of secondary forests which are important wild species habitats.



Upland farming

As reasons for the decreasing trend of 37.7% regarding rice production, the following was mentioned: unfavourable climatic conditions 18.9%, rodents/wild pigs 2.1%, disease 1.1%, lack of/unsuitable land 14.7%, reason not further specified 1.1%. The high percentage of answers given under category “lack of/ unsuitable land” shows clearly the limits of further expansion of rice fields. Especially in resettled villages or those with a high percentage of migrants having been settled there, the lack of land or the availability of only unsuitable land is an important limiting factor of rice production. The partial flooding of rice fields and other agricultural production areas due to dam construction might further lead to conversion of secondary forests into upland rice fields in future. Lands not used for rice or being only extensively used are also increasingly converted to intensively agricultural areas as the results for cash crops and plantations show. Good market prices for cash crops/trees such as teak and vegetables were mainly reported as reasons for an increasing cash crop and tree plantation production. While this refers mainly to villages with quite good road access; a massive increase in Job’s Tear production was observed overall in the study area. This crop is grown by contract farmers providing Job’s Tear to Chinese companies and replaces rice to a certain extent although it is not locally consumed. Some villages reported that they sustain themselves with rice from the income gained through production of Job’s Tear. Since Job’s Tear requires complete clearance of land, this type of land use puts heavy stresses on

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<sup>10</sup> Group discussions held later on during the survey phase revealed that new seed varieties and organic fertilizers were mostly introduced by government extension programs.

remaining close-to-natural habitats, such as secondary forests or gallery forests nearby tributary streams.

Although domestic animal-raising - including cattle, ducks, chickens, rabbits and goats - shows an increasing trend, the major reasons for a decreased trend which are the lack of grasslands (16.7%) and disease (6%) also indicate the limits of this most promising alternative income source to be developed with regard to biodiversity management.

The trend of increased fish catch with 72.2% is alarming since it is the most important wild resource in the whole study area, both for consumption and income. Furthermore, the effects of dam building could be severe especially for migrating fish species. Reasons leading to decreased fish catch or general overexploitation involves rising population and new fishing technologies including the use of poison, electricity and new nets. Villagers often identified these new technologies as the main problem and often overlooked what the realities of their communities' population growth would mean for resource availability in the long term. The results regarding other wild species and NTFPs from the village survey did not show any realistic results. This issue was analyzed in-depth during household surveys and group discussions at target village level.

Further, the villagers were asked to identify their involvement in the management of forests, fishing, hunting and NTFP harvesting in order to identify successful past conservation management programmes, if any of these are still ongoing or to see what did not work out. The nature of management practices either locally organized or in co-management between local government authorities and/or donor-led projects, was also included in the questions.

**Table 7: Resource management practices in the target area**

Type of management Resource (use)	Not existing (%)	Village (%)	Government (%)	Co-management (%)
Village conservation area	9.3	81.4	0	9.3
Spirit forest <sup>11</sup>	10.3	76.3	0	13.4
Sacred river section <sup>12</sup>	76.3	22.7	0	1
Controlled logging	6.2	35.1	1	57.7
Controlled hunting	14.4	48.5	3.1	34.0
Controlled NTFP harvesting	63.5	30.2	0	6.3
Controlled fishing	12.4	70.1	2.1	15.5
Tourist attraction	52.1	46.9	0	1

Source: IUCN/CEPF livelihood village survey (2012)

A scarcity of resource management projects funded by donors, international NGOs, or local NGOs was reported by the villagers. Except for a few failed fish protection projects, and government-led initiatives, this area has not received much by way of outside support for resource management planning. The team was also surprised at the lack of government-led efforts to manage fish, as this is such an important livelihood asset. Both of these findings provide a clean slate for future management efforts through the IUCN/CEPF partnership but also equally reflect the difficulty that future management efforts will face. The same holds true for NTFP management which is barely practiced in any site. Open access resource use

<sup>11</sup> It is believed that spirits live in big trees to protect the village from bad spirits. If those are to be cut, people might die. In some areas, spirit forests are also used as a cemetery.

<sup>12</sup> Sacred river sections are the locations, usually deep pools, where Nagas (river snakes) are believed to stay. Locals ask for them not to be harmed while fishing there by shouting loudly. In order to keep Nagas friendly, villagers bring gifts to the river bank near the deep pool, usually flowers or sweets.

regimes involving neighbouring villages were mentioned as the main obstacles that past management initiatives had faced and that future conservation plans will have to tackle. In terms of resource use related to forestry, such as controlled logging, forest protection tended to more common but is poorly enforced by the villagers and local authorities.

52% of villages mention potential tourist attractions, mainly the occurrence of caves, waterfalls, patches of remaining dense forest, and islands with important wildlife habitats, including monkeys and elephants as well as spiritual places.

**Table 8: Potential tourism sites in the study area**

Type of tourist attraction	Tourist attraction 1 Occurrence in total numbers	Tourist attraction 2 Occurrence in total numbers
Cave	26	7
Waterfall	17	5
Island	3	1
Forest	2	1
Temple	2	1
Missing Values	47	85

Source: IUCN/CEPF livelihood village survey (2012)

This does not mean that with the exception of a few of the study villages near Louangphabang that these locations are developed for tourism. But as is further described below at village level, some of the potential destinations are very interesting for ecotourism development, which could include wildlife watching, home stays, local cooking practice, hiking and so on. Cultural and political history, from ancient religious sites to sites of interest to the more recent Indochina war are also important resources to be developed as touristic draws along with ecotourism. As an example, many caves were used to hide from armed forces during the long years of the Indochina wars or as refugee camps. A Mekong eco and culture tourism cruises project between Louangphabang and Vientiane would be an alternative income option many villages of the target area would benefit from.



Handicrafts in Ban Ou

The favoured option for tourism development is also reflected in the results of the development priorities of surveyed villages.

**Table 9: Resource Management and Development priorities in the target area**

Management/ development priority	Occurrence (%)
Tourism development	37.1
Protection of forest animals	14.4
Reforestation of natural trees	10.3
Fish protection	8.2
Protection of secondary forest	23.7
Raising of Mekong Fish	2.1
Road infrastructure/ Electricity	1.0
Missing values	3.1

Source: IUCN/CEPF livelihood village survey (2012)

This list gives a first impression of what areas of resource use are considered to be important by the villagers.

## 6. Development trends, resource use and management in potential target villages

As described earlier, 13 villages had been chosen as potential target villages due to the occurrence of Mekong habitat species of high conservation value (see table 1). In each of the villages, the survey team conducted household surveys and group discussions to learn more about current development trends leading to resource pressure, current resource use focusing on species of high conservation value and past and current resource management practices as well as alternative livelihood income sources.

### 6.1 Ban Ou

#### 6.1.1 Settlement history and demography

The village of Ban Ou is located in Louangphabang Province, Louangphabang District. In 2012, the population was 273 people living in 61 households, all being Lao Loum. While the overall population has almost doubled since foundation of the village (natural growth until 1960), the increasing trend from 1960 to 1975 until now is significant. The major reason for the steady recently decreasing population is labor related from out-migration to bigger cities (mainly Louangphabang). However the most recent population trend is stable or slightly increasing.

**Table 10: Population trend in Ban Ou**

Year	1800	1945	1960	1975	1980	1990	2000	2012
Populationsize	150	180	420	380	270	320	260	273

Source: IUCN/CEPF livelihood village survey (2012)

Although parts of the village's agriculture land will be flooded, especially river bank gardens, due to the construction of the XaignabouliDam, the village itself will not be relocated. Individual houses may be relocated, but this number was not known at the time of the survey.

### 6.1.2 Resource use

The most important resources for both consumption and sale are rice, domestic animals, cash crops, fish and aquatic plants, such as river weed. Villagers stated that fish crabs and mushrooms are the most important NTFPs/aquatic species harvested. The major sites for fishing were identified as the Mekong River and the streams Houay Xi, HouayOu and HouayKhai. Crabs are harvested in the same sites and in the rice fields. Mushrooms are mainly collected in nearby mountains such as Phou Phased and PhouPhao. While all households are involved in the harvesting of crabs and mushrooms, 45 practice fishing. Fishing is practiced every day except during the full moon; crabs are collected during the morning and at night throughout the year, while mushrooms are harvested in the months of June, November and March. The following table shows the amount harvested in the whole village per day and the percentage which is sold.

**Table 11: Basic data per main species harvested for Ban Ou**

Resources	Fish	Crab	Mushroom
<b>Kilo per day/household</b>	0.55	0.88	2.22
<b>Sales in percentage</b>	70	90	70
<b>Days of harvesting</b>	365	182	90-182
<b>Price range per kilo (or unit) in KIP</b>	20,000 – 70,000	26,000 – 39,000	15,000 – 52,000
<b>Household income range in million KIP and USD per year</b>	2.8 -12.77 KIP 347 – 1,561 USD	0.12 – 0.77 KIP 15 – 94 USD	2 – 9.5 KIP 244 – 1,162 USD

Sources: IUCN/CEPF livelihood survey (2012), IUCN/CEPF household survey (2012)

All amounts are harvested in the above mentioned sites. While fish is caught throughout the whole year, mushrooms and crabs are collected during seasons of a maximum of half a year. The income ranges per household indicate a very high importance, especially of fish and mushrooms, for livelihood security.

Since *Probarbus jullieni* is the focal resource to be potentially protected at that village, the team asked about the different fish species that are harvested. Further the team asked about the recent price development of this and other fish species.

**Table 12: Fish species and their price evolution in Ban Ou**

Lao name in English	Lao name in Lao	Scientific name	Price 2012 (KIP per kilo)	Price 2007 (KIP per kilo)
Pa Yang	ປາຢາງ	<i>Pangasius species</i>	30,000	25,000
Pa Park	ປາປາກ	<i>Hypsibarbus species</i>	50,000	30,000
Pa Gaeng	ປາແກງ	<i>Cirrhinus molitorella</i>	50,000	40,000
Pa Nai	ປາໃນ	<i>Cyprinus carpio</i>	50,000	40,000
Pa Pia	ປາເປ້ຍ	<i>Labeo chrysophekadion</i>	50,000	40,000
Pa Kae	ປາແຂ້	<i>Bagarius species</i>	60,000	50,000
Pa Od	ປາອອດ	<i>Pangasius species</i>	30,000	25,000
Pa Kod	ປາກົດ	<i>Hemibagrus species</i>	40,000	20,000

Pa Dang Daeng	ປາດັງແດງ	<i>Hemisilurusmekongensis</i>	50,000	30,000
Pa Eun	ປາເອີນ	<i>Probarbus species</i>	50,000	25,000
Pa Sa Ngoua/Nang	ປາສະຈຽວ	<i>Micronemaapogon</i>	70,000	50,000
Pa Keung	ປາເຄິງ	<i>Hemibagruswyckioides</i>	60,000	40,000

Source: IUCN/CEPF group discussion survey (2012), IUCN/CEPF household survey (2012)

Amongst these species, at least one, *Probarbus jullieni* (*Probarbus* sp.) is recorded as endangered on the IUCN Red List of Species. Local populations have been decreasing all over the Mekong mainstream and this is probably the case in the study area as well (confirmed by villagers' interviews during phase 1 of the project).

While the prices have increased for all types of fish, the price of *Probarbus jullieni* has doubled. This fact, together with the high sales rate of *Probarbus jullieni* of almost 100% shows the challenges future fish management efforts will face.

Tables 11 and 12 show the perceptions given during group discussions and household-level interviews regarding the ranking of the most important resources in terms of consumption and income. Fish ranks as the most important resource (apart from agricultural land and domestic animals) due to its high importance for local diets and major contribution to local incomes. Although crabs contribute much less to local incomes than mushrooms, they are ranked as the second most important resource. The reason is again due to the high crab population in rice fields of Ban Ou compared to other villages, and as a consequence their high importance for daily meals such as a flavour and meat in papaya salad, cooked in banana leaves, or processed in the form of crab paste which is also an important local product for income generation. The endangered big crab<sup>13</sup>, living in Mekong tributaries is sold unprocessed at a price of around 1,000 KIP per piece. Overall, the merged data from the three most important NTFPs and aquatic resources confirms other livelihood studies, which highlight the importance of NTFPs, fish, wildlife and other species for local consumption and income.

The ranking of crabs as being more important than mushrooms by the villagers might be due to the survey team's announcement that the village of Ban Ou could be a site for crab conservation. As the table shows, the actual income through mushroom harvesting is much higher than the income obtained from crabs. The prices for fish, crabs and mushrooms have considerably increased during the past 5 years: fish between 25%-100% depending on the species (see table 12), crabs increased by 150% from 2,000 KIP for 3 crabs to 5,000 KIP for 3 crabs, mushroom prices increased by 233% from 15,000 to 50,000 KIP/kilo. The reason for this growth is that there is a higher demand for these resources whilst at the same time a decrease in population/habitat has occurred.

Fish is sold directly to restaurant owners from Louangphabang and to local traders who then sell them primarily to the market in Louangphabang. Crabs and mushrooms are also mainly sold to local traders who sell them to these markets.

<sup>13</sup> The species name for "small crabs" from rice fields or "big crabs from the Mekong" could not be identified.

### **6.1.3 Resource trends/pressure on resources**

Besides a higher demand, the major pressures on fish are new and sometimes illegal fishing practices; such as the use of electricity, small nets and a greater variety of nets which help to catch juvenile fishes.

The highest pressure on the crab population is an increased demand. Crabs which live in rice fields are additionally threatened by the use of herbicides. But the villagers expect an increase of the crab population due to the increase in irrigated rice fields.

The demand for mushrooms has significantly increased, while their habitats have decreased due to slash and burn agriculture that is encroaching on their forest habitat.

Additional pressures on all three resources are due to resource users from the neighboring Ban Pak Si. Access limitations do not exist.

From dam construction, the Ban Ou population expects an increase of fish population due to higher water levels and the flooding of vegetable gardens which could lead to the expansion of upland agriculture fields. Insecurity about the effects on river crabs was expressed by villagers. Although we know that this perception of an increase in fish as an effect of the dam does not reflect what will happen in reality, it is interesting that the populations repeatedly came up with that idea in almost all target villages (see chapters below).

### **6.1.4 Resource management**

Findings from the livelihood survey indicated that villagers are involved in some management of conservation areas, protected areas, the spirit forest, and the control of logging. Co-management between villagers and government authorities is practiced for enforcing the control of fishing and hunting. The sacred section of the river or the control of NTFP harvesting does not exist.

Other past resource management efforts were not mentioned, with the exception of an irrigation project which was perceived as being successful by the villagers.

Interest in future conservation options regarding fish, especially the management of a deep pool called BeungNongSai, was mentioned. The management challenge of this site is free access to the villagers from Ban Ou and Ban Paksi. This needs to be looked into further and discussed amongst both villages as well as district officials before any management plans can be drafted. The free access by residents of these two villages to harvest big river crabs was also mentioned as a challenge at a major harvesting site called HouayOu, where stone crabs are also collected. With respect to crabs from rice fields, the preliminary results regarding management options are ambiguous<sup>14</sup>. In discussions with residents, some expressed an interest in limiting the amount of pesticides used to reduce harm to the crabs, while others expressed concerns that if the crab populations were to expand, so would the crabs burrows which damage the rice fields. Willingness to improve management and protection was expressed for the so-called Phoutao forest, which would have a positive effect on the occurrence of mushrooms that are mainly harvested at this site.

Villagers expressed an interest in tourism development, mushroom cultivation, technical support to further process cotton for the growing local tourism-related handicraft industry and training related to fish and crab raising (e.g., nurseries). Some villagers had heard that these aquaculture projects were being used in Thailand. These development priorities need to be

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<sup>14</sup> Crab species were not identified.



considered when identifying alternative income sources for activities related to the use of primary resources which are threatened.

## 6.2 Ban Pak Si

### 6.2.1 Settlement history and demography

Pak Si village is located in Louangphabang District, Louangphabang Province. The population size in 2012 was 864 people living in 142 households, all Lao Loum. It was founded sometime around 1700. The population from 1960 to 1990 has steadily increased. From 1990 to 2000, the population almost doubled, before a slight decrease took place between 2000 and 2012. Historically most of the increase in population was a result of steady natural growth. The population doubling seen in the last decades was related to migration and then it slightly decreased due to out-migration.

**Table 13: Population trend in Ban Pak Si**

Year	1700	1960	1975	1980	1990	2000	2012
Population size		380	400	515	520	914	864

Sources: IUCN/CEPF livelihood survey, 2012

According to the villagers and local government officials, parts of the agricultural land will be flooded by the construction of the Xaignabouli Dam, which is mainly affecting land for cash crop gardens along the Mekong riverbank.



Riverbank garden

The village itself will not be relocated. The number of households to be relocated, if any, was not known during this survey.

### 6.2.2 Resource use

The five major resources mentioned as important for people living in Ban Pak Si are land for rice, land for cash crops, fish, domestic animals, and land for tree plantations. The most important natural resources mentioned are fish, mushrooms and crabs. Most fishing is done on the main stem of the Mekong River. Mushrooms are primarily collected at Phou Sad. Crabs are harvested at Huay Si and in the rice fields. Hundred households are involved in

fishing, 70 households are involved in collecting mushroom, and all households are involved in harvesting crabs. Fishing is practiced every day; mushrooms are collected four days a week during June and July. Crabs which are found in the rice fields are harvested every day from July to September, while crabs that live in the streams are harvested daily for local consumption or sale, most often between September and December.

**Table 14: Basic data per main species harvested in Ban Pak Si**

Resources	Fish	Crab	Mushroom
Kilo per day/household	10-20	1-2	Not mentioned
Sales in percentage	90-95	50-95	Not mentioned
Days of harvesting	208-260	36-48	210
Price range per kilo (or unit) in KIP	39,000 - 60,000	26,000 – 39,000	Not mentioned
Household income range in million KIP and USD per year	3-6 KIP 373 – 748 USD	0.3 – 0.5 KIP 37 – 87 USD	0.5 KIP 62 USD

Source: IUCN/CEPF group discussion survey (2012), IUCN/CEPF household survey (2012)

All NTFPs/aquatic resources are harvested at the above mentioned sites. The price development of the three major NTFPs and aquatic resources show a similar trend as that in Ban Ou. The same reasons were given to explain the increasing price trend.

**Table 15: Fish, mushroom and crab species and their price evolution in Ban Pak Si**

Lao name in English	Lao name in Lao	Scientific name	Price in 2012 (KIP per kilo)	Price 2007(KIP per kilo)
Pa Yang	ປາຢາງ	<i>Pangasius species</i>	40,000	Not mentioned
Pa Park	ປາປາກ	<i>Hypsibarbus species</i>	40,000	Not mentioned
Pa Nai	ປາໃນ	<i>Cypriuscarpio</i>	40,000	Not mentioned
Pa Pia	ປາເພີຍ	<i>Labeochrysophekadion</i>	40,000	Not mentioned
Pa Eun	ປາເອິນ	<i>Probarbus jullieni</i>	70,000	Not mentioned
Pa Sa Ngoua	ປາສະງົວ	<i>Micronemaapogon</i>	70,000	Not mentioned
Pa Keung	ປາເຄິງ	<i>Hemibagruswyckioides</i>	70,000	Not mentioned
Mushroom	ເັ້ດ	Not known	30,000	20,000
Rice field Crab paste	ນ້ຳປຸງປາ	Not known	30,000 <sup>15</sup>	15,000
Stream crab	ປູຫ້ວຍ	Not known	2,000 <sup>16</sup>	1,000

Source: IUCN/CEPF group discussion survey (2012), IUCN/CEPF household survey (2012)

<sup>15</sup>Price per Ovaltine box.

<sup>16</sup>Price per unit. If not indicated otherwise as “unit” in the according cells of the table all prices refer to a kilo throughout the rest of the report.

The major reason for the price differences over the years in mushrooms and crabs are due to the fact that these products were only harvested for self-consumption in the past, while nowadays they are sold to local traders in the village. Louangphabang was again mentioned as the end of the value chain. Income from fish is around 3 to 6 million KIP per year per fisherman's household. Income from crabs varies between 300,000 to 700,000 Kip per year per crab harvester's household. Income from mushrooms is around 500,000 Kip per year per mushroom harvester's household.

### **6.2.3 Resource trends/pressure on resources**

The major pressure on fish population and the reason for recent decreases is due to illegal fishing practices that use electricity, dynamite or chemicals, which kill or stun many fish at a time and lead to a lot of untargeted species being killed and wasted.

Most villagers mentioned mushroom and crab populations as being stable. However, some villagers mentioned that the availability of mushrooms had decreased due to habitat destruction of the forests where they grow; others were concerned about the impact of pesticides on the crabs which were found in the rice fields. Although the villagers reported selling less fish over the past few years, the income during the same time was increasing due to higher prices.

Additional high pressure on fish is that other resource users from Louangphabang practice fishing in Ban Pak Si. Technically the community has restrictions against outsiders harvesting in their areas, but this was reported as rarely being enforced.

Despite the problems the villagers themselves acknowledged came from expanding their agricultural fields into forested habitat, they expressed a need to increase the amount of land being farmed. Villagers saw increased agricultural output as essential to increasing their income.

Regarding the Xaignabouli Dam construction, the population of Ban Pak Si expects an increase of fish population due to higher water levels.

### **6.2.3 Resource management**

The survey indicated that villagers are involved in the management of a spirit forest. Village conservation areas and protected areas are under co-management by villagers and local governmental authorities. Among the controls that are being enforced, some relate to controls on logging and hunting. Villagers stated that there were no restrictions related to the harvesting of NTFPs or regulations for the sacred river section of the Mekong<sup>17</sup>.

Other past efforts at resource management were not mentioned, with the exception of a mulberry project (Por Sa)<sup>18</sup> and a buffalo-raising project. The mulberry project was perceived poorly due to low prices for the mulberry, thereby not making its cultivation worthwhile. However, the buffalo-rearing project was perceived as being successful because of high prices in the market and good participation on the part of the villagers. It was noted that further implementation of the buffalo-raising project could create a new source of income which could decrease the harvesting of NTFPs.

The villagers expressed an interest in future fish and crab management projects if these projects could increase income. The villagers identified the biggest challenge to these

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<sup>17</sup> We did not visit the sites referring to these different conservation categories. It might well be the fact that villagers mixed up the different categories.

<sup>18</sup> Mulberry bark is used to produce traditional paper, which is bought by Lao people for decoration and also by tourists.

projects as basically being the unrestricted use of these resources, by not only local villagers and their neighbors, but from Louangphabang town as well. As noted in the reports on neighboring Ban Ou, while many villagers want crab populations to increase in both forests and agricultural lands, some villagers see crabs in their rice fields as pests and in Ban Pak Si it appeared that some people may actively target crabs with chemical pesticides.

Having been impressed by the success of the buffalo-rearing project, residents also mentioned interests in similar projects for goats, cattle, and chicken. While this may decrease the reliance on NTFP harvesting, too much of an increase in livestock could lead to a steady increase in habitat destruction for the creation of pastureland. Other assorted development priorities were mentioned, such as funding to support better equipment and capacity for local textile weavers.

### 6.3 Ban Thadeua

#### 6.3.1 Settlement history and demography

The village of Ban Thadeua is located in Xaignabouli District, Xaignabouli Province. It was established in around 1873 with an initial population of 25 people. The population size has since risen to about 1600, who are living in 257 households, almost all of them Lao Loum.

**Table 16: Population trend in Ban Thadeua**

Year	1873	1965	1975	1980	1990	2000	2012
Population size	25	1100	1220	1300	1420	1515	1600

Sources: IUCN/CEPF livelihood survey, 2012

The population has been steadily increased since its foundation. This is due to voluntary immigration. Some parts of the village will be flooded by the Xaignabouli dam's reservoir. Households which may be impacted were informed to move to higher areas of the village. Some parts of Tad Chao will be flooded as well. Despite the dam construction being already under way, the villagers were not yet clearly informed of the time of resettlement.

#### 6.3.2 Resource use

Respondents listed important resources to be land for rice, land for cash crops, domestic animals, fish and land for tree plantation. Important NTFPs and wild species were mentioned as fish, amphibians and mulberry bark. Fish are harvested at KhokKhuaoYai, KokThongsum, Luang (big stream; bigger and larger than a Houay) Hoi Kham, Pak Khai, Luang Tad, Luang Thamxang and Luang Sentham. Amphibians are harvested at NongHinNgone, Nong Yao, NongPakhai and Tad Chao. PorSa are collected at HouaySatoun. Eighty households are involved in fishing and amphibian harvesting and thirty households are involved in collecting "PorSa". Fishing is practiced two times every day in the morning and night over the whole year. Amphibians are harvested every night from November to April. Mulberry bark is harvested ("Por Sa") everyday from October to March.

**Table 17: Basic data per main species harvested in Ban Thadeua**

Resources	Fish	Amphibians	Mulberry Bark
Kilo or units per day/household	Up to 10kg	Up to 5 units	Not mentioned
Sales in percentage	90	20	100
Days of harvesting	356	176 core days	176

<b>Price range per kilo (or unit) in KIP</b>	35,000 - 50,000/kg	700/unit	1,500/kg
<b>Household income range in million KIP and USD per year</b>	0.5 -1 KIP 47 – 94 USD	0.3 KIP 38 USD	1 KIP 94 USD

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

**Table 18: Fish, amphibian and PorSa species and their price evolution in Ban Thadeua**

<b>Lao name in English</b>	<b>Lao name in Lao</b>	<b>Scientific name</b>	<b>Price in 2012 (KIP per kilo or unit)</b>	<b>Price in 2007 (KIP per kilo or unit)</b>
<b>Fish</b>				
Pa Jok	ປາໂຈກ	<i>Cyclocheilichthysenoplos</i>	35,000	20,000
Pa Pia	ປາເພັຍ	<i>Labeochrysophekadion</i>	35,000	20,000
Pa Pak	ປາປາກ	<i>Hypsibarbus species</i>	30,000	20,000
Pa Sanguao	ປາສະຫຼັວ	<i>Micronemaapogon</i>	50,000	25,000
Pa Kheung	ປາເຄິງ	<i>Hemibagruswyckioides</i>	50,000	25,000
Pa Khae	ປາແຂ້	<i>Bagarius species</i>	50,000	25,000
<b>Amphibian</b>				
Kop Kied	ກົບຂຽດ	Not known	5,000/7 units	2,000/10 units
<b>Mulberry Bark</b>	ບໍ່ສາ	Not known	4,000	1,500

Sources: IUCN/CEPF group discussion (2012)

Income gained from fish is between 500,000 to 1,000,000 KIP per year per household. Income from amphibian harvesting is 300,000 KIP per year per household. Income from mulberry bark is around 1,000,000 KIP per year per household. The reasons for increasing prices are the same as in all other villages.

### 6.3.3 Resource trends/pressure on resources

The increased demand for fish in the market has led to more people engaging in fishing than ever before. Access is unrestricted to most resources which have led to outsiders engaging in fishing as well as amphibian harvesting. The amphibian population has decreased with the expansion of agricultural fields. Mulberry bark abundance has been impacted due to predation from cattle and water buffalo. The dam will not affect the availability of mulberry bark, since it has been planted in elevated areas. The villagers are concerned that amphibians will migrate since their habitats will be mainly flooded by the dam.

### 6.3.4 Resource management

The villagers of Ban Thadeua are involved in the management of village conservation areas, protected areas, spirit areas, controlled harvesting of NTPFs (mainly mulberry bark and

controlled fishing. The local officials collaborate with the district-level government on forestry management.

Villagers expressed an interest regarding forest and wildlife conservation at the Tad Chao spirit forest. The forest currently receives protection in the form of traditional bans on hunting and logging, but these local protections often don't have much effect on outside users. The site surrounds a small stream which pours into a waterfall. Locals say that former kings of Lao came to bathe here and that the water has healing effects. In early 2000, villagers stated that a member of the Thai royal family paid for the construction of several site improvements; including viewing platforms, stairways, and picnic tables with the idea that the area would attract tourists. Unfortunately, the donor did nothing to attract tourists and most of this infrastructure has fallen into a state of disrepair. The community has stated that it is their desire that future management of the site would provide not just additional income from ecotourism development, but also serve as a habitat for local wildlife.

Other development priorities include increasing cattle and buffalo stock as well as increasing the production of cash crops such as peanuts, cassavas, Job's Tear and corn.

### 6.3.5 Biodiversity findings related to future management

Tad Chao received a lot of attention from survey teams. The herpetological team identified it as a site for a community-based conservation site. This site was described as "a patch of semi-evergreen forest enclosing a waterfall (Tad Jao) with a spectacular view overlooking the Mekong River, a Buddhist shrine, and infrastructure consisting of stairs, picnic tables, toilets, and several open buildings, all built by the royal family of Thailand over 10 years ago." The report goes on to state that "Villagers from Ban Thadeua reported they do not hunt at Tad Jao owing to the Buddhist shrine. A large wild *Python reticulatus* found during the survey supports this notion."

These existent biodiversity levels and management frameworks make Ban Thadeua interesting as a potential site for management projects.

## 6.4 Ban Pak Neun

### 6.4.1 Settlement history and demography

Ban Pak Neun is located in Nan district, Louangphabang Province. It was established in around 1712, with an initial population of 20 people. The population size in 2012 was recorded as 445 people living in 91 households, almost all of them Lao Loum.

**Table 19: Population trend in Ban Pak Neun**

Year	1712	1975	1980	1990	2000	2012
Population size	20	350	380	525	545	445

Sources: IUCN/CEPF livelihood survey, 2012

The population steadily increased since its foundation up to the year 2000 after which the population dropped significantly. The significant increase between 1980 and 1990 was due to natural growth as well as due to voluntary in-migration. The decrease that occurred after 2000 was mainly due to labour related voluntary out-migration.



Xaignabouli Dam

The construction of the Xaignabouli Dam will mean that most of the village lands will be submerged in water. Resettlement plans have been made, and some villagers mentioned that they had been told they will be moved soon.

#### 6.4.2 Resource use

Villagers mentioned important natural resources to be gold, land for cash crops, fish, amphibians and domestic animals. Gold mining and fishing are practiced all year round every day. Amphibians are harvested on an average of three days a week, especially from September to November. Fish are harvested in HouayNeun. Amphibians are harvested at HouayNeun, Houay Ting, Houay Yan and Houay Tong. Gold mining is practiced along the Mekong river bank. Ninety one households are involved in harvesting fish and amphibians, the number of household involved in gold mining was not known. The biodiversity survey had identified this community as being involved in reptile trade specifically for tortoises, but this was not mentioned by villagers during the livelihood assessment perhaps due to an actual lack of importance or fear of admitting to illegal practices.

**Table 20: Basic data per main species harvested in Ban Pak Neun**

Resources	Fish	Amphibians	Gold
<b>Kilo or units per day/household</b>	Up to 50 kg	Up to 20 units	Up to 1 houn (1houn = 0.38 gram)
<b>Sales in percentage</b>	80	60	100
<b>Days of harvesting</b>	All year	36 core days <sup>19</sup>	All year
<b>Price range per kilo (or unit) in KIP</b>	25,000 - 50,000/kg	10,000/kg	130,000/houn
<b>Household income range in</b>	10 – 15 million KIP 1,274 – 1,912 USD	0.2 – 3million KIP 25 – 382 USD	Up to 5 million KIP 637 USD

<sup>19</sup> On other days, no harvesting or only occasionally minor harvesting occurs.

million KIP and USD per year			
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Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

**Table 21: Fish and amphibian species and their prices including that of gold in Pak Neun**

Lao name in English (in English)	Lao name in Lao	Scientific name	Price in 2012 (KIP per kilo or unit)	Price in 2007 (KIP per kilo or unit)
<b>Fish</b>				
Pa Pak	ປາປາກ	<i>Hypsibarbus species</i>	25,000	15,000
Pa Sanguao	ປາສະຫຼັວ	<i>Micronemaapogon</i>	40,000	25,000
Pa Pia	ປາເພັຍ	<i>Labeochrysophekadion</i>	25,000	15,000
Pa Sakang	ປາສະກາງ	<i>Puntioplitesfalcifer</i>	25,000	15,000
Pa Vah	ປາຫວ້າ	<i>Bangana species</i>	30,000	25,000
Pa Jok	ປາໂຈກ	<i>Cyclocheilichthysenoplos</i>	30,000	25,000
Pa Eun	ປາເອິນ	<i>Probarbus species</i>	30,000	25,000
Pa Khae	ປາແຂ້	<i>Bagarius species</i>	50,000	30,000
Pa Yorn	ປາຍອນ	<i>Pangasius species</i>	25,000	15,000
Pa Taep	ປາແຕບ	<i>Parachelawillaminae</i>	15,000	10,000
Pa Kheung	ປາເຄິງ	<i>Hemibagrusrwyckioides</i>	50,000	25,000
Pa Kod	ປາກົດ	<i>Hemibagrusr species</i>	25,000	15,000
Pa Dungdaeng	ປາດັງແດງ	<i>Hemisilurusmekongensis</i>	40,000	25,000
<b>Amphibian</b>				
Kop Kied <sup>20</sup>	ກົບຂຽດ	Not known	10,000/ unit	4,000/ unit
<b>Gold mining</b>				
Kham (Gold)	ຄຳ	N/A	130,000/ houn	90,000/ houn

Sources: IUCN/CEPF group discussion (2012)

Prices for fish and amphibians have been rising due to increased demand in the villages. The steadily increasing global price for gold has made this an ever increasingly attractive opportunity.

Amphibians are usually sold in the village for local consumption. Fish traders based in the town buy fish from villagers and then sell them elsewhere. All mined gold is sold to traders from Nan District.

Income received from fishing is between 10,000,000 to 15,000,000 KIP per year per household. Income from amphibian harvesting is between 200,000 to 3,000,000 KIP per

<sup>20</sup> The English names for Kop Khied, Kop and Khied could not be identified.



year per household. Income from gold mining is around 5,000,000 KIP per year per household.



Gold mining

#### **6.4.3 Resource trends/pressure on resources**

The main threat to the fish population is overharvesting; the rate of which has increased with the use of electro-fishing, explosives and poisons. Pollution from the Xaignabouli Dam construction site was also thought to have a negative impact on the fish population. The roads constructed for building the dam have increased access to a lot of the village's resources for outsiders. Residents blamed these roads for causing the decline of amphibians as well as due to over harvesting. Gold mining has also been impacted by the dam's construction which has taken over much of the previously utilized area.

#### **6.4.4 Resource management**

The villagers in Pak Neun are involved in village management of village conservation areas, protected areas, spirit forest areas, sacred river sections, controlled hunting, and controlled fishing. Local officials work with the district-level government on logging regulations. Currently, there are no restrictions on NTFP collection. Future options for resource management regarding fish and amphibians were mentioned. Other development priorities were mentioned as raising fish and domestic animals.

#### **6.4.5 Biodiversity findings related to future management**

Ban Pakneun's reptile trade was surveyed by the herpetological team during their visit. Through conversations with villagers, they identified the village as an "interim point for the trade of wildlife brought in from remote villages and mountains east of the Mekong and with traders from Xaignabouli town". The residents told the interviewers that villagers from Ban Pakneun regularly travelled to remote upland villages east of the Mekong to obtain wildlife through purchase or collection, and to then sell them to travelling wildlife traders.

Remains of two Chelonian species, the Keeled box turtle *Cuoramouhotii*, and the Impressed tortoise *Manouria impressa* (a CEPF priority species) were found in the village.

Houay Ting, located near Ban Pakneun, was identified as a potential site for reptile conservation by the team. They described the stream as running through disturbed semi-evergreen forest as well as bamboo forests.

The findings and recommendations of the biodiversity team led to this village being targeted by the livelihood assessment. However, the towns' location at the building site of the Xaignabouli Dam makes future project goals unlikely.

## 6.5 Ban Houaykhoulouang

### 6.5.1 Settlement history and demography

Ban Houaykhoulouang is located in Xaignabouli District, Xaignabouli Province. It was established in around 1675, with an initial population of 75 people. The population in 2012 was recorded to be 460 people living in 91 households, all of them Lao Loum.

**Table 22: Population trend in Ban Houaykhoulouang**

Year	1675	1975	1980	1990	2000	2012
Population size	75	250	270	320	350	460

Sources: IUCN/CEPF livelihood survey, 2012

The population steadily increased since its foundation, with a remarkable rising trend from 2000 to 2012. The reason for this large increase was given to be voluntary in-migration. No plan for resettlement was mentioned.

### 6.5.2 Resource use

Villagers listed the most important resources as land for rice, fish, land for cash crops, and secondary forests. Important NTFP and other harvested wild species included fish, amphibians and reptiles. Fishing is practiced at Nong Houay La, Nong Yao and Nong Pa Kod. Amphibians are harvested at Houay Laep. Reptiles are hunted at Pha Khao, Pha Thao and Pha Nang. Fishing is practiced every day, while amphibians are harvested around two times a week, especially between June to September and December to March. Reptiles are hunted on an average of five times a month, especially between April and September. Ninety one household are involved in fishing, 30 households are involved in harvesting amphibians, and 14 households are involved in hunting reptiles.

**Table 23: Basic data per main species harvested in Ban Houaykhoulouang**

Resources	Fish	Amphibians	Reptiles
Kilo or units per day/household	Up to 50kg	Up to 10 units	Up to 10 units per month
Sales in percentage	50	Not known	50
Days of harvesting	356	64 core days	35 core days
Price range per kilo (or unit) in KIP	15,000 - 50,000/kg	Up to 3,000 per unit	20,000 per unit
Household income range in million KIP and	0.3 – 0.5 million KIP 38 – 63 USD	0.4 – 0.8 million KIP 51 – 102 USD	0.1 – 1.5 million KIP 12 – 191 USD

<b>USD per year</b>			
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Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

**Table 24: Fish, amphibian and reptile species and their prices range in Houaykhualuang**

Lao name in English	Lao name in Lao	Scientific name	Price in 2012(KIP per kiloorunit)	Price in 2007 (KIP per kilo or unit)
<b>Fish</b>				
Pa Mang	ປາມາງ	<i>Amblyrhynchichthys truncatus</i>	15,000	5,0000
Pa Jad	ປາຈາດ	<i>Poropuntius species</i>	15,000	5,000
Pa Bok	ປາບອກ	<i>Henicorhynchus species</i>	15,000	5,000
Pa Kheung	ປາເຄິງ	<i>Hemibagrus wyckoides</i>	50,000	20,000
Pa Mon	ປາມອນ	Unknown	15,000	5,000
Pa Douk	ປາດູກ	<i>Clarias species</i>	20,000	5,000
Pa Panh	ປາພັນ	<i>Schistura species</i>	15,000	5,000
Pa Khae	ປາແຂ້	<i>Bagarius species</i>	40,000	10,000
Pa Eun	ປາເອິນ	<i>Probarbus species</i>	50,000	10,000
Pa Ierm	ປາເລີມ	<i>Pangasiussanitwongsei</i>	30,000	10,000
Pa Pia	ປາເພັຍ	<i>Labeochrysopehekadion</i>	30,000	10,000
Pa pak	ປາປາກ	<i>Hypsibarbus species</i>	30,000	10,000
Pa Nai	ປາໃນ	<i>Cyprinus carpio</i>	30,000	10,000
Pa Kho	ປາຄໍ້	<i>Channa species</i>	30,000	10,000
Pa Kaeng	ປາແກງ	<i>Cirrhinus molitorella</i>	30,000	10,000
Pa Nin	ປານິນ	<i>Oreochromis species</i>	30,000	10,000
Pa Sanguao	ປາສະຫຼົວ	<i>Micronema apogon</i>	50,000	10,000
<b>Amphibian</b>				
Kop	ກົບ	Not known	3,000/ unit	1,000/ unit
Kied	ຂຽດ	Not known	5,000/40 units	2,000/40 units
<b>Reptile</b>				
Laen	ແລນ	<i>Varanus bengalensis</i>	20,000	15,000

Sources: IUCN/CEPF group discussion (2012)

Fish and reptiles are sold to local traders within the village. Amphibians are sold to other villagers in the same village. Income from fishing is between 300,000 to 500,000 KIP. Compared to other villages this is relatively low. Bad road access during dry season only was given as the explanation for that low income from fisheries. Income from amphibian harvesting is between 400,000 to 800,000 KIP per year per household. Finally, income from reptile collecting is between 100,000 to 1,500,000 KIP per year per household.

### 6.5.3 Resource trends/pressure on resources

Although the village access to markets is very bad, the populations of fish, reptiles, and amphibians have dropped dramatically in the past few years according to residents. They stated that the rise in prices in markets have lead to the increase in harvesting from both the villagers and those from outside who use these resources from as far away as Xaignabouli town. The adoption of electro-fishing and dynamite has also speeded up population decline. Again, the residents assume that the construction of Xaignabouli Dam will positively affect fish populations due to higher water levels throughout the year.

### 6.5.4 Resource Management

The villagers of Ban Houaykhoulouang are involved in management of village conservation areas, protected areas, spirit forest areas, sacred river sections, controlled logging, controlled hunting and controlled fishing. Co-management between village authorities and government officers as well as controlled harvesting of NTPFs do exist. Future conservation ideas were mentioned, especially regarding fish, but a specific site for fish conservation was not mentioned. Villagers mentioned an interest in a variety of livelihood improvement opportunities such as aquaculture, duck, chicken and pig-raising. The opportunity of ecotourism development was mentioned for the sites HouayLaep, Tad Houay Mark Phai and Tad HouayLaep.

### 6.5.5 Biodiversity findings related to future management

Ban Houaykhoulouang was a site of particular interest for the herpetological team to do its survey on reptile trade. A visit to the traders during the survey recorded living and dead specimens of the Keeled box turtle *Cuoramouhotii*, also reported were 10 carapaces of Impressed tortoises *Manouriaimpressa*(a CEPF priority species) and a captive Asiatic softshell *Amydcartilaginea*(a CEPF priority species). The softshell had been captured in the Mekong in front of the village, while the Keeled box turtles were reported to have been collected in the nearby forested limestone mountains.

The fish survey involved conducting interviews with residents of Ban Houaykhoulouang. Fisherman reported that Giant barb *Catlocarpiosiamensis* and *Probarbus labeamajor* were occasionally caught but were rare. Village residents identified the rapids across from the village as being *Probarbus jullieni* display grounds. Another CEPF priority species the Mekong freshwater stingray, *Dasyatislaosensis*, was reported to be quite scarce with most remaining individuals being found in a pool (KhokVeune) just north of the village. Two large catfish *Pangasiussanitwongseia* and the Giant Mekong catfish *Pangasianodongigas*(a CEPF priority species) had previously been caught near the village, but had not been seen in several years. The fish survey team noted that “villagers want to set up a fish conservation pool, but lack appropriate conduct guidelines.”

The findings of the reptile and fish surveys led to this community being targeted by the livelihood assessment. Future projects especially with *Probarbus* are likely to be proposed.

## 6.6 Ban Khokfak

### 6.6.1 Settlement history and demography

The village of Ban Khokfak is located in Xaignabouli District, Xaignabouli Province. It was established around 1877 and the initial population is not known. The population in 2012 was 205 people living in 47 households, all of them Lao Loum.

**Table 25: Population trend in Ban Khokfak**

Year	1975	1980	1990	2000	2012
Population size	170	178	265	270	205

Sources: IUCN/CEPF livelihood survey, 2012

The village currently has no plans for resettlement.

### 6.6.2 Resource use

Residents reported their most important resources to be land for rice and other agricultural purposes, fish, domestic animals and as secondary forest trees. As the most important NTFPs/aquatic species; fish, amphibians and reptiles were mentioned. Additionally crab, especially stream crab, was mentioned as important resources. Fish is harvested in VangKhokfak, KhokHouayKonpadaed and HouayKonHae. Amphibians are harvested at HouayKhokfak, NongHouayNeua, and in pools along the Mekong river. Reptiles are hunted at PhaLaep and HouayAek. All households are involved in the harvesting of fish and amphibians and only three households are involved in reptile hunting. Fishing is practiced twice daily in the morning and at night. Amphibians are harvested three times a week. Reptiles are hunted every day from May to June.

**Table 26: Basic data per main species harvested in Ban Khokfak**

Resources	Fish	Amphibians	Reptiles
Kilo or units per day/household	Up to 20kg	Up to 5 units	Around 2 units
Sales in percentage	60	0-20	95
Days of harvesting	356	156 core days	60 core days
Price range per kilo (or unit) in KIP	20,000 - 50,000/kg	around 16,000/kg	20,000/unit
Household income range in million KIP and USD per year	2-24 million KIP 254 – 3,050 USD	around 0.3 million KIP 38 USD	3.5 – 8 million KIP 444 – 1,016 USD

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

**Table 27: Fish, amphibian and reptile species and their prices range in Ban Khokfak**

Lao name in English	Lao name in Lao	Scientific name	Price in 2012 (KIP per kilo)	Price in 2007 (KIP per kilo)
<b>Fish</b>				
Pa Kheung	ປາເຄິ່ງ	<i>Hemibagrus wyckioides</i>	50,000	40,000

Lao name in English	Lao name in Lao	Scientific name	Price in 2012 (KIP per kilo)	Price in 2007 (KIP per kilo)
Pa sanguan	ປາສະຫຼັງ	<i>Micronemaapogon</i>	50,000	40,000
Pa Pak	ປາປາກ	<i>Hypsibarbus species</i>	20,000	15,000
Pa pia	ປາເພີ້ຍ	<i>Labeochrysophekadion</i>	20,000	15,000
Pa Kaeng	ປາແກງ	<i>Cirrhinusmolitorella</i>	20,000	15,000
Pa Jok	ປາໂຈກ	<i>Cyclocheilichthysenoplos</i>	30,000	20,000
Pa Eun	ປາ ເອີນ	<i>Probarbus species</i>	40,000	30,000
<b>Amphibian</b>				
Amphibian	ກົບຂຽດ	Not known	Household consumption only	Household consumption only
<b>Reptile</b>				
Laen	ແລນ	<i>Varanusbengalensis</i>	20,000	15,000

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

Fish are sold to local traders within the village, who in turn sell the fish to markets in Xaignabouli city. Reptiles are usually sold as well.

Income gained from fishing is about 20,000,000 to 24,000,000 KIP per year per fisherman's household. The income from reptile collecting is about 350,000 to 500,000 KIP per year per reptile hunter's household.

### 6.6.3 Resource trends/pressure on resources

Fish stocks are threatened by overharvesting, which has increased due to a rising demand and the adoption of dynamite and electricity. Access by outsiders to the villages' fishing areas is also a factor contributing to overfishing. Reptiles and other wildlife are suffering decline due to habitat destruction and overhunting. Fish is sold less, but people earn more money due to higher prices.

The village authorities expressed that it was their belief that any dam construction would increase the population of fish due to higher water levels. However, the water will flood forests and streams that are habitable for reptiles. But the villagers expressed that the reptiles will move to other places. The amphibians will lack habitats due to flooding of streams.

### 6.6.4 Resource management

Findings from the livelihood survey indicated that villagers were involved in the management of village conservation areas, spirit forest areas and control fishing. Co-management between village authorities and government are practiced for control logging and control hunting. Control harvesting NTFPs, spirit parts of the river, and protected areas do not exist. Villagers expressed an interest in participating in fish, amphibian and reptile management projects as well as ecotourism.

With the exception of a *Jatropha* plantation owned by Kho Lao company, resource management activities were not mentioned. This project was deemed a failure by villagers because the company bought very little of what the villagers produced.

The plantation was not thought to have had a big impact on fish or amphibian populations. Villagers reported that reptiles had left plantation area due to habitat loss. Development priorities were mentioned as increased domestic animal production especially cows, buffalos, and goats, increased production of cash crops such as cassava, corn, sesame, and peanuts. Particular interest was given to ecotourism development. This would include homestays, boat services and guided tours of caves and forests.

### 6.6.5 Biodiversity findings related to future management

Ban Khokfak was one of the sites identified by the fish survey as having a deep pool used by *Probarbus jullieni* to rest after spawning. The report also identified a likely *Probarbus* spawning ground just downstream closer to the confluence of the Pakpoui River. As with the neighbouring Ban Houaykhoulouang area, the presence of critical habitat for *Probarbus* led to this site being chosen for further analysis by the livelihood assessment and as a likely spot for future fish conservation projects.

## 6.7 Ban Nongkhai

### 6.7.1 Settlement history and demography

Ban Nongkhai is located in Paklay District, Xaignabouli Province. The village was founded in 1760 with an initial population of 40 people. The population in 2012 was 448 people living in 85 households, all of them Lao Loum.

**Table 28: Population trend in Ban Nongkhai**

Year	1760	1960	1975	1980	1990	2000	2012
Population size	40	250	300	325	350	385	448

Sources: IUCN/CEPF livelihood survey, 2012

Since the year of foundation, the village has experienced a steady population increase due to marriage and natural growth. No plans for future resettlement were mentioned.

### 6.7.2 Resource use

The important natural resources listed by residents of Ban Nongkhai are land for rice, land for cash crops, and domestic animals. NTFPs of major importance were listed as fish, birds and amphibians. Fish are harvested in the Mekong river, birds are hunted in the village's surrounding forests, and amphibians are harvested at Houay Pong, NongDok Ked, Nong Yao and NongDokKhoun. According to interviews, 25 households are actively involved in fishing, 15 households are actively involved in bird hunting, and 9 household are actively involved in amphibian harvesting. Fishing is practiced twice every day throughout the year (in the morning and evening). Birds are harvested on an average of two times a week. Amphibians are harvested two times a week, mainly at night; the peak season being August and September.

**Table 29: Basic data per main species harvested in Ban Nongkhai**

Resources	Fish	Birds	Amphibians
Kilo or units per	Up to 50kg	Up to 25 units	Up to 100 units

Resources	Fish	Birds	Amphibians
day/household			
Sales in percentage	80	90	20
Days of harvesting	356	104 core days	16 core days
Price range per kilo (or unit) in KIP	25,000 - 45,000/kg	2,500 – 7,000 per unit	20,000 – 25,000/kg
Household income range in million KIP and USD per year	3-15 KIP 381 – 1,906 USD	Information not available	1-6 KIP 127 – 762 USD

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

**Table 30: Fish, amphibian and bird species and their price evolution in Ban Nongkhai**

Lao name in English	Lao name in Lao	Scientific name	Price in 2012 (KIP per kilo or unit)	Price in 2007 (KIP per kilo or unit)
<b>Fish kg</b>				
Pa Pak	ປາປາກ	<i>Hypsibarbus species</i>	25,000	12,000
Pa Pia	ປາເພັຍ	<i>Labeochrysophe kadion</i>	25,000	12,000
Pa Yang	ປາຢາງ	<i>Pangasius species</i>	25,000	12,000
Pa sanguan	ປາສະຫຼັວ	<i>Micronemaapogon</i>	40,000	30,000
Pa kheung	ປາເຄິງ	<i>Hemibagruswyckioides</i>	40,000	30,000
Pa JoK	ປາໂຈກ	<i>Cyclocheilichthys enoplos</i>	25,000	12,000
Pa Eun	ປາເອີນ	<i>Probarbus species</i>	45,000	30,000
<b>Amphibian</b>				
Kop	ກົບ		25,000	8,000
Khied	ຂຽດ		20,000	5,000
<b>Bird species</b>				
NokEud	ນົກອິດ		7,000/ unit	3,000/ unit
NokPao	ນົກເປົາ		7,000/ unit	3,000/ unit
NokKhuak	ນົກຂວກ		3,000/ unit	1,000/ unit
NokKhor	ນົກຂໍ້		2,500/ unit	1,500/ unit



Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

The prices of fish, amphibians, and birds have recently changed. While all species used to be mostly locally consumed, a growing number of traders have begun to arrive from Pak Lai to purchase animals to sell to markets. Annual income from birds was not known, while fish brought on average between one and 15 million KIP per year and amphibians between 1-6 million.

### **6.7.3 Resource trends/pressure on resources**

Residents reported that the population of fish has been decreasing due to an increase in fishing by a growing number of populations. The villagers further listed fishing nets, dynamite and electro fishing techniques as the most damaging fishing methods and cited uncontrolled access from neighbouring Ban Donxaingam as another cause of overfishing. The villagers said that bird populations have decreased due to habitat loss, while amphibian population decrease is thought to have been caused by uncontrolled access by other villages. In addition, amphibian breeding habitats have suffered in the recent years from draught, and the excessive harvesting of larval amphibians hurts their ability to reproduce. Access limitations do not exist. Also, free access for fishing is perceived as acceptable because areas for fishing and hunting birds are shared amongst the nearby villages such as Ban Donxaingam and Ban Pak Phaen.

Villagers reported that agricultural lands were steadily increasing as a result of the increasing population and the desire for more cash income. Some of their agricultural fields will be lost after the construction of the Tad Jang Dam. The Ban Nongkhai population expressed that some parts of the village and cash crops fields will be flooded. However, the affects of the dam on the harvesting of fish, birds and amphibians were not mentioned by villagers.

### **6.7.4 Resource management**

The residents of Ban Nongkhai reported having some restrictions on hunting and fishing that they themselves enforced. Residents mentioned collaboration between village and government authorities to regulate the harvesting of NTFPs, control logging, village conservation areas, spirit forest areas, and protected areas. Villagers mentioned that access to their resources from residents of other villages was a major threat. The past resource management efforts were not mentioned by villagers. Job's Tear and corn have been grown as cash crops. The villagers reported that Job's Tear cultivation has been much more profitable than corn because of the current market prices.

Other development priorities mentioned were raising domestic animals such as cows and buffalos, increasing production of cash crops such as Job's Tear and cucumbers, as well as tourism development. Ban Nongkhai shares nearby Don Hon Island with Ban Donxiangnam. The island was identified as a possible site for ecotourism due to its mature forest stands, wildlife, and historical ruins of an old village, which include an ancient temple<sup>21</sup>. On the northern end of the island, more recent Buddhist shrines have been put in along with meditation shelters.

### **6.7.5 Biodiversity findings related to future management**

The Biodiversity Report made note of Ban Nongkhai in several chapters. In the fish chapter, the commercially traded *Wallagoattu*, a species of catfish, was reported in the Mekong

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<sup>21</sup> The villagers said that it was a former village (the island was not initially an island) destroyed by floods. Only the temple remained, and they rebuilt and consolidated it. It is now a sacred place.

across from the village. Interviews with fisherman gave an insight into the decline of the Giant stingray *Himanturapolylepis* (a CEPF priority species), which villagers said is a rare species but was caught frequently in the past in the nearby pool of KhokKeub. *Probarbus jullieni*, another CEPF priority species, was reported as being previously caught in pools such as Khok Kai Dam and Khok Kai Done usually in March, but now fisherman speculated that the population had moved “further to KhokKhao Mao and KhokKeub for unknown purposes”.

In the aquatic invertebrates chapter, Ban Nongkhai was listed as the downstream terminus for *Potamidae sp.*, a species of crab. Finally, the bird chapter found Savanna nightjars (*Caprimulgus affinis*), River Lapwings (*Vanellus duvaucelii*), and small pratincoles (*Glareolalactea*) amongst the observed species.

Don Hon Island, which Ban Nongkhai has partial jurisdiction of, was also mentioned in the Biodiversity Report, stating “Permanently exposed parts of Don Hon support what is probably the least degraded natural bank-top forest anywhere in the study area, a small patch (less than 10 ha) of mature secondary forest along its west bank. The remainder above the level of regular river inundation is degraded scrub. The island is a community protected site of Ban Nongkhai. Residents stated that hunting and logging are prohibited.”

The biodiversity survey mentioned the area surrounding Ban Nongkhai in several chapters. These seemingly high levels of biodiversity as well as Don Hon Island being reported as having the most intact forest in the study area led to its inclusion as a target village of the Livelihood Assessment survey.

## 6.8 Ban Donxaingam

### 6.8.1 Settlement history and demography

The village of Ban Donxaingam is located in Med District, Vientiane Province. Its population at the time of the survey was 283 people living in 63 households, all of whom were identified as Lao Loum. The village was founded quite recently in 1995, with an initial population of 50. Since the year of foundation till 2000, the population has significantly increased due to immigration and natural growth.

**Table 31: Population trend in Ban Donxaingam**

Year	1995	2000	2012
Population size	50	252	283

Sources: IUCN/CEPF livelihood survey, 2012

No resettlement in the future was mentioned during the survey.

### 6.8.2 Resource use

Land for cash crops and rice as well as domestic animals were identified by village residents as being the most important resources. The most important NTPFs and other wild species were identified as fish, amphibians, birds and reptiles. Fishing is practiced along the Mekong river. Amphibians are mainly harvested at the streams HouayTham and Houay Hon and also in rice fields. Birds are hunted along the stream of Houay Hon and Don Hon. Reptiles are hunted in the forests surrounding the caves. While all households are involved in fishing, 13 households are involved in bird hunting, 60 households are involved in amphibian harvesting, and 13 household are involved in hunting reptiles. Fishing is practiced every day. Amphibians are harvested every day, especially from June to October. Birds are hunted

2-3 times a week, especially from April and May. Reptiles are, on average, hunted 3 times a week from June to July. The following table shows basic information on the most important wild species of Ban Donxaingam.

**Table 32: Basic data per main species harvested in Ban Donxaingam**

Resources	Fish	Amphibians	Birds	Reptiles
Kilo or units per day/household	Up to 15kg	Up to 10kg	Up to 50 units	Up to 3 units
Sales in percentage	90	90	90	100
Days of harvesting	356	150 core days	40-60	Around 60
Price range per kilo (or unit) in KIP	20,000 – 60,000	20,000	800	N/A
Household income range in million KIP and USD per year	0.5 – 5 million KIP 47 – 471 USD	around 0.5 million KIP 47 USD	N/A	N/A

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

**Table 33: Bird, fish, amphibian and reptile species and their price evolution in Ban Donxaingam**

Lao name in English	Lao name in Lao	Scientific name	Price 2012 (KIP per kilo or unit)	Price 2007 (KIP per kilo or unit)
<b>Birds</b>				
NokJak	ນົກຈາກ	Not known	0.8/ unit	0.2/ unit
NokJik	ນົກຈິກ	Not known	0.8/ unit	0.2/ unit
NokPid	ນົກປິດ	Not known	0.8/ unit	0.2/ unit
NokPao	ນົກເປົ້າ	Not known	5,000/ unit	3,000/ unit
Nokkhuak	ນົກຂວກ	Not known	2,500/ unit	0.4/ unit
<b>Fish</b>				
Pa Pak	ປາປາກ	<i>Hypsibarbus species</i>	20,000	1,5000
Pa Pia	ປາເພັຍ	<i>Labeochrysopekadion</i>	20,000	15,000
Pa mang	ປາມາງ	<i>Amblyrhynchichthystruncatus</i>	15,000	10,000
Pa sanguan	ປາສະງົວ	<i>Micronemaapogon</i>	60,000	30,000
Pa kheung	ປາເຄິງ	<i>Hemibagruswyckioides</i>	60,000	30,000
Pa khae	ປາແຂ້	<i>Bagarius species</i>	20,000	15,000
Pa Od	ປາ ອອດ	<i>Pangasius species</i>	20,000	15,000

Lao name in English	Lao name in Lao	Scientific name	Price 2012 (KIP per kilo or unit)	Price 2007 (KIP per kilo or unit)
Pa yang	ປາຢາງ	<i>Pangasius species</i>	20,000	15,000
<b>Amphibian</b>				
Kop	ກົບ		30,000	15,000
Khied	ຂຽດ		15,000	7,000
<b>Reptile</b>				
Laen	ແລນ	<i>Varanusbengalensis</i>	20,000	15,000

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

Fish, birds, amphibians and reptiles are sold to local traders from Ban Nongkhai, Ban Pak Toung and Ban Phaliap. Income from birds is 2,000,000 KIP per year per bird hunter's household. Income from fish is between 1,000,000 to 2,900,000 KIP per year per fisherman's household. Income from reptiles is 500,000 Kip per year per reptile hunter's household.

### 6.8.3 Resource trends/pressure on resources

The biggest pressure on fish comes from overfishing. The most effective methods are illegal but widespread; electricity, dynamite and large nets of various kinds. The over collection of juvenile and larval stage amphibians is the greatest threat to the amphibian population. The population of birds was said to be stable due to a lack of people hunting and eating them. The population of reptiles is decreasing due to habitat loss and over harvesting by villagers and user groups from other villages. Village authorities have attempted to restrict access in the past, but this has largely been unsuccessful. The villagers expressed that expansion of agricultural land was necessary to increase income as well as for local consumption to catch up with the recent population increase.

### 6.8.4 Resource management

The findings from the livelihood survey indicated that villagers are involved in the management of village conservation areas, protected areas, spirit forests, parts of the river with spiritual significance, and hunting regulations. Co-management between the village authorities and government authorities is exercised to create and enforce logging restrictions. There were no regulations focused on the harvesting of other NTFPs at the time of the survey.

Past efforts or activities for resource management were not mentioned, with the exception of a domestic animal raising project supported by Oxfam and an irrigation project. Domestic animal-raising was not believed to have affected the harvesting of fish, birds, amphibians, and reptiles; but the villagers perceived that the irrigation project helped increase fish population, perhaps by flooding rice fields<sup>22</sup>. Both projects were deemed successful by village residents due to good management and the technical support received. The villagers expressed an interest and willingness to participate in conservation projects focused on fish, birds, amphibian and reptiles. They identified access from outside users especially fishers

<sup>22</sup> Fish which is breeding in rice fields is called "black fish" by the locals. It is locally consumed but has no big importance for income generation.

and hunters from Ban Nongkhai and Ban Phaliap and reptile collectors from Vientiane Province as a management issue.

Residents expressed interest in many different alternative development projects and gave priority to those involving fish farming and livestock (cattle and buffalo). Ecotourism was given high priority as a possible future development plan. Villagers would like to be involved in providing home stays, boat trips and other guided adventures to tourists. The sites that the residents believed had the most potential for ecotourism development were Don Hon, surrounding limestone caves including observation of the monkey populations living there. The said caves are historical spiritual places for the kingdom of Louangphabang to celebrate the so-called “KauHao”<sup>23</sup> ceremony before continuing the festivities at the Don Hon stupa. Documented local culture and history and well-presented by trained local guides could be interesting elements of a cultural and ecotourism package for Lao and foreign guests.

### 6.8.5 Biodiversity findings related to future management

Ban Donxaingam has common use regulations of Don Hon Island with Ban Nongkhai. As noted in the Ban Nongkhai section, this island was regarded by the botany survey as having the most intact forest in the study area and would therefore be a priority site for further biodiversity study and conservation.

## 6.9 Ban Phaliap

### 6.9.1 Settlement history and demography

The village of Ban Phaliapis located in Pak Lay District, Xaignabouli Province. The village was founded in around 1512. The population in 2012 was 825 people living in 136 households, all of them Lao Loum. The population increased steadily from 1960 to 2000. After 2000, a rapid increase occurred due to voluntary in-migration.

**Table 34: Population trend in Ban Phaliap**

Year	1512	1960	1975	1980	1990	2000	2012
Population size	N/A	350	450	550	575	675	825

Sources: IUCN/CEPF livelihood survey, 2012

Future resettlement was not mentioned by residents.

### 6.9.2 Resource use

Residents surveyed and listed the most important resources to be land for cash crops, land for rice, domestic animals, land for plantations and tourism attractions. The most important wild and NTPFs categories are fish, reptiles, amphibians, birds and bamboo. Fishing is practiced along the Mekong River, as well as at KhokHouayHinkhao (a temporary deep pool of a nearby stream) and Pakki (a grass wetland with temporary filled pools). Amphibians are harvested along the Mekong River bank, Vang (Vang meaning permanent pool, bigger than a Khok) HouayLiap, Na HouayLek, Na HouayLiap, as well as in rice fields. Birds are hunted at HouayHinKhao and HouayLiap. Bamboo is only locally consumed and is harvested in the forests of Ban Phaliap. 50 households are involved in fish and amphibian harvesting. The number of households hunting birds, reptiles and harvesting bamboo were not known or mentioned to the survey team. Fish and birds are harvested every day. Amphibians are

<sup>23</sup> The villagers reported that the KhaoHao ceremony (literally meaning “entering” in English) was celebrated by villagers and members of the King’s family by entering the dark cave and anonymously selecting a partner for sexual practices in order to gain favor with the gods for a good fish catch.

harvested four times a week, especially during June and July. Bamboo is harvested every day from June to November. Reptiles are collected everywhere around the village, depending on the household, between once and three times a week. It is notable that the average income from birds and reptiles is bigger than that from fish in this village.

**Table 35: Basic data per main species harvested in Ban Phaliap**

Resources	Fish	Amphibians	Birds	Reptiles
<b>Kilo or units per day/household</b>	up to 10kg	Up to 8kg	Up to 8 units	3-8 kg
<b>Sales in percentage</b>	90	90	90	0
<b>Days of harvesting</b>	356	32 core days	365	52 – 156
<b>Price range per kilo (or unit) in KIP</b>	25,000 - 35,000/kg	10,000/kg	2,000 – 5,000/unit	26,000 – 35,000
<b>Household income range in million KIP and USD per year</b>	0.5 – 4 million KIP 47 – 377 USD	Not available	1.6 – 9 million KIP 151 – 849 USD	1.5 – 5 million KIP 141 - 471 USD

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

The amounts are all harvested at the above mentioned sites.

The next table shows the main fish, amphibian and bird species harvested.

**Table 36: Fish, amphibian, bird and bamboo species and their prices in Ban Phaliap in 2012 and 2007**

Lao name in English	Lao name in Lao	Scientific name	Price 2012 (KIP per kilo or unit)	Price 2007 (KIP per kilo or unit)
<b>Fish</b>				
Pa Pak	ປາປາກ	<i>Hypsibarbus species</i>	25,000	10,000
Pa Pia	ປາເພັຍ	<i>Labeochrysophekadion</i>	30,000	10,000
Pa Yang	ປາຢາງ	<i>Pangasius species</i>	35,000	10,000
Pa sanguan	ປາສະຫຼັ້ວ	<i>Micronemaapogon</i>	55,000	35,000
Pa kheung	ປາເຄິ່ງ	<i>Hemibagruswyckioides</i>	55,000	35,000
Pa JoK	ປາໂຈກ	<i>Cyclocheilichthysenoplos</i>	35,000	20,000
Pa Eun	ປາເອິນ	<i>Probarbus species</i>	40,000	20,000
Pa Khaow	ປາຄ້າວ	<i>Wallagoattu</i>	40,000	25,000
<b>Amphibian</b>				
KopKhied	ກົບຂຽດ	Not known	25,000	10,000
<b>Birds</b>				

Lao name in English	Lao name in Lao	Scientific name	Price 2012 (KIP per kilo or unit)	Price 2007 (KIP per kilo or unit)
NokEud	ນົກອິດ	Not known	8,000/ unit	2,000/ unit
NokPao	ນົກເປົາ	Not known	10,000/ unit	5,000/ unit
NokKhuak	ນົກຂວກ	Not known	1,500/ unit	0.3/ unit
NokJijae	ນົກຈີແຈ້	Not known	0.5/ unit	1,000/ unit
<b>Bamboo</b>				
Bamboo	ໜໍໄມ້	Not known	Household consumption only	Household consumption only

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

Fish, amphibians and birds are sold to local traders in the village. The local traders sell the animals mostly to markets and restaurants in Pak Lay city.

### 6.9.3 Resource trends/pressure on resources

As the population of the town increased, so has the pressure on birds, fish, reptiles and amphibians as more are needed for local consumption and more people are involved in their sale as a source of income.

The biggest pressure on fish is over harvesting, usually using a variety of nets but also electricity. Irrigation for agricultural lands has led to a drop in water levels in local streams which along with the use of pesticides and tractors has put a lot of pressure on amphibian species. The bird population has decreased due to the use of mist nets.

As in other villages, pressure from uncontrolled access by residents of other villages is also a factor in the decline of many species. Local authorities said that they had created a system of fines for illegal hunting and fishing, but the problem still persists.

Expansion of agricultural fields is expected to continue. Villagers explained that due to the increasing population, agricultural lands would have to increase to keep up with food production as well as land for cash crops to generate more income.

The villagers appear to have been informed that their whole village and rice fields will be flooded due to the construction of Tad Jang Dam. The entire village is to be relocated to a higher elevation by the government, but the time of this move was not known by the local residents during the survey. Residents of Ban Phaliap expect an increase of the fish population due to higher water levels and flooding of streams. Some parts of the forests will also be flooded, which will decrease the population of birds and amphibians due to a lack of habitat.

### 6.9.4 Resource management

The current resource management practices that the residents of Ban Phaliap are involved in are management of village conservation areas, protected areas, spirit areas and fishing controls. Restrictions on logging and hunting are overseen in cooperation with district and provincial governments. Currently, there are no controls on the harvesting of NTPFs. Past efforts for resources management were not mentioned, with the exception of an ongoing irrigation project. The population of Ban Phaliap expects an increase of fish, amphibian and

bird population due to the higher water levels that they believe would increase habitats of these resources.

The population of Ban Phaliap expressed their willingness to be involved in the conservation of birds. The villagers described that the population has significantly decreased due to the clearing of forests. Although this poses a challenge to conservation, the authorities explained that conservation might still be possible in the future, since the forests of Ban Phaliap are still large enough to be an important bird habitat.

Other development priorities of the village are cash crop cultivation (corns, Job's Tear, sesame, and rice), raising domestic animals (pig, cow, chicken and duck) and the development of the Phaliap cave for establishing ecotourism. Potential ecotourism activities could be cave climbing, monkey, squirrel, deer and bird-watching. The development of ecotourism needs to be well studied due to the fact that although the Phaliap cave is located near Ban Phaliap, it belongs to the administrative boundaries of neighboring Ban PhonSavanh in Vientiane Province.

### 6.9.5 Biodiversity findings related to future management

The botany survey described the area as having abundant deciduous forests as well as bamboo while the actual large limestone cliff “PhaLiap” has a small isolated evergreen forest. During the bird survey, the sign the Brown Fish Owl *Ketupazeylonensis* was of considerable interest, a little known species, whose status in Lao PDR remains unclear due to a lack of data. These reports and recommendations from the biodiversity survey members led to Ban Phaliap’s inclusion as a target village in the livelihood assessment.

## 6.10 Ban Houaylay-Noy

### 6.10.1 Settlement history and demography

The village of Houaylay-Noy is located in Paklay District, Xaignabouli Province. The town was established in around 1880, with an initial population of 35 people. The population size in 2012 had grown to 761 people, living in 157 households; all residents were identified as Lao Loum. The population has become more than double between 1975 and 1980 as a result of in-migration.

**Table 37: Population trend in Ban Houaylay-Noy**

Year	1880	1975	1980	1990	2000	2012
Population size	35	300	750	741	759	761

Sources: IUCN/CEPF livelihood survey, 2012

No future resettlement plans were mentioned during the livelihood survey.

### 6.10.2 Resource use

Important resources mentioned by villagers are land for cash crops, land for rice, domestic animals, land for plantations and NTFPs. The most important wild foods mentioned were fish, birds, bamboo and reptile. Fishing is practiced at KhokHouaySangua and Pak So. Birds are hunted at HouayKonkak and HouayNgeaPasak. Reptiles are hunted at HouayKhonkhut, HouaySangua and HouayXamten forest. Bamboo was harvested in the forests surrounding the village. Information on the numbers of households involved in bird and reptile hunting, fishing, and bamboo harvesting were not known during the household survey. Fishing is practiced on an average of three days a week. Birds are hunted two times a week. Reptiles are hunted three times a week. Bamboo is harvested every day during June to October.



**Table 38: Basic data per main species harvested in Ban Houaylay-noy**

Resources	Fish	Birds	Bamboo	Reptiles
<b>Kilo or units per day/household</b>	Up to 3 kg	Up to 20 units	Up to 40 kg	Around 2 units
<b>Sales in percentage</b>	80	70	0	90
<b>Days of harvesting</b>	156 core days	104 core days	140 core days	156 core days
<b>Price range per kilo (or unit) in KIP</b>	20,000 - 70,000/kg	700 – 3,000/unit	3,000/kg (but rarely sold)	Around 60,000/unit
<b>Household income range in million KIP and USD per year</b>	0.1 – 5 million KIP 13 – 635 USD	Not known	Not known	0.1 – 0.3 million KIP 13 – 64 USD

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

**Table 39: Fish, bird, bamboo and reptile species and their price evolution in Ban Houaylay-Noy**

Lao name in English	Lao name in Lao	Scientific name	Price 2012 (KIP per kilo or unit)	Price 2007 (KIP per kilo or unit)
<b>Fish</b>				
Pa Pia	ປາເພີ້ຍ	<i>Labeochrysophekadion</i>	40,000/kg	20,000/kg
Pa mang	ປາມາງ	<i>Amplyrhynchichthys truncates</i>	20,000/kg	7,000/kg
Pa sanguan	ປາສະງົວ	<i>Micronemaapogon</i>	70,000kg	45,000kg
<b>Birds</b>				
NokPid	ນົກປິດ	Not known	700/unit	250/unit
NokPao	ນົກເປົາ	Not known	2,000/ unit	Not known
NokKhuak	ນົກຂວກ	Not known	3,000/unit	1,000/unit
<b>Reptile</b>				
Laen	ແລນ	Not known	60,000	2,500
<b>Bamboo</b>	ໜໍ່ໄມ້	Not known	3,000	0.5

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

The same reasons were given as in the case of the other villages regarding price evolution. Fish and NTFPs are all sold to traders from Paklay city.

### 6.10.3 Resource trends/pressure on resources

Fish stocks are threatened by overharvesting, villagers specifically identified electricity fishing as particularly damaging. Reptiles are also being overharvested and residents

reported that increased prices in the market for both fish and reptiles had caused an increase in the collection of species. As in other villages, uncontrolled access to community resources from outsiders complicates management. Regulations regarding resource use were largely ineffective. Future problems with deforestation were predicted by residents who saw their increasing population as eventually requiring an expansion of their cultivated land. According to interviews, if built, the series of dams planned on that stretch of the river will have an impact on agricultural lands of the villages along the bank of the Mekong, where many of the communities' cash crops are grown. The village authorities expected that the population of fish will increase due to higher water levels. But the effects on bird and reptile populations were not mentioned.

#### 6.10.4 Resource management

The villagers of Ban Houaylay-Noy are involved in the management of village conservation areas, protected areas, spirit forests, sacred river sections, controlled hunting, controlled logging, controlled harvesting of NTPFs, and controlled fishing. Collaboration between the district government and villages on resource management was not mentioned. The only past resource management efforts mentioned were an EU-funded plantation and a project on raising domestic animals. The project was deemed successful by the respondents because of the training component.

The villagers and village authorities expressed an interest and willingness to be involved in better resource management. Special interest was expressed for the management projects involving reptile trade and management of conservation areas. The management of reptiles and wildlife is perceived to be feasible due to the remaining conservation forests and protected forest areas located around the village. The proximity to the village will allow effective monitoring of those forests.

Villagers enlisted development priorities as increasing the production of cash crops such as cucumber, watermelon, chili, and eggplant, increasing domestic animal production, as well as the development of ecotourism. The villagers also mentioned the establishment of a wildlife zoo for tourists and students.

### 6.11 Ban Don Men

#### 6.11.1 Settlement history and demography

Ban Don Men is located in Kenthao District, Xaignabouli Province. The population size in 2012 was 1022 people living in 218 households, all of them Lao Loum. The village was established in around 1712, with a population of 15 people. There has been a steady increase in the population since then until 2012 as a result of in-migration.

**Table 40: Population trend in Ban Don Men**

Year	1712	1975	1980	1990	2000	2012
Population size	15	430	460	690	780	1,022

Sources: IUCN/CEPF livelihood survey, 2012

Men Island (Don Men) and some parts of the village will be flooded due to the construction of the Don Khuad Dam<sup>24</sup>. This will mainly affect the agricultural area of the villages, but

<sup>24</sup> Don Khuad is approximately one of the six dam projects located on the Mekong mainstream. Villagers were already informed that dam construction will occur once the pilot project of the Xaignabouli Dam is successful.

some residents say that they had been told the whole village will be relocated as well. The proposed date for relocation was not known to villagers during the time of this survey.

## 6.12 Resource use

Survey respondents listed land for cash crops, land for rice, rubber trees and fish as the four most important resources for their livelihoods. Birds, fish, and crickets were identified as the primary wild resources. The household survey and group discussions focused on birds, *Probarbus jullieni*, and insects.

Kengmai was identified as an important area for catching *Probarbus jullieni* and other fish species. Kengmai is also an important fish habitat; especially for the spawning of *Probarbus jullieni*. Birds are primarily hunted on the islands of Don KhiKhauy and Don Men. Crickets are mostly collected at Don Sand or anywhere else along the Mekong river bank where grass grows. While almost all households are involved in fishing, only 15 households practice bird hunting and even fewer are involved in the harvesting of crickets. Fishing is practiced every night, while birds are hunted 2-3 times a week, especially in February and March. Crickets are collected every day from October to November and January to February. The following table shows the amount harvested per day in the whole village and the percentage which is sold.

**Table 41: Basic data per main species harvested in Ban Don Men**

Resources	Fish	Birds
Kilo or units per day/household	3-20	Up to 200 units
Sales in percentage	90-95	95
Days of harvesting	156 – 208	60
Price range per kilo (or unit) in KIP	26,000 – 70,000 per kilo	500 – 11,000 per unit
Household income range in million KIP and USD per year	2.5 – 13 million KIP 320 – 1,663 USD	Up to 2.5 million KIP 320 USD)

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

All amounts are harvested at the above mentioned sites.

**Table 42: Bird species and their price evolution in Ban Don Men**

Lao name in English	Lao name in Lao	Scientific name	Price 2012 (KIP per unit)	Price 2007 (KIP per unit)
Nokkhao	ນົກເຂົາ	Not known	15,000	self consumption only
NokNgew	ນົກງົວ	Not known	2,500	500
Nokxaew	ນົກແຊວ	Not known	25,000	self consumption

				only
NokPao	ນົກເປົ້າ	Not known	500	1000
Nokhon	ນົກຫອນ	Not known	15,000	self consumption only

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

**Table 43: Fish species and their price evolution in Ban Don Men in 2012**

Lao name in English	Lao name in Lao	Scientific name	Price 2012 (KIP per kilo or unit)	Price 2007 (KIP per kilo or unit)
Pa Eun	ປາເອິນ	<i>Probarbus species</i>	52,000	39,000
Pa Pia	ປາເພີຍ	<i>Labeochrysopehekadion</i>	47,000	13,000
Pa Kheung	ປາເຄິງ	<i>Hemibagruswyckioides</i>	62,000	20,000
Pa Sangua	ປາສະງົວ	<i>Micronemaapogon</i>	70,000	20,000
Pa Pak	ປາປາກ	<i>Hypsibarbus species</i>	39,000	7,000
Pa yang	ປາຢາງ	<i>Pangasius species</i>	45,000	13000

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

Both fish and birds are sold to local traders who travel to the village. The local traders then sell them to markets and restaurants in Kenthao District.

Income from fishing is 13,000,000 KIP per year per fisherman's household, while income from bird hunting is 2,500,000 KIP per year per bird hunter's household.

### 6.12.1 Resource trends/pressure on resources

The major pressure on fish is overharvesting, caused in part due to increased demand and prices. In addition, electricity and a variety of fishing nets are used to collect fish. Birds in Don Men were under threat mostly due to habitat destruction. Fishing has increased in the past five years due to price increase. Bird hunting has decreased due to a lack of market. Pressure on both birds and fish has increased due to outside resource-users; such as people from Pak Phang village, Phalat village and Pak Lay. Currently, access limitations do not exist. Habitat destruction may increase as villagers stated that gaining more land for cash crop cultivation was necessary to improve income. The affect that the construction of the dam could have on the harvesting of fish and birds were not mentioned during the survey.

### 6.12.2 Resource management

Findings from the livelihood survey indicated that villagers are involved in the management of -conservation areas, village conservation areas, and sacred river section, and practice controlled fishing. Controls and limitations on logging and hunting are overseen by village and local government officials. Currently, no controls exist for the harvesting of NTFPs. Only one past resource management effort was mentioned, which was a somewhat successful project that promoted the growth and sale of assorted cash crops. Villagers are willing to involve themselves in bird conservation projects, but only if the proposed alternative project can increase household income. Village residents expressed an interest in projects focused

on domestic animal-rearing such as pigs, chickens and ducks. As in other villages, conservation projects suffer from the issue of open access by other communities.

### 6.12.3 Biodiversity perspective on livelihood results

Don Men is one of the communities which use the Kengmai fishing area; identified by the fish survey as being a potentially important site for *Probarbus* sp. The livelihood assessment was particularly interested in targeting communities that rely on *Probarbus* for income or are in close proximity to critical habitat for this species.

## 6.13 Ban Phalat

### 6.13.1 Settlement history and demography

The village of Ban Phalat is located in Sanakham District, Vientiane Province, with a population size of 762 in 2012, and all residents were identified as Lao Loum. The village was founded in 1890 with an initial population of 60 people. Since its foundation, the village has experienced a massive population increase mainly due to voluntary migration and natural growth. The current number of households is 174, with an estimated total population of around 900 people. The villagers expressed that they were not aware of any future resettlement plans.

### 6.13.2 Resource use

Agricultural land for rice production and other crops as well as domestic animals were given the most importance by those interviewed. Fishing, bird and wild pigs were mentioned as the most important wildlife natural resources.

Fish are mainly harvested along the stretch of Mekong river between BeungKhuang and Kengmai (a large rapid which is an important fish spawning ground for *Probarbus jullieni* and perhaps other species, see the map in Annex 13)). Birds and wild pig are hunted throughout the fields and forests that surround the village. The use of wild pig was not further analyzed during this study, as they are not an endangered species. While 25 households are involved in fishing, 120 households practice bird hunting. Fishing is practiced during the day and night, especially between the months of November and February. Wild birds were hunted with most frequency in November and December.

A small herd of ten wild Asian elephants were said to be living along a stream Houay King at the border between Ban Phalat and Ban Donsok. According to the villagers, these elephants are currently not hunted, but are threatened by future hunting due to the destruction they have caused to rice fields belonging to the two neighbouring villages.

**Table 44: Basic data per main species harvested for Ban Phalat**

Resources	Fish (Other)	Birds
Kilo or units per day/household	1.5 – 5	Up to 100 units
Sales in percentage	50 – 80%	80%
Days of harvesting	156 - 365	60

<b>Price range per kilo (or unit) in KIP</b>	26,000 – 52,000 per kilo	500 – 2,500 per unit
<b>Household income range in million KIP and USD per year</b>	3 – 4 million KIP 283 – 377 USD	1-2 million KIP 94 – 282 USD

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

The table shows the perceptions given during group discussions and household-level interviews regarding the ranking of the most important resources, in terms of consumption and income generation. Fish, including *Probarbus jullieni*, ranks as the most important resource (apart from agricultural land and domestic animals) due to its high importance in local diets and major contribution to local incomes. Initially, the village was chosen as a potential management site for *Probarbus jullieni*, but given the high number of birds collected in the time period of only two months per year and the major contribution to local income, bird conservation could also be considered as a potential management priority.

**Table 45: Bird species and their price evolution in Ban Phalat**

<b>Lao name in English</b>	<b>Lao name in Lao</b>	<b>Scientific name</b>	<b>Price in KIP per unit</b>
Nokkhao	ນົກເຂົ້າ	Not kown	15,000
Nokkhuaw	ນົກຂວກ	Not kown	2,500
Nokxaew	ນົກແຊວ	Not kown	25,000
Nokpid	ນົກປິດ	Not kown	500
Nokhon	ນົກທອນ	Not kown	25,000

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

The species NokKhao and NokXaew are perceived to be endangered by the villagers<sup>25</sup>. Although the villagers reported that they can only realize a catch of 1-3 of these bigger birds per day during the season, this catch rate is still quite high given the endangerment status. In addition, during the past 5 years, all bird types were not sold, while currently they are now sold again. This further indicates a growing recent pressure on these bird populations.

### 6.13.3 Resource trends/pressure on resources

Villagers stated that the population of fish, including *Probarbus jullieni*, decreased across all species due to the use of chemicals and habitat destruction associated with gold mining. While some bird populations decreased, others increased as described below.

The respondents claimed that some species of the bird population such as the locally named “NokKhao” had increased because it is a bird that is hard to catch since current methods used by villagers for hunting other bird species don’t work well with this species. The population of another species locally named “Nokxaew” has also increased; villagers said this was due to both the difficulty in hunting it and that its meat was less desirable than the other species. The population of a third bird type, locally called “Nokpid”, was reported to

<sup>25</sup> The species could not be identified. According to bird experts, villagers use the same name for different species and this differs from village to village. Thus, species identification is in most cases only possible through direct observation or using pictures to show to the villagers for their identification. This was not the purpose of the livelihood survey.

have risen due to a recent increase in insects that are the main food source for this species. The populations of other species, locally called “Nokkhuak” and “Nok Hon”, decreased due to an increase in hunting and habitat loss. The villagers mentioned that an additional high pressure on bird populations is due to chemicals used for killing rats that have a negative side-effect on birds that consume these chemicals.

Additional pressure on *Probarbus jullieni* is caused by access to fishing areas by residents of other villages such as Ban Don Men. This unrestricted access is a threat also to birds and neither resource access limitations nor restrictions exist.

#### 6.13.4 Resource management

The livelihood survey indicated that villagers are involved in the management of conservation areas, protected forest areas, and spirit forests. Co-management between government and village authorities is in place to set controls for logging and hunting.

There was mention of some past efforts for resource management, including those for *Probarbus jullieni*. Specifics of the project were not available, but it appeared to have been a government-led project. The project was not successful due to unrestricted access to the fishing area by people from outside the village. In addition, the project was said to have not increased income for the fishermen’s families and therefore lacked a strong interest and commitment from the community.

Future conservation options regarding fish, including management of fishing at Kengmai, were mentioned. People are interested in fish management projects if they can improve income. Residents were also interested in fish farming, and if successful, this could reduce pressure on the Kengmai area<sup>26</sup>.

Other development priorities mentioned were increased growth of cash crops and the raising of domestic animals.

#### 6.13.5 Biodiversity perspective on livelihood results

Ban Phalat is also one of the communities that uses the Kengmai fishing area; identified by the fish survey as being a potentially important site for *Probarbus*. As with communities to the north, communities in proximity to habitat critical to *Probarbus* were of special interest to the livelihood assessment.

### 6.14 Ban Don Kang Khong

#### 6.14.1 Settlement history and demography

The village of Ban Don Kang Khong is located in Sangthong District, in the capital of Vientiane. It was established in 1976, with an initial population of 45 people. The population size in 2012 was 372 people living in 82 households, all of them Lao Loum.

**Table 46: Population trend in Ban Don Kang Khong**

Year	1976	1980	1990	2000	2012
Population size	45	100	130	150	372

<sup>26</sup>Most of the projects in Laos which tried this have failed. Fish farming requires a lot of resources (financial) that the villagers don’t have. It also requires a lot of work and technical knowledge since it is quite different from net fishing in rivers. Finally, and maybe the most important, Lao people always prefer wild Mekong fish, if available.

Sources: IUCN/CEPF livelihood survey, 2012

The population of Ban Don Kang Khong has steadily increased since its foundation. From 2000 to 2012, the population has increased by more than double. Pre-2000, growth was due to natural factors and the latest big expansion was because of voluntary in-migration. No future plans for resettlement were known to villagers.

#### 6.14.2 Resource use

The most important resources were listed by the villagers as land for rice, land for cash crops, domestic animals, fish and gold mining. They listed natural trees, birds, fish, crickets and amphibians as the most important NTFPs and harvested animal species. Birds and insects are harvested on small islands in the Mekong river near Ban Don Kang Khong village. Amphibians are harvested in rice fields and natural forests which surround the village. The number of households involved in harvesting birds, fish, insects and amphibians was not known during the survey. Fishing is practiced on an average of three days a week. Birds are hunted four times a week, usually in the morning and afternoon. Insects (mainly crickets) are harvested every day from October to November and other species are collected throughout the rest of the year. Amphibians are harvested every day during rainy season.

**Table 47: Basic data per main species harvested in Ban Don Kang Khong**

Resources	Fish	Birds	Amphibians	Insects
<b>Kilo or units per day/household</b>	Up to 10 kg	400-600 units	Up to 20 units	Around 7 kg
<b>Sales in percentage</b>	100	90	90	Not known
<b>Days of harvesting</b>	156 core days	208 core days	176 core days	Not known
<b>Price range per kilo (or unit) in KIP</b>	around - 35,000/kg	around 13,000/unit	2,000 – 5,000/unit	430/unit (cricket) 45,000/kg (bugs) 2,500/unit (aquatic insect) 35,000/kg (grasshopper)
<b>Household income range in million KIP and USD per year</b>	0.5 – 2 million KIP 64 – 256 USD	1-3 million KIP 128 – 384 USD	Not known	1 million KIP 128 USD

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

**Table 48: Fish, birds, insects and amphibian species and their prices range in Ban Don Kang Khong**

Lao name in English	Lao name in Lao	Scientific name	Price 2012 (in thousand KIP per kilo or unit)	Price 2007 (in thousand KIP per kilo or unit)



Lao name in English	Lao name in Lao	Scientific name	Price 2012 (in thousand KIP per kilo or unit)	Price 2007 (in thousand KIP per kilo or unit)
<b>Fish</b>				
Pa Eun	ປາອິນ	<i>Probarbus jullieni</i>	35,000	13,000
<b>Birds</b>	ນົກ	Not known	13,000 per 1 unit	13,000/10 units
<b>Insects</b>				
Cricket	ຈີ່ນາຍ	Not known	13,000/30 units	250/1 unit
Bugs	ແມງຈູຈີ່	Not known	45,000	N/A
Aquatic insect	ແມງໄມ້ນ້ຳ (ແມງດາ)	Not known	2500/1 unit	120/1 unit
Grasshopper	ຕົ້ກກະແຕນ	Not known	35,000	25,000
<b>Amphibian</b>				
Kop Kied	ກົບຂຽດ	Not known	Not known	Not known

Sources: IUCN/CEPF household survey (2012) and IUCN/CEPF group discussion (2012)

The income generated from fishing is between 500,000 to 2,000,000 KIP per year, per household. Income from hunting birds is between 1,000,000 and 3,000,000 KIP per year, per household. Income from collecting insects is around 1,000,000 KIP per year, per household.

#### 6.14.3 Resource trends/pressure on resources

Bird populations have declined due to habitat loss from expanding agricultural lands. Insect populations were reported to be healthy and to have not fluctuated much over the past few years. Residents listed pollution from sources including dam construction and the use of dynamite by outside fishermen as the main cause of population decline in fish. Birds could lose more habitat as residents reported they would most likely need to expand their rice fields to keep up with population growth.

#### 6.14.4 Resource management

The villagers of Ban Don Kang Khong are involved in resource management of village conservation areas, protected areas, controlled logging, controlled hunting, and controlled fishing. Co-management between village authorities and government officers and controlled harvesting of NTFPs do not exist.

The only past resource management project mentioned was a government-led initiative called The Good Farmer Project. This project was perceived by residents as being successful as it taught efficient agricultural practices and involved many people in the community. In the future, residents expressed an interest in bird conservation, but also expressed worries that open access to the islands might hamper the project. They liked the idea of using islands as places to take tourists and birdwatchers. Residents also said that they wanted to install an irrigation system for their rice fields and increase domestic animal production.

#### **6.14.5 Biodiversity findings related to future management**

The bird surveys found the area along the Lao-Thai border to be of significant interest for a variety of bird species due to the formation of large sand bars during the dry season which is absent from the narrow channel characteristic of the Mekong in the sections of the study area north from here. During the biodiversity survey, a small flock of Red Avadavat (*Amandava amandava*) was seen here, making it only the second time this species has been recorded in Lao PDR. Ban Don Kang Khong is centrally located in an area that the bird survey described as being some of the most productive habitats for birds in the study area. For this reason, it was included in the targeted communities for the livelihood assessment.

### **7. Discussion**

The survey revealed that demographic trends along with resettlement and infrastructure programs led by the state, the modernization of resource exploitation, and an increasing demand for natural resources and agricultural products - both leading to higher prices - are major trends contributing to biodiversity loss along the Mekong.

The significant incomes obtained from harvesting wild species including NTFPs is sometimes much higher than that from other sources such as rice. This holds especially true when we look at the total income from various resources of wild species. Any management effort leading to less pressure on those resources - while maintaining self consumption and sales for income generation below the respectively critical threshold for each resource - would need to compensate villagers for their losses with alternative income sources.

Even if the Government of Lao PDR, the project and villagers will agree on co-management efforts, the transboundary harvesting practices involving more than one village or several districts and resource users from Thailand, and the market pressure brought about by an increasing number of traders from the region and neighboring countries will pose a challenge for the success of co-management. The biodiversity survey concluded with the paragraph: "In sum, other than for fish which provide some very clear spatial priorities, site selection for this project should probably be based largely around situational factors such as willingness of the local communities and government to engage." Thus the community profiles in this report will enable future stakeholders to identify project sites and community partners.

The perception from the communities on the potential impact of hydropower development upon livelihoods on this stretch of the river has been unclear.

Whereas direct concerns about the impacts of resettlement and flooding of agricultural land have been clearly expressed by both communities and local officials, some interviewees stated that reservoirs created by the different dams could locally result in an increased fish population.

It has been shown in past studies and projects that dams can cause drastic changes in water quality through the degradation of former terrestrial vegetation in the reservoir which could lead to a decrease of fish population and other aquatic species. Moreover changes in flow and flood patterns as well as changes in sedimentation could have impacts on upstream and downstream natural habitats and flow changes could impact the migration for many species of fish. It is also likely that the dam itself would have an impact on the migration possibilities of some species.

Most of the Teak plantations from the village in the study area are also somewhat close to the river located in low lands. Floods created by dam construction could have an impact on these plantations and therefore on the income of the communities. It has not been possible

to document the compensation discussed between the Lao governments and communities in this regards or in case of resettlement.

Nevertheless, dam construction has been sometimes expressed as a good source of employment for locals, but it is still unclear if this activity will involve locals for a long period of time which could therefore replace other sources of income or if they will lead to short-term work contracts which wouldn't compensate for the potential loss in terms of agricultural lands or aquatic resources.

According to these results on livelihoods studies, it is somewhat difficult to establish a clear and direct link between some CEPF priority species and pressure from harvesting/fisheries.

It seems that the use of natural resources in the target area is not "species specific" but is rather "taking them all". Impacts on key species through the direct destruction of natural habitats, like destructive agricultural techniques (slash and burn), is probably heavier than the direct use or consumption of wildlife.

In this regard it seems more relevant to adopt a site based conservation approach rather than a species specific one. Sustainable management of forests and other natural habitats will benefit all ranges of wildlife, from the very common to the most endangered. This approach seems particularly relevant in the villages of Ban Thadeua (Thad Jao site) and Ban Nongkhai (Don Hon).

Small projects providing alternative and new sources of income, through sustainable tourism for example or direct employment for species protection, seems also to be a promising way to ensure a lesser impact on natural resources.

Nevertheless, some "species focused" projects can still be considered, mainly targeting the two *Probarbus* species through fisheries management and controlled trade.

Soft shell turtles have not been directly indicated as those which are targeted by the villagers, but further discussions with them always led to the fact that these species became quite rare and the cost/benefit ratio of targeting them is quite low. Small populations of soft shell turtles have been indicated in some sections of the Mekong river and could justify the implementation of nest protection schemes at site level, providing direct income to the communities for species protection.

Many promising income alternatives have been identified, which partially have been implemented elsewhere in Lao. Also eco-tourism has a big potential in the study region, but would also need to involve private investors.

## Annexes

### Annex 1: Questionnaire rapid livelihood and village assessment

#### 1. General information

1.0 ID Number:
1.1 Date of interview:
1.2 Name of enumerator 1:
1.3 Name of enumerator 2:
1.4 Name of Enumerator 3:
1.5 Name of enumerator 4:
1.6 Name of local interview partner 1:
1.7 Position of local interview partner 1:
1.8 Name of local interview partner 2:
1.9 Position of local interview partner 2:
1.10 Name of local interview partner 3:
1.11 Position of local interview partner 3:
1.12 Province where village is located:
1.13 District where village is located:
1.14 Name of village:
1.15 GPS of village:

#### 2. Settlement History and Population Dynamics

##### 2.1 Year of village foundation:

##### 2.2 Population size in total number of villagers

Year	Number of villagers
2012	
2000	
1990	
1980	
1975	
1960	
1945	
1910	
Year of village foundation	

**2.3 In which year did the village encounter a major population increase or decrease?**

**2.3.1 For what reason?**

**2.4 What is the biggest ethnic group in the village?**

Lao Loum  Khmou  Hmong  Akha  Other:.....

**2.4.1 List the subgroups per ethnic main groups**

Main Group	Sub Groups
Lao Loum	
Khmou	
Hmong	
Akha	
Other	

**2.5 Population size per ethnic group**

Name of ethnic group	Total number in 2012
1. Lao Loum	
2. Khmou	
3. Hmong	
4. Akha	
5. Others (specify):	

**2.6 In which year did the ethnic groups settle at the current location?**

Name of ethnic group	Year of settlement
1. Lao Loum	
2. Khmou	
3. Hmong	
4. Akha	
5. Others (specify):	

## 2.7 Reasons for settlement per ethnic group

(Interviewer: multiple answers allowed, put X for “yes”)

Name of ethnic group	Looking for new agricultural land	Looking for better access to fish, wildlife, NTFPs	Resettlement	Spirits	War	Better infrastructure access	Problems in the village	Other reason (specify)
1. Lao Loum								
2. Khmou								
3. Hmong								
4. Akha								
5. Others								

**2.8 Will the village soon be resettled (yes or no)?**

**2.9 If yes, when?**

**2.10 If yes, for what reason**

## 3 Resource use and management

**3.1 List the resources for consumption or/ and income**

(Interviewer: put nothing if not important, 1=consumption, put 2 for income, put 3 for consumption AND income)

Name of ethnic group	Lao Loum	Khmou	Hmong	Akha	Other
<b>Resource use</b>					
Land for rice cultivation					
Land for other crops (e.g tree plantation)					
Birds					
Bird eggs or nests					
Deers					
Monkeys					
Other large mammals (specify) .....					
Mice and rats					
Squirrels					
Bats					
Otters					

Name of ethnic group	Lao Loum	Khmou	Hmong	Akha	Other
Turtles from Mekong					
Turtle egg from Mekong					
Turtles from elsewhere (tributary, hill, forest....)					
Turtles egg from elsewhere (tributary, hill, forest)					
Varanids and large lizards					
Varanids and large lizards egg					
Snakes					
Snake egg					
Geckos					
Others (specify) .....					
Amphibians					
Fish General					
Fish <i>Probarbus jullieni</i>					
Aquatic insects					
Snails and mussels					
Shrimps					
Crabs					
Large trees					
Shoots (e.g. Bamboo, Rattan)					
Mushroom					
Tubers					
Worms					
Insects					
Aquatic plants					
Riparian Plants					

**3.2 Out of the above list, what are the five most important resources for income/ consumption?**

(Interviewer: put 1, 2, 3, 4, 5 as a ranking)

Name of ethnic group	Lao Loum	Khmou	Hmong	Akha	Other
<b>Resource use</b>					
Land for rice cultivation					
Land for other crops (e.g. tree plantation)					
Birds					
Bird eggs or nests					
Deer					
Monkeys					
Other large mammals (specify) .....					
Mice and rats					
Squirrels					
Bats					
Otters					
Turtles from Mekong					
Turtle egg from Mekong					
Turtles from elsewhere (tributary, hill, forest....)					
Turtles egg from elsewhere (tributary, hill, forest)					
Varanids and large lizards					
Varanids and large lizards egg					
Snakes					
Snake egg					
Geckos					
Others (specify) .....					
Amphibians					
Fish General					
Fish <i>Probarbus jullieni</i>					



Name of ethnic group	Lao Loum	Khmou	Hmong	Akha	Other
Aquatic insects					
Snails and mussels					
Shrimps					
Crabs					
Large trees					
Shoots (e.g. Bamboo, Rattan)					
Mushroom					
Tubers					
Worms					
Insects					
Aquatic plants					
Riparian Plants					

**3.3 Is there abundance or depletion of those five resources?**

**3.4 Do you protect or manage any natural sites/ resources nearby the village and how?**

*(Interviewer: put X for “yes”)*

	Village	Government	Project	Other (specify):
<b>Village Protected Areas</b>				
<b>Village Conservation Area</b>				
<b>Spirit Forest</b>				
<b>Controlled logging</b>				
<b>Controlled hunting</b>				
<b>Controlled NTFP collection</b>				
<b>Spiritual part of the river</b>				
<b>Controlled fishing</b>				
<b>Tourist attraction</b>				

**3.5 Is the village willing to implement resource management measures or ecotourism projects in the future?**

## Annex 2: Questionnaire household survey

### 1 General information

1.0 Name and ID Number of village: <i>(to be filled in matching the ID number of the rapid assessment)</i>
1.1 Date of interview:
1.2 Number of family members
1.6 Names, sex, ages of family members <i>(those who really live in the village)</i> 1.6.1 Name, sex and age person 1 Position in the village <i>(if any, e.g. head of local fishermen...)</i> 1.6.2 1.6.3 .....

### 2 General livelihood and resource management information

2.2 How many family members are involved in the harvesting/ fishing/ hunting of..... *(Put resource name e.g. crab, turtle, reptile.....)?*

2.3 List and rank the most important *(in terms of importance for income and consumption)* NTFPs and/ or species *(including aquatic and riparian)* for the household?.....  
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### 3 Information on focus resource

3.1 How often and when do you *(in terms of average of the user group)* harvest/ fish/ hunt..... *(Put name of resource to be managed)?*  
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**3.2 What amounts (specify units, e.g. number, kilogram...) do you recently harvest/ fish/ hunt?**

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**3.3 Please indicate in percentage the amount per incidence/season of harvesting/ fishing/ hunting which is consumed by the family and which is marketed (e.g. five turtles collected and sold (=100%), 10 kilos of crabs harvested and 50% sold)?**

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**3.4 Which price per unit do you recently obtain?**

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**3.5 How and why did the price change during the past five years?**

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**3.6 To whom/ where (traders, market, government....) and how often do you sell**  
..... (Resource name)?

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**3.7 To which percentage does the income obtained from** .....  
..... (Resource name) **contribute to an average household income?**

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**4 Pressures on focus resource**

**4.1 What amounts did you harvest/ fish/ hunt 5 years ago?**

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**4.2 What quantities did you harvest/ fish/ hunt 10 years ago?**

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**4.3 Please indicate the reasons for increase or decrease of harvested/ fished/ hunted amounts**

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**4.4 Compared to five years ago, do you sell .....  
(Resource name) more or less often and why?**

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**4.5 Which other types of resource uses affect the harvesting/ fishing/ hunting of**  
..... *(Resource name) and how?*

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**4.6 Which other resource users (not located in the village) access the resource?**

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**4.7 How do you deal with these external users?** *(E.g. not at all, controlled harvesting through co-management, restrict their access through patrolling, involve government agencies for control....)*

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**5.3 How successful do you consider this support and why?**

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**5.4 How did/ do these activities affect the harvesting/ fishing/ hunting of**  
..... *(Put resource name)?*

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**5.5 Could you imagine to be involved in controlled harvesting/ fishing/ hunting**  
**of**..... *(Put resource name)?*

.....  
.....

**5.6 What would be the most important alternative income sources to be**  
**strengthened to come up with a better management of** ..... *(Put resource*  
*name)?*

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.....  
.....  
.....  
.....

**5.7** In your opinion, what are the most important counter management efforts to be undertaken to really enforce a better management system (e.g. regular government extension or patrolling initiatives)?

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## Annex 3: Questionnaire Group Discussions

### 1 General information

<b>1.0 Name and ID Number of village:</b> <i>(to be filled in matching the ID number of the rapid assessment)</i>	
<b>1.0.1 Names and GPS of sites</b>	
<b>1.1 Date of interview:</b>	
<b>1.6 Name and position of participants in the group discussion</b>	
<b>1.6.1 Name and sex person 1</b>	<b>Position</b> (e.g. female villager, head of local fishermen...)
<b>1.6.2</b>	
<b>1.6.3</b>	

### 2 General livelihood and resource management (site) information

2.1 How many households live in the village?

2.2 How many households are involved in the harvesting/ fishing/ hunting of..... *(Put resource namee.g. crab, turtle, reptile.....)?*

**2.3 List and rank the 3 most important (in terms of importance for income and consumption) NTFPs for the village?** .....

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**2.4 Name the most important sites for NTFP collection and give the reasons for their importance? (Refer to Raphael's matrix, if possible, visit the sites)**

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**3 Information on focus resource**

**3.1 How often and when do you (in terms of average of the user group) harvest/ fish/ hunt..... (Put name of resource to be managed)?**

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**3.7.1 How much was your income from..... (Resource1, resource2, resource3)  
in  
2012?.....**

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.....  
.....  
.....

**4 Pressures on focus resource**

**4.1 Five years ago, did you harvest/ fish/ hunt more or less and why?**

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**4.2 Ten years ago, did you harvest/ fish/ hunt more or less and why?**

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**4.4 Compared to five years ago, do you sell .....  
(Resource name)more or less and why?**

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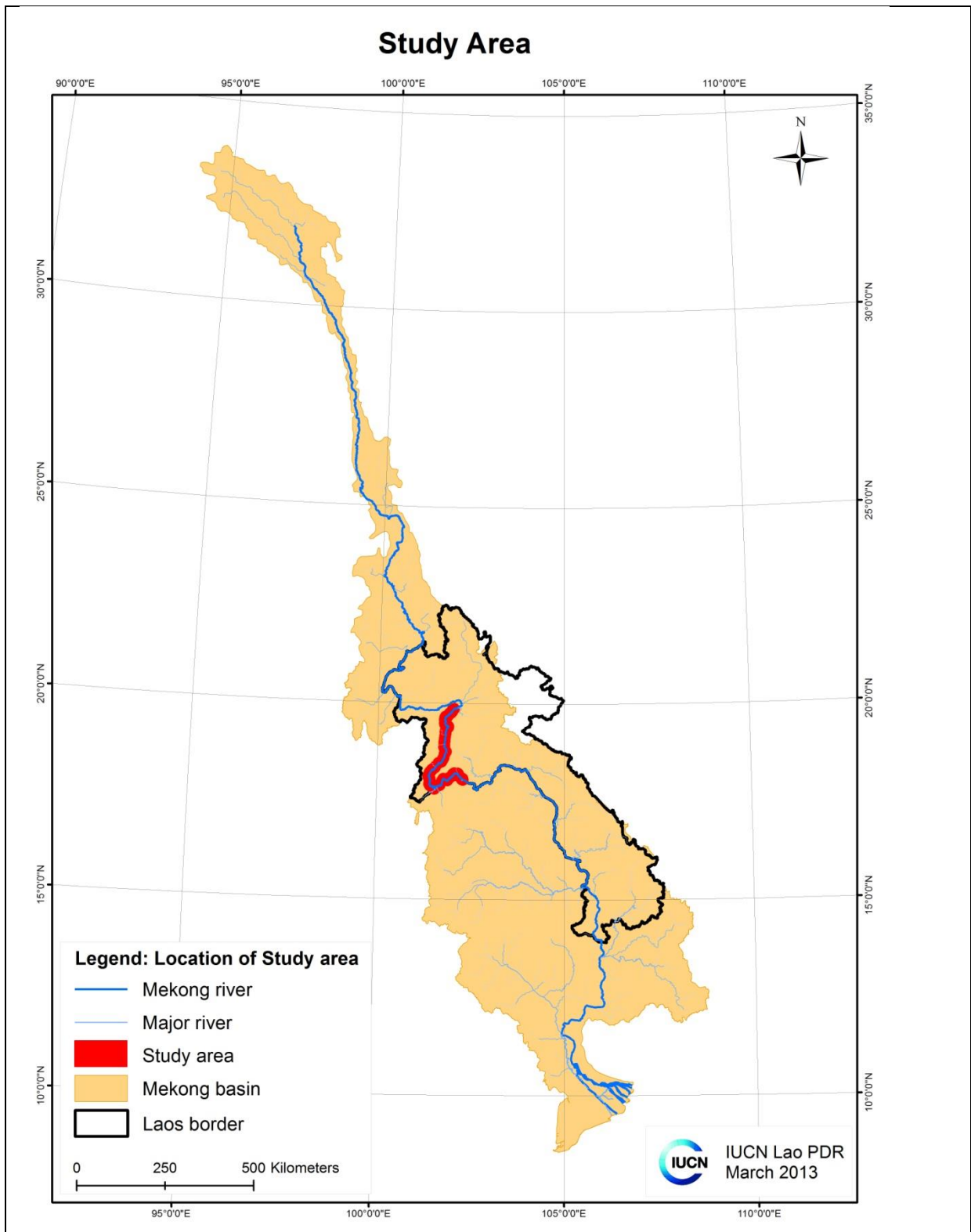
**5.4** Would you like and/ or be able to be involved in controlled harvesting/ fishing/ hunting of.....(*put resource name*)?

.....  
.....

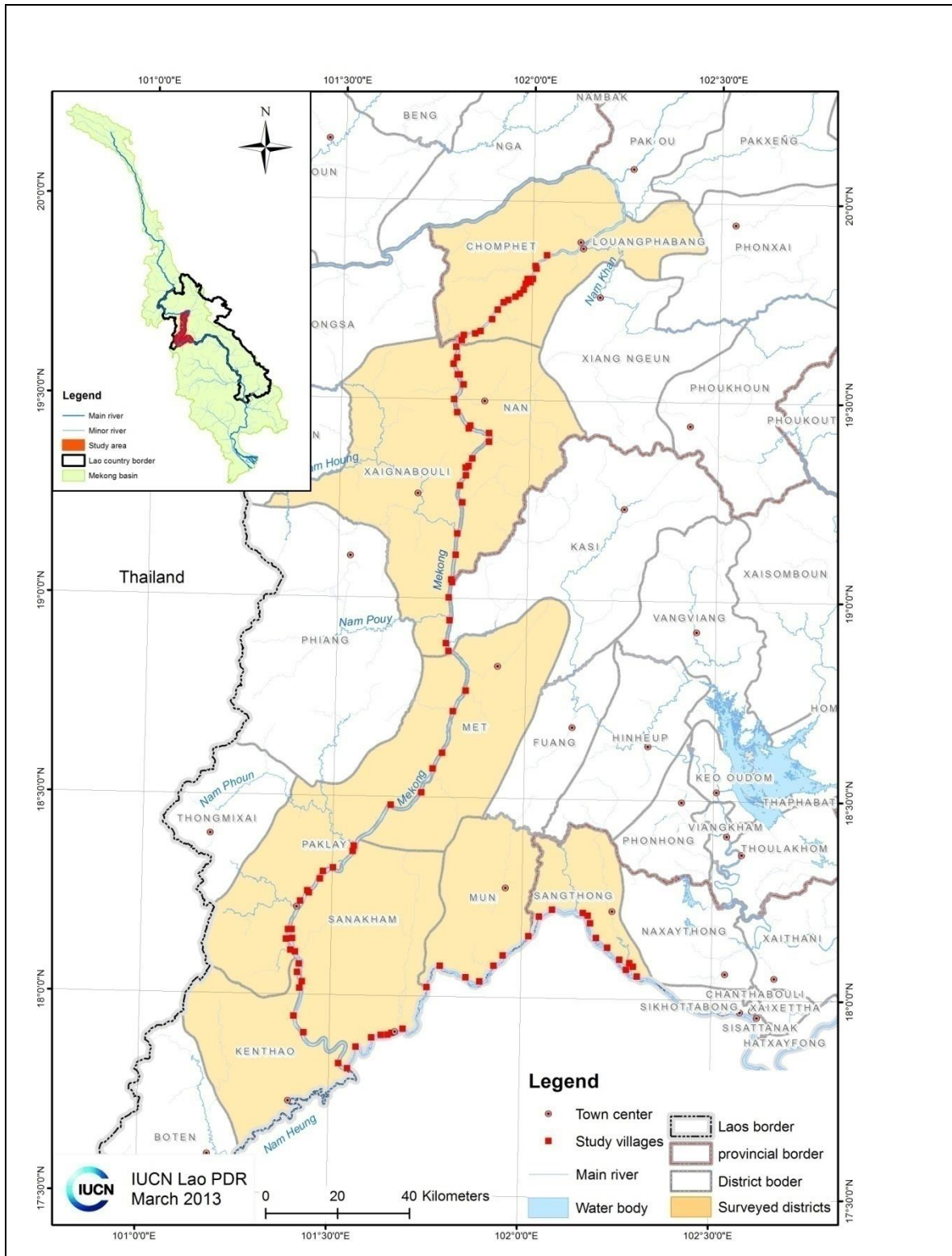
**5.5** What would be the most important alternative income sources to be strengthened to come up with a better management of ..... (*Put resource name*)?

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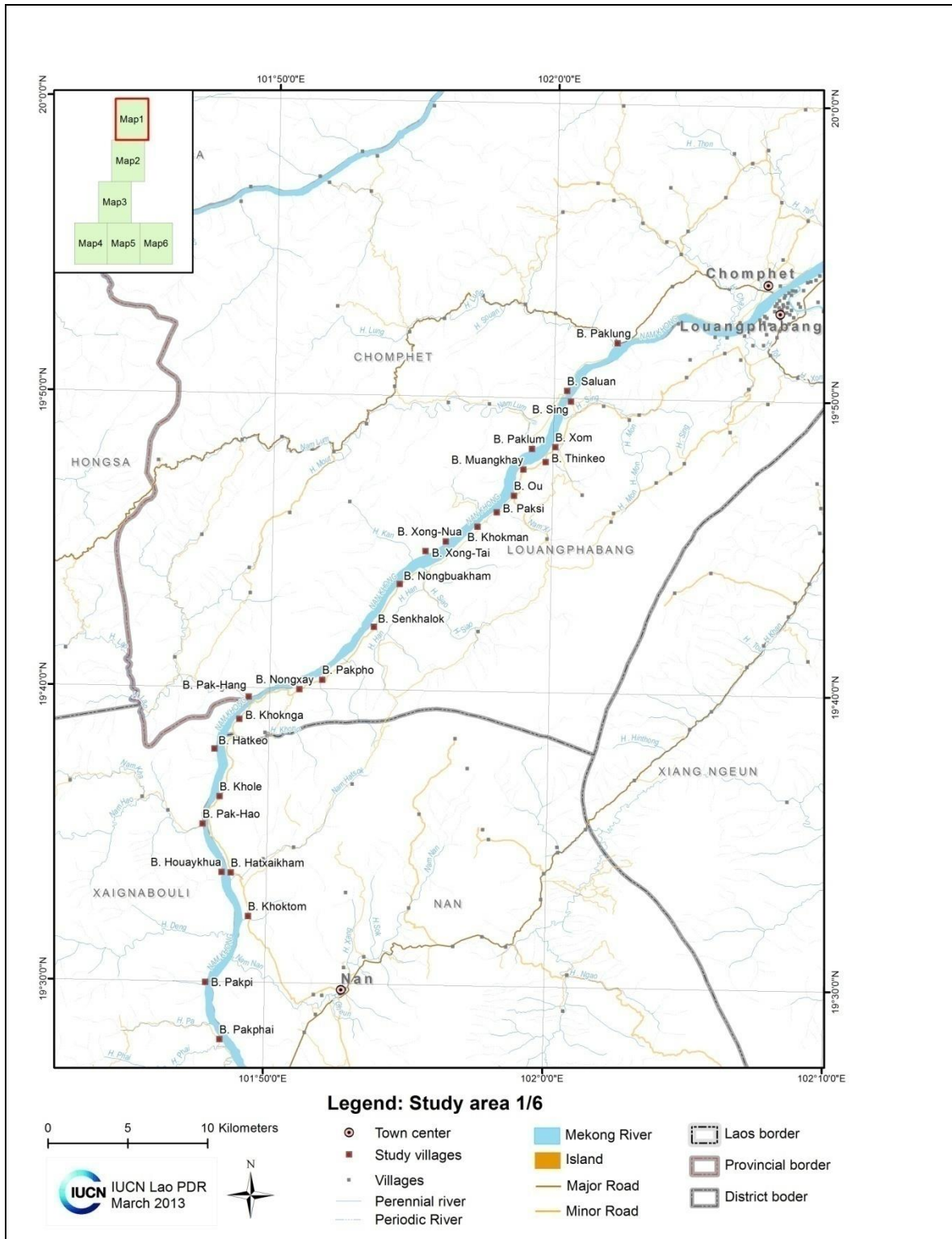
## Annex 4: Study location



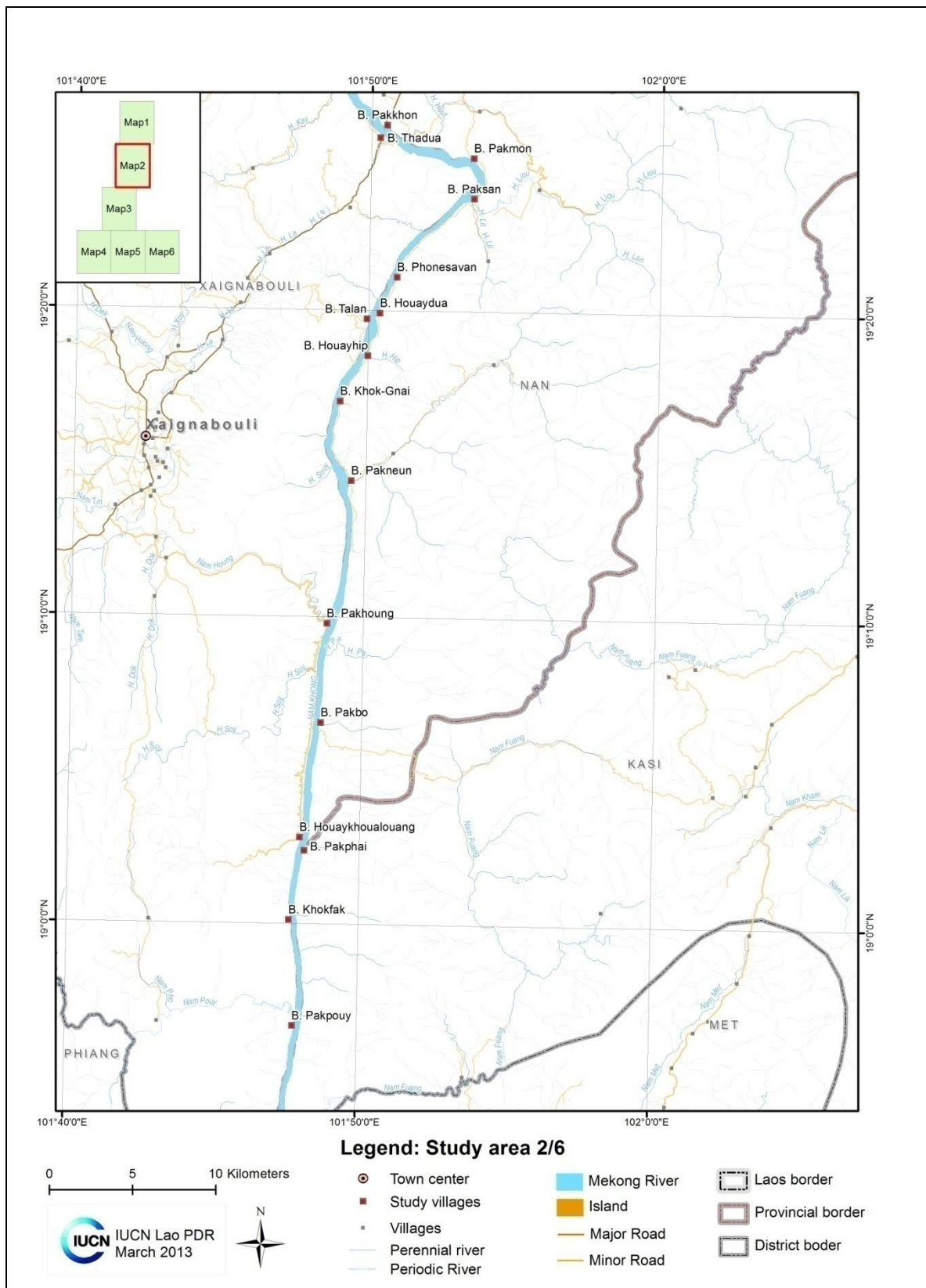
# Annex 5: Overview study area



# Annex 6: Study area part 1

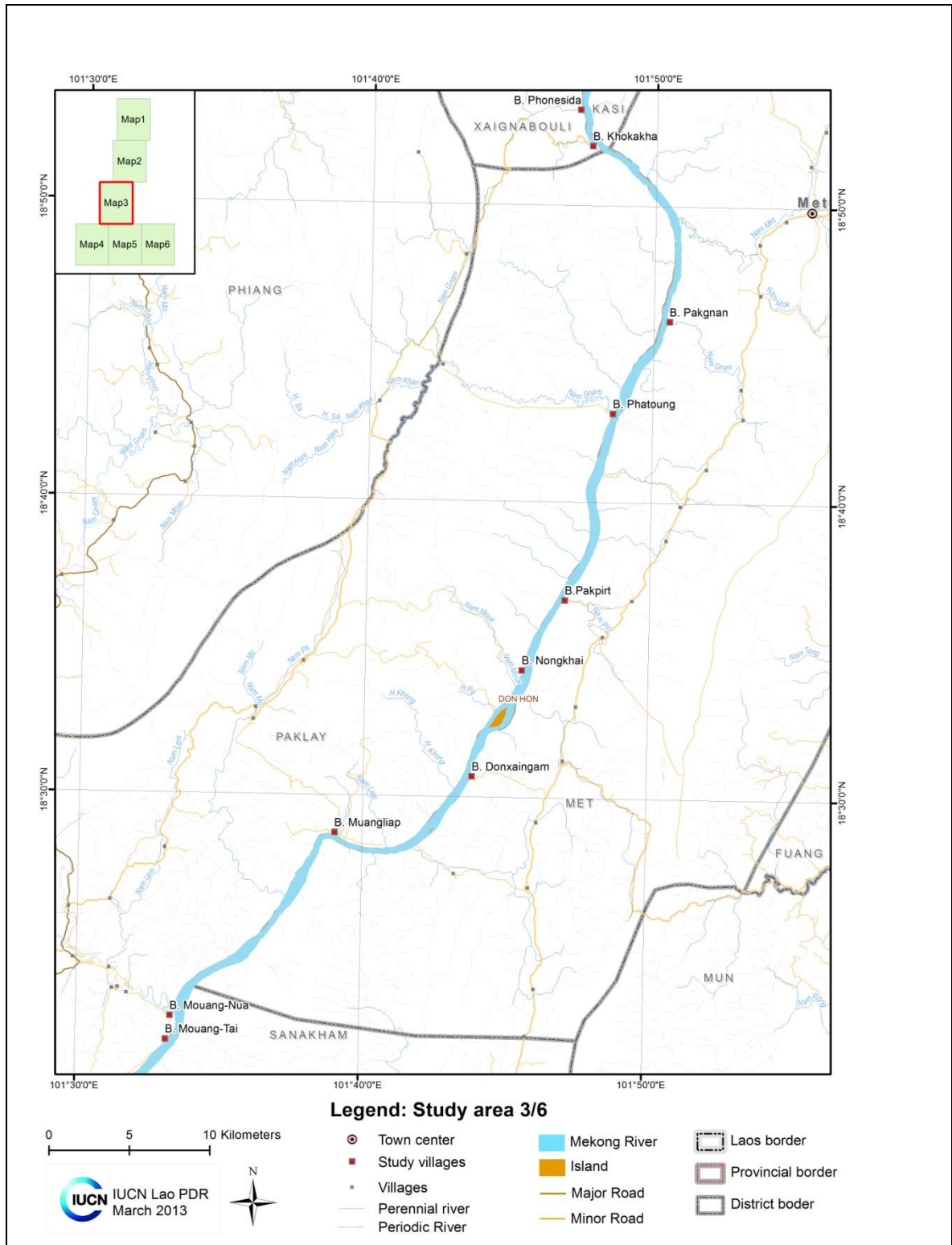


## Annex 7: Study area part 2

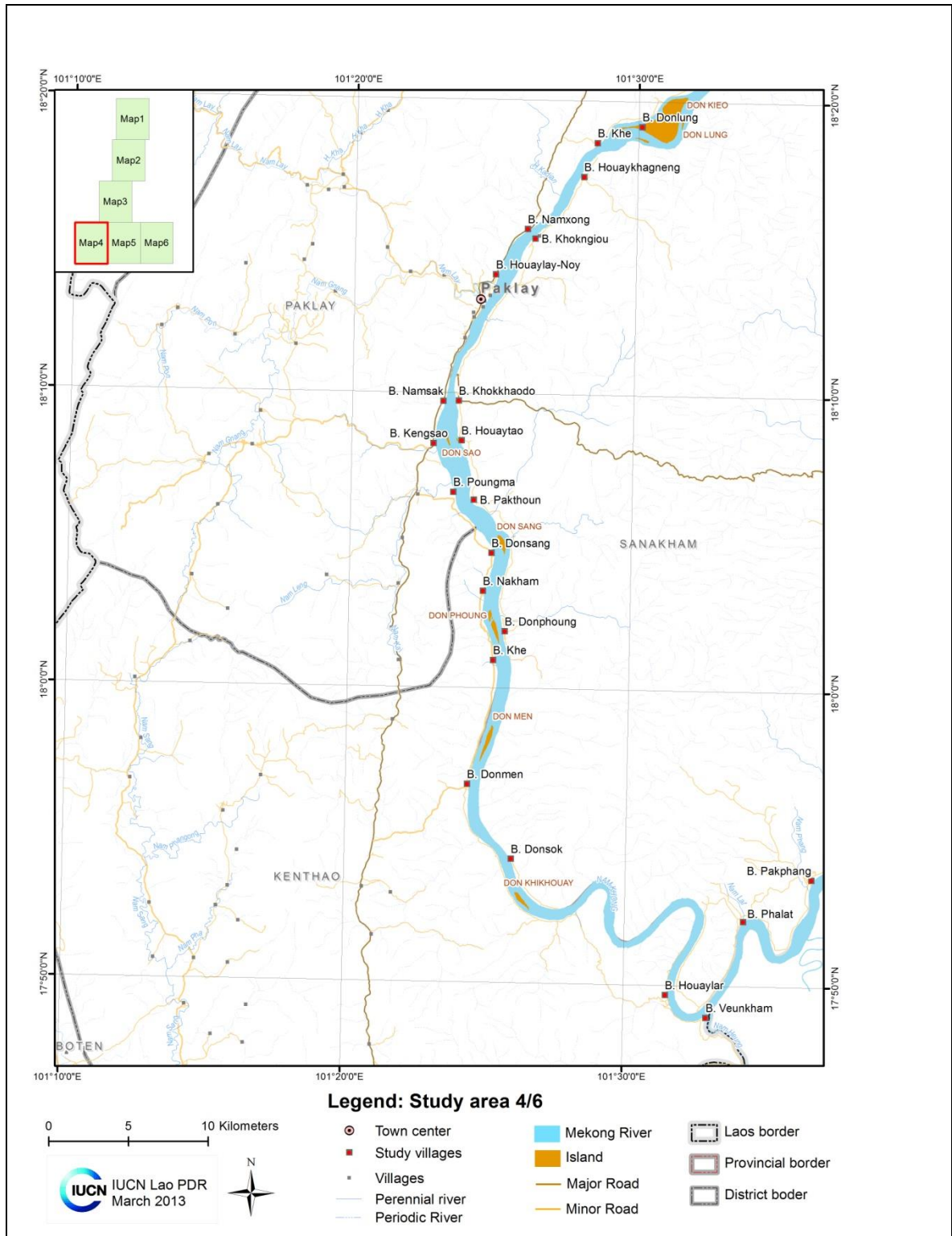




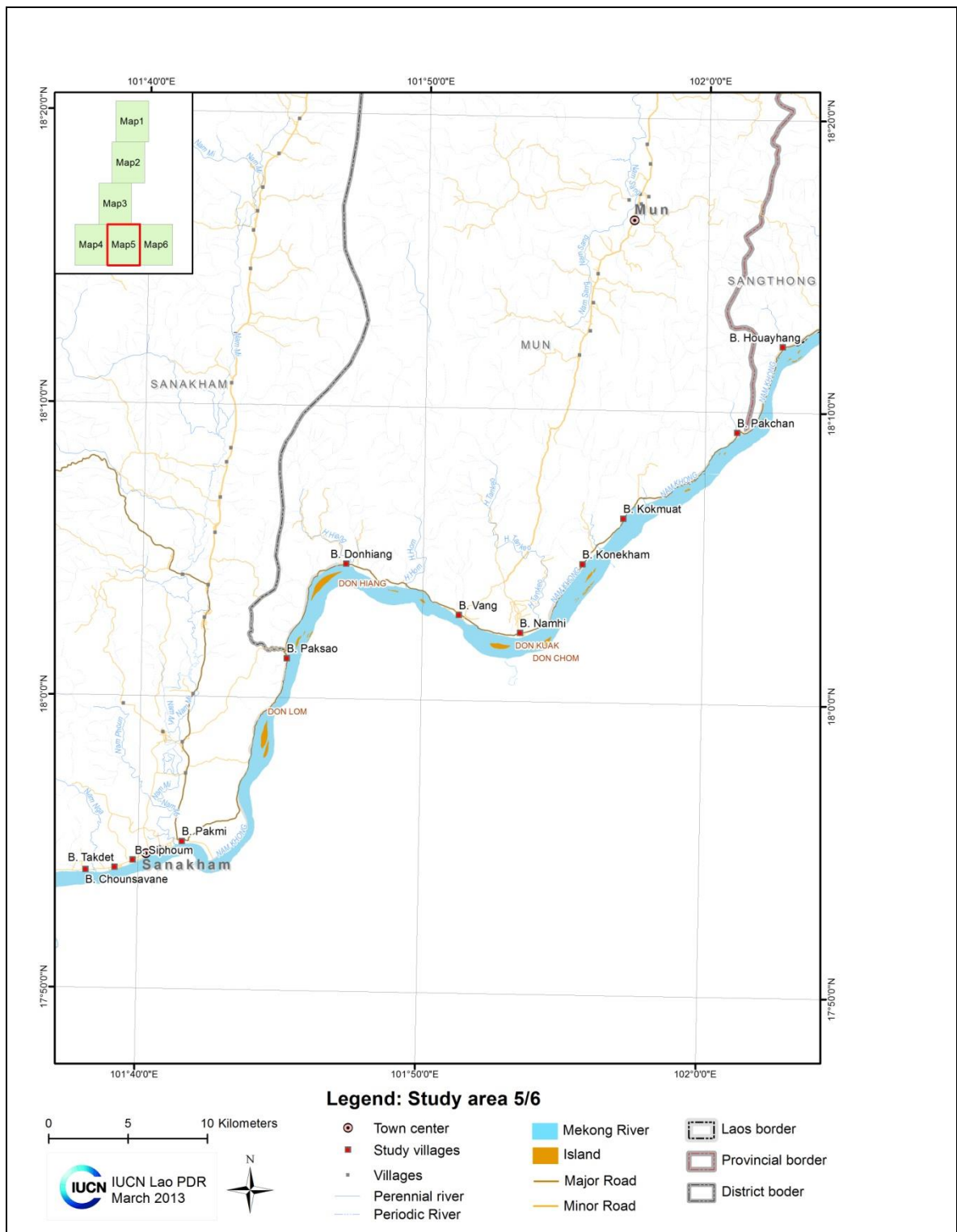
# Annex 8: Study area part 3



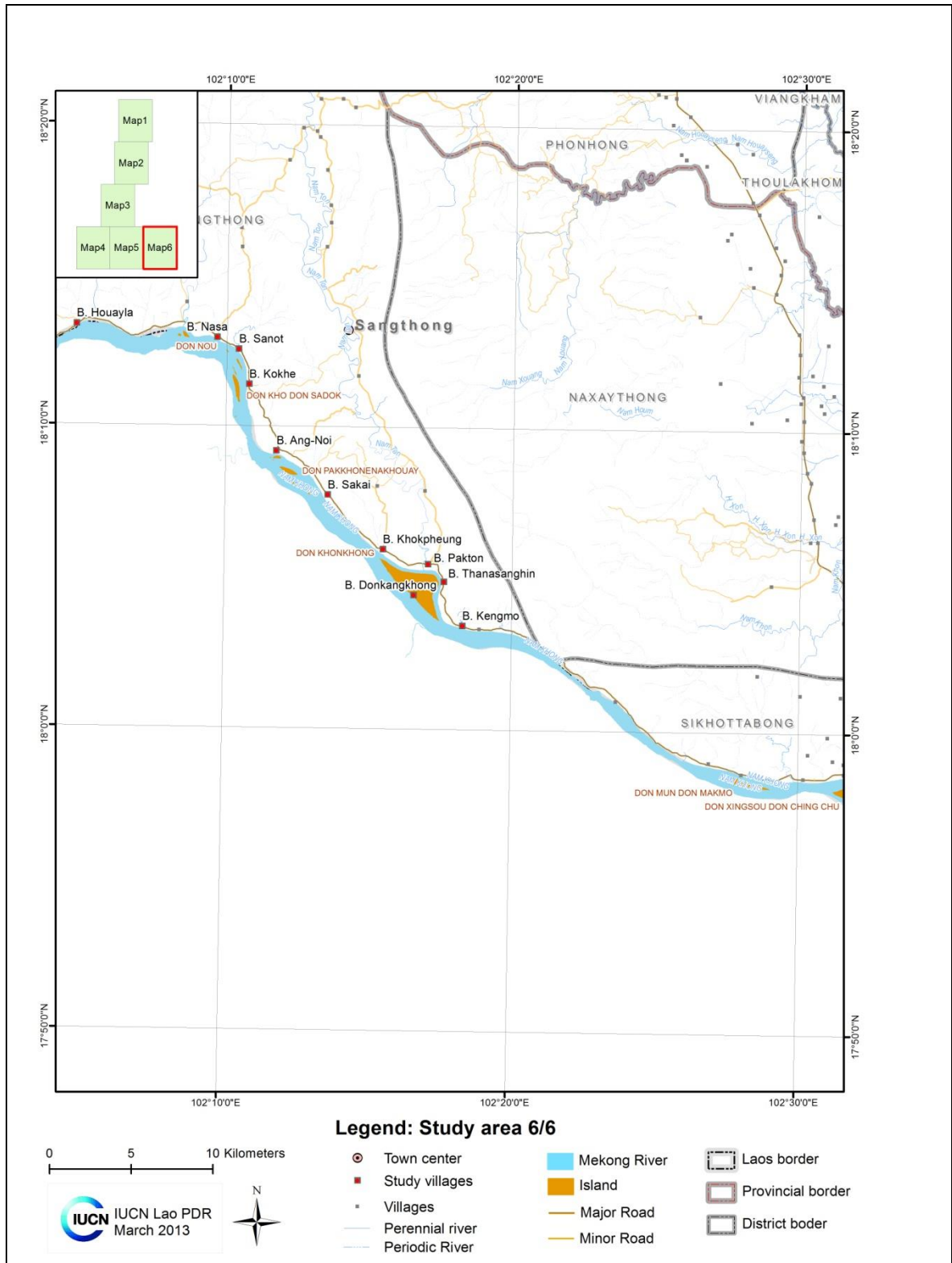
# Annex 9: Study area part 4



# Annex 10: Study area part 5

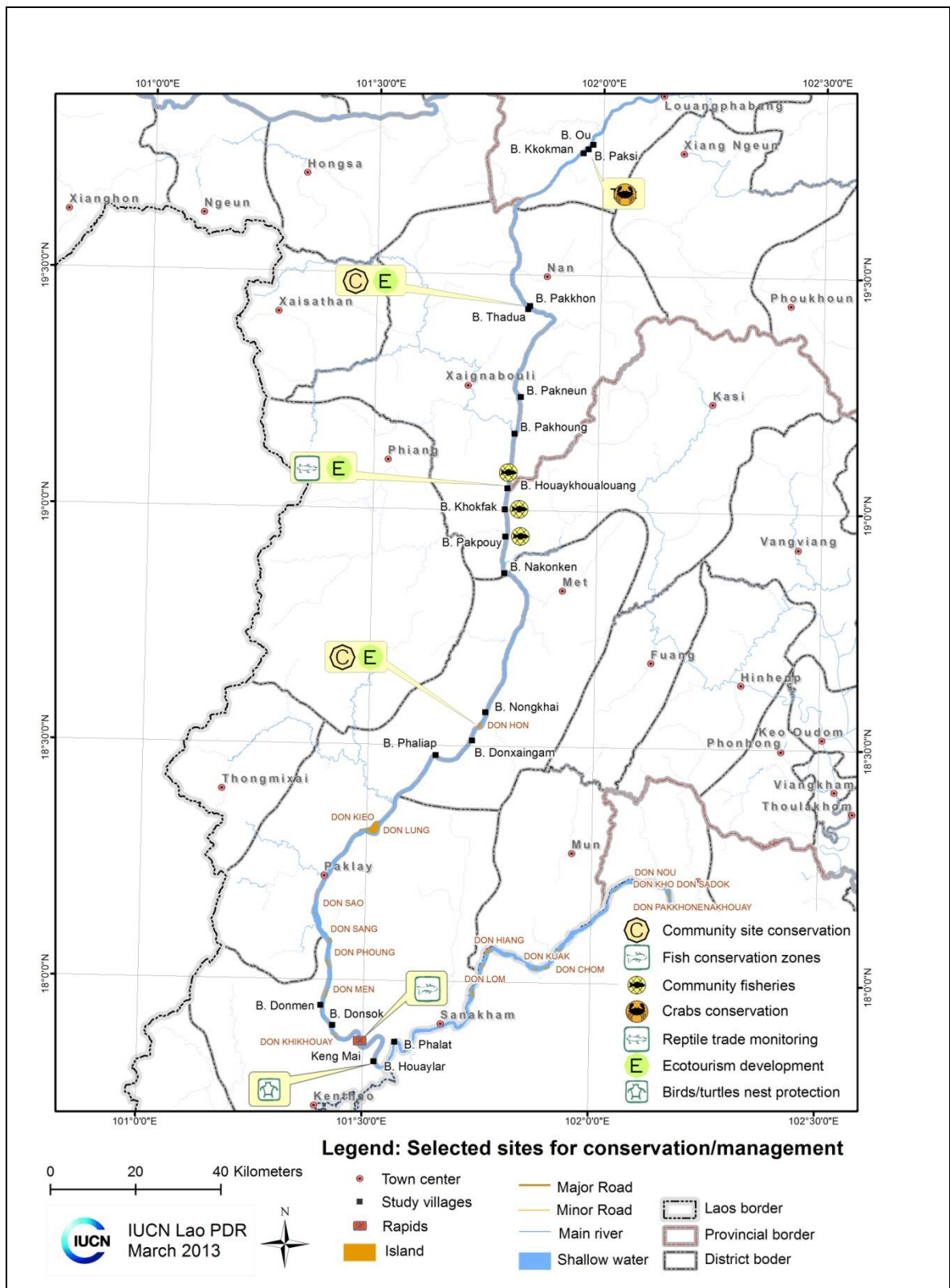


# Annex 11: Study area part 6

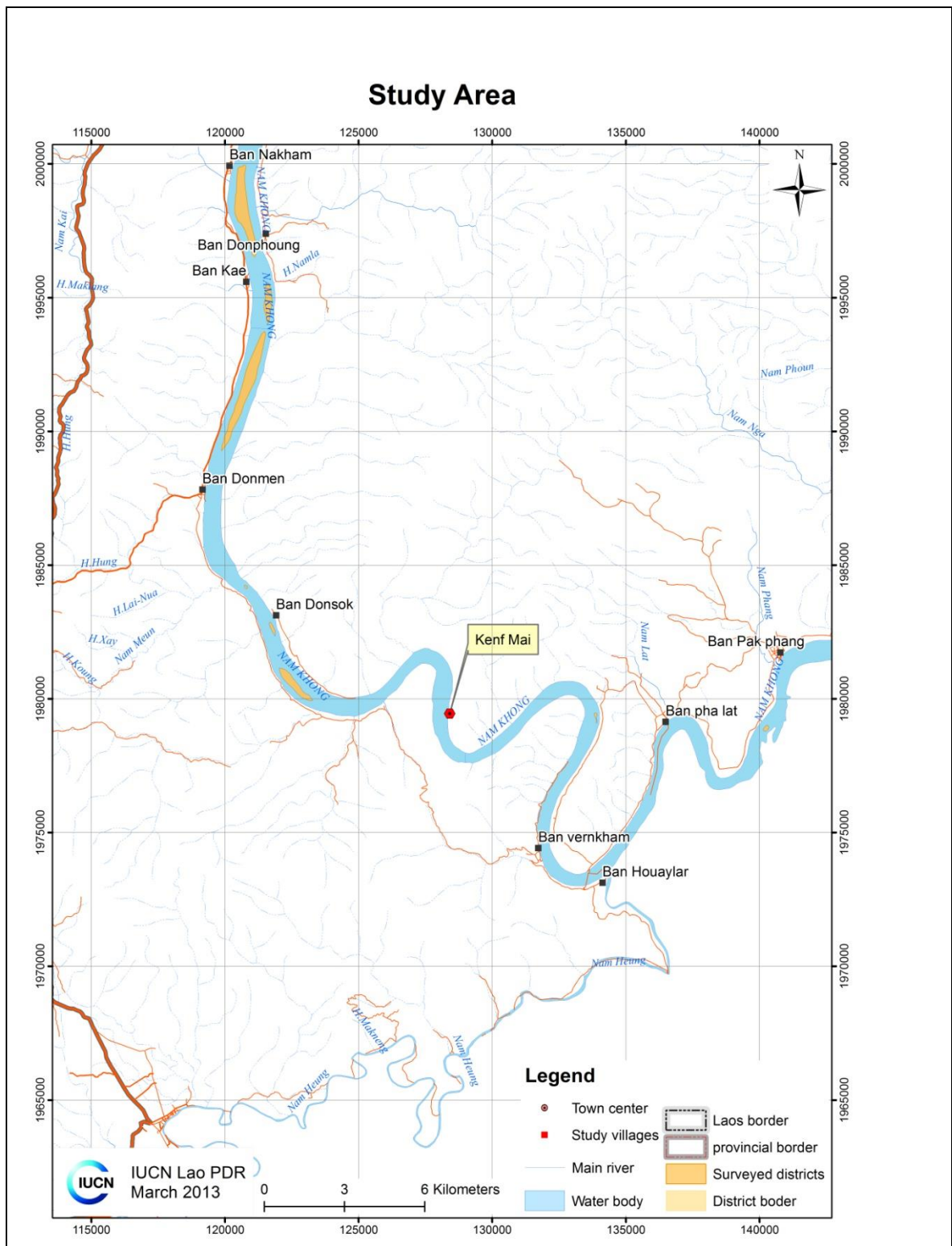




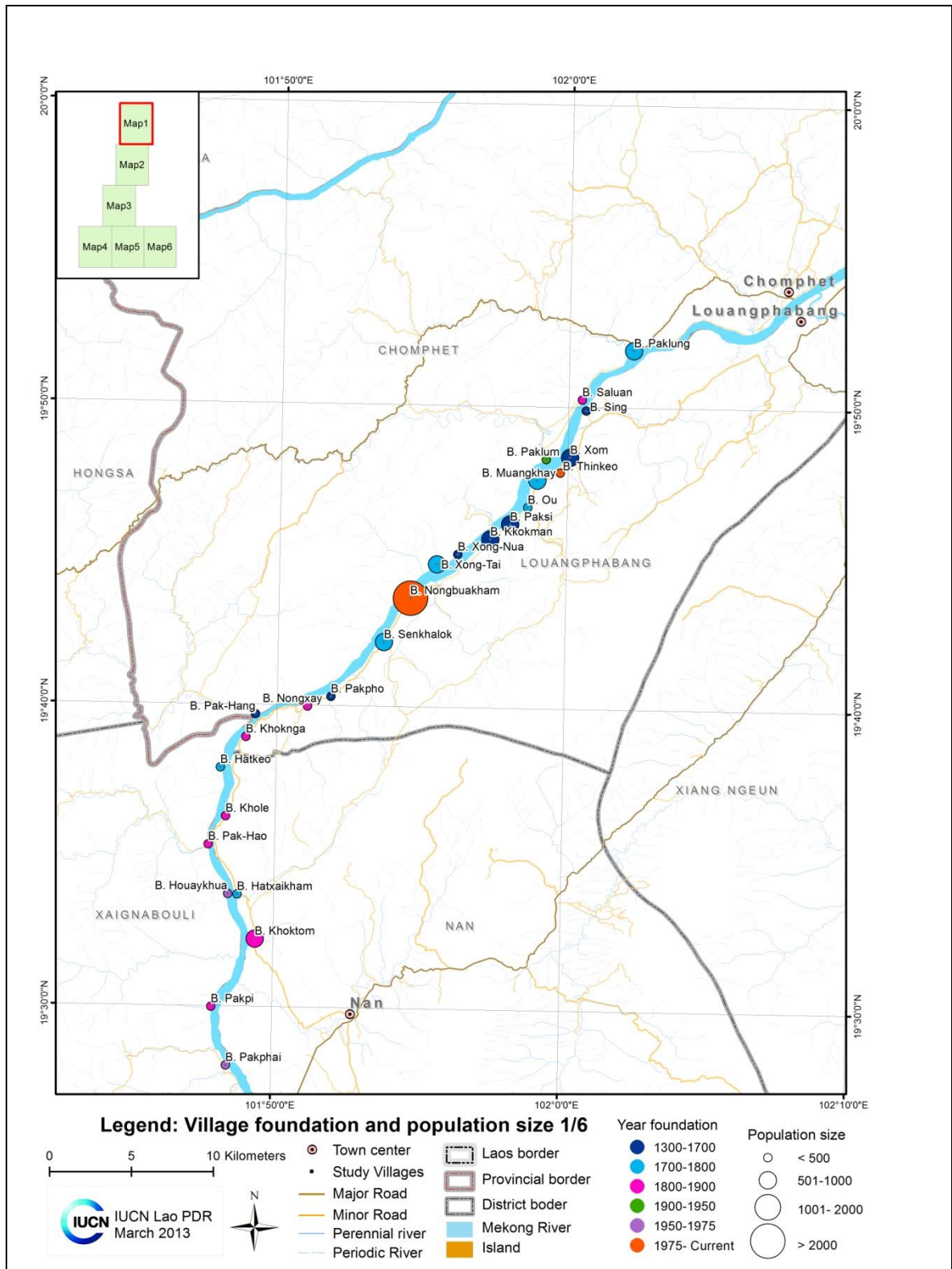
# Annex 12: Conservation Map



# Annex 13: Keng Mai

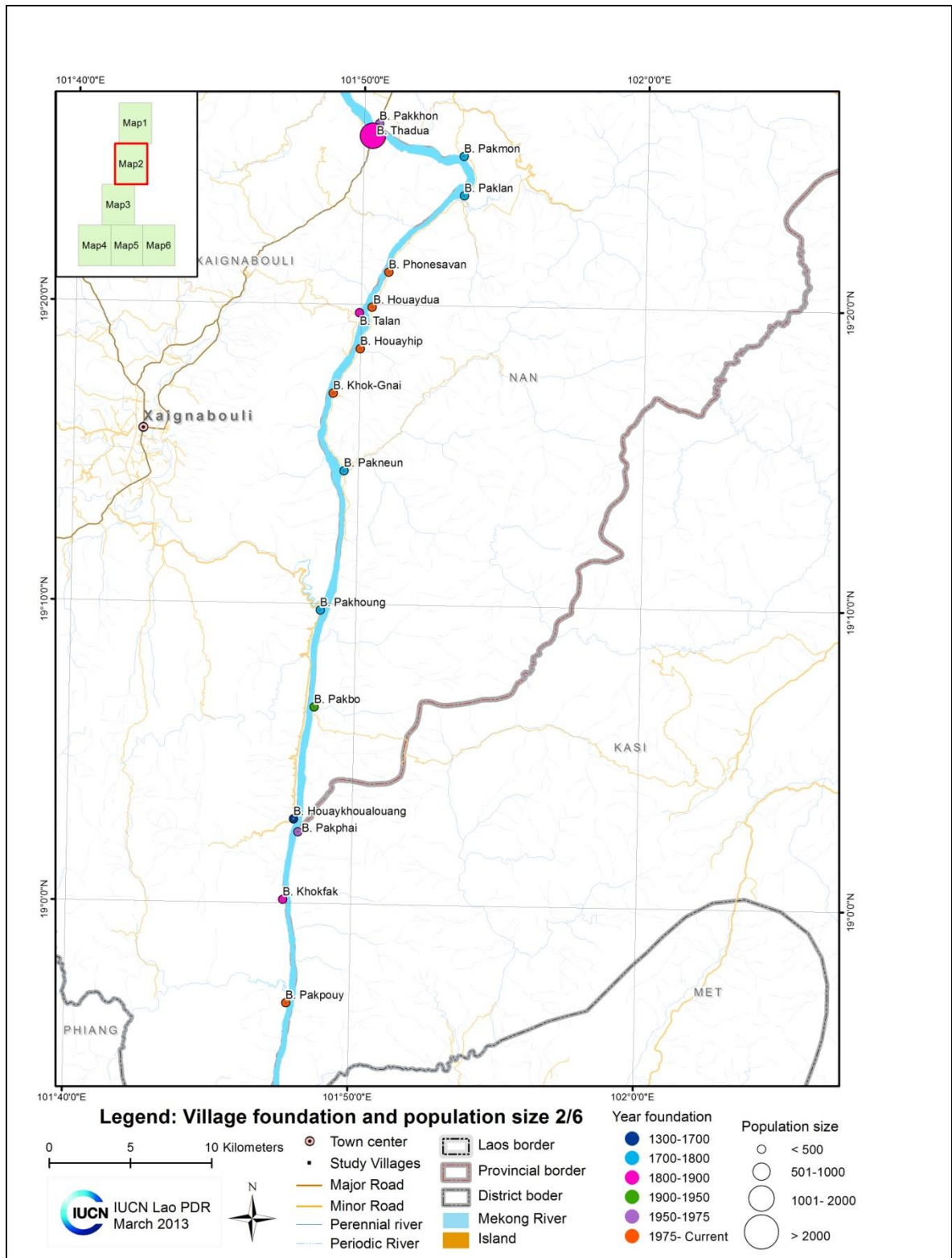


# Annex 14: Population size and village foundations part 1 of the study area



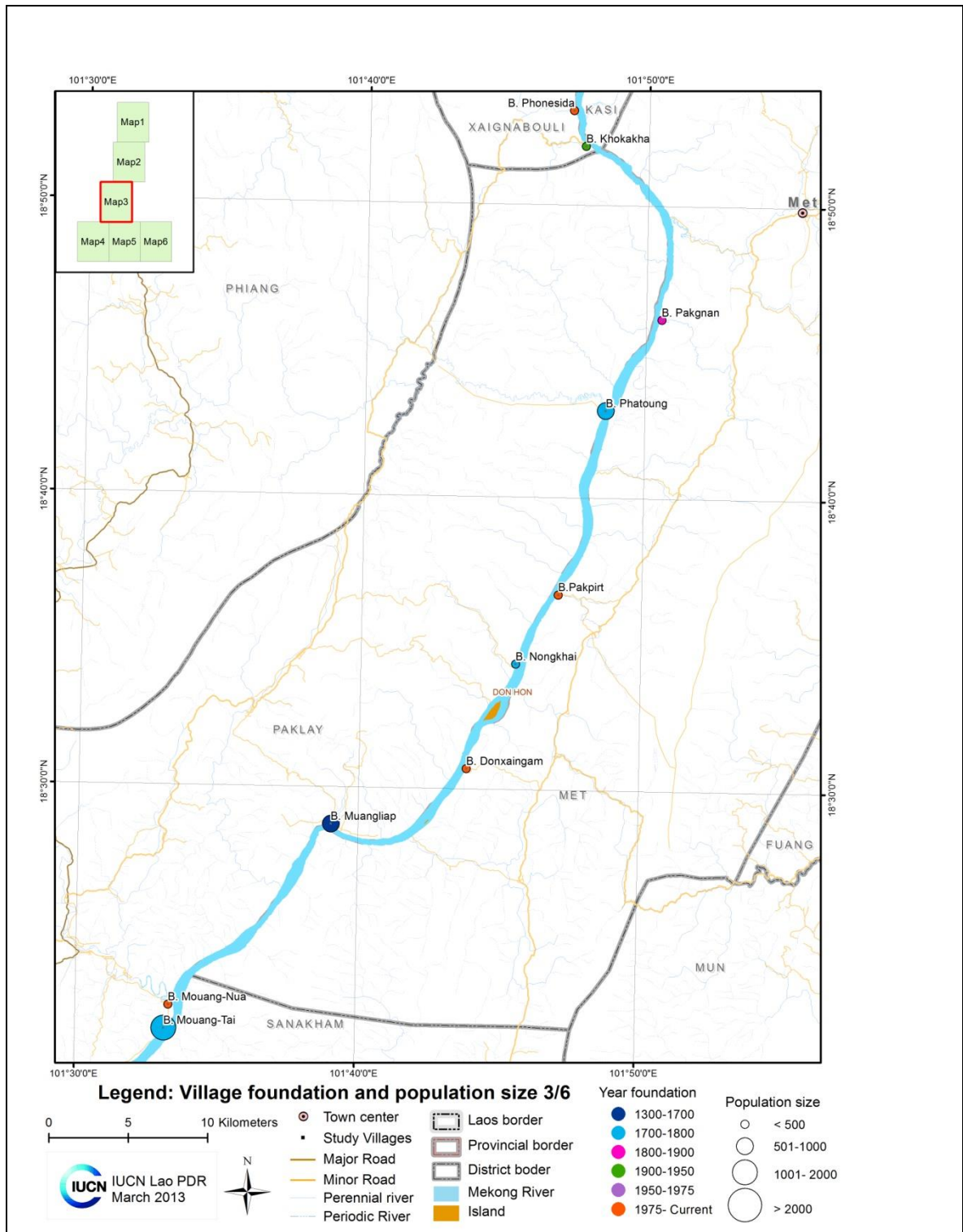


# Annex 15: Population size and villages foundations part 2 of the study area

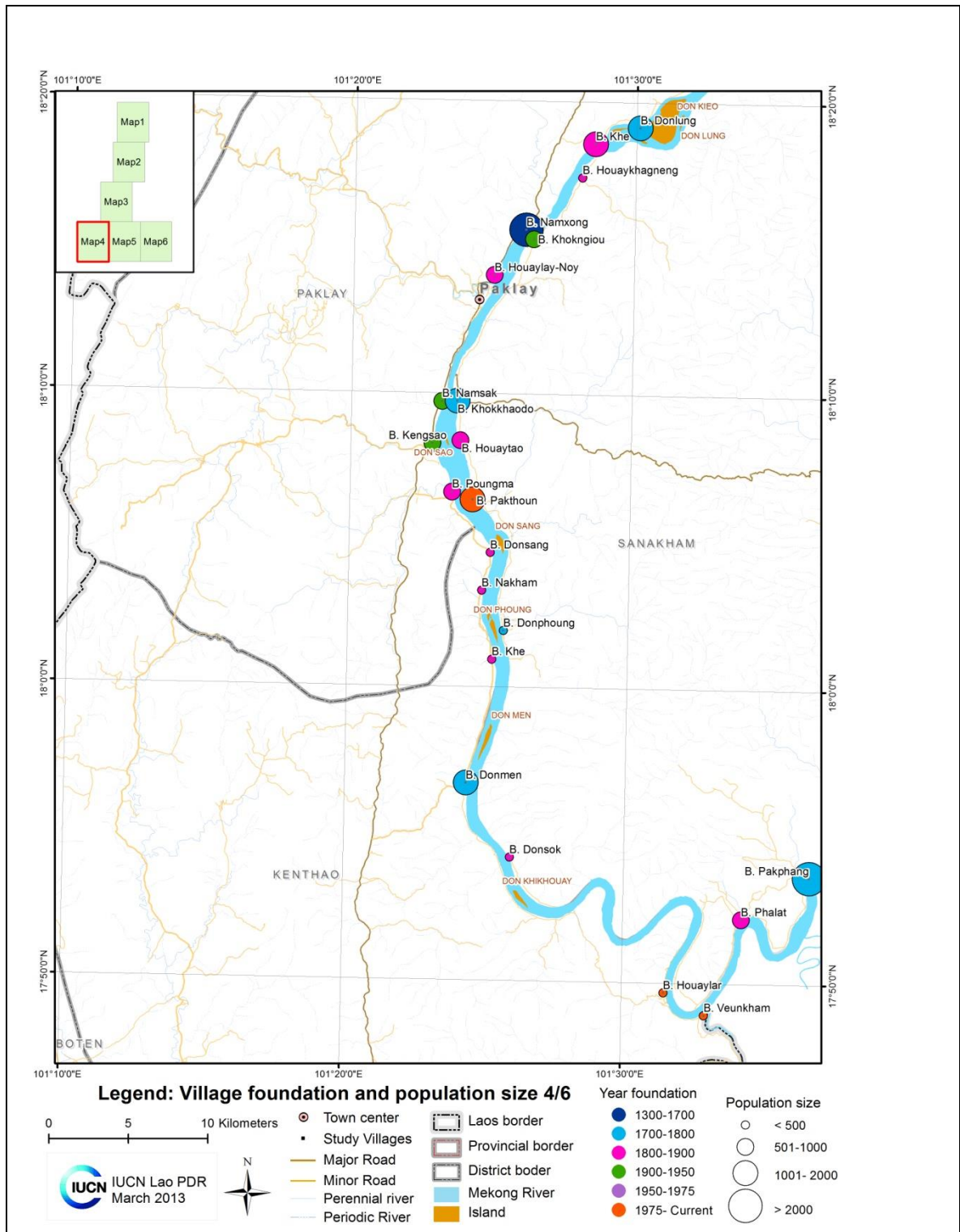




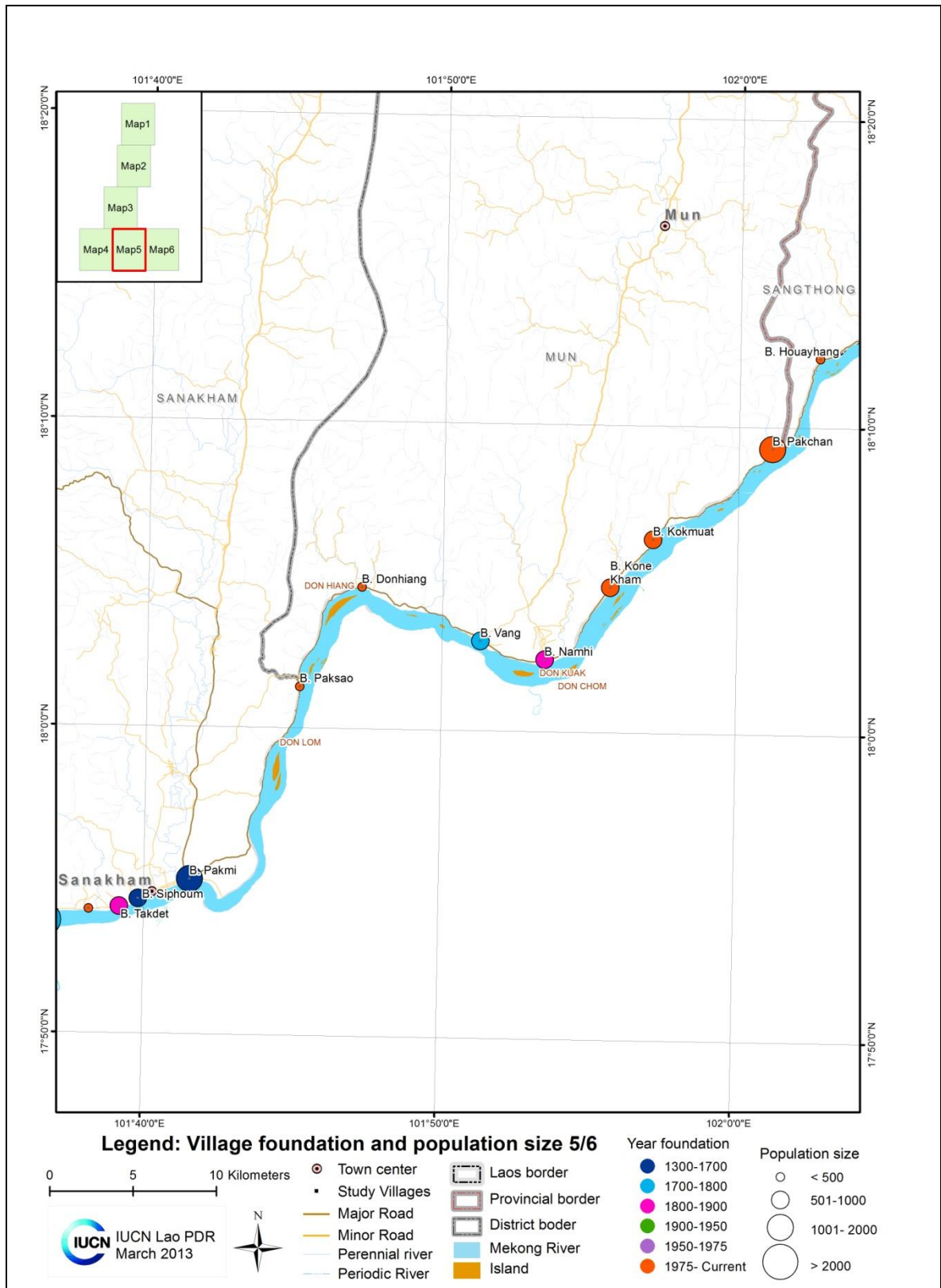
# Annex 16: Population size and villages foundations part 3 of the study area



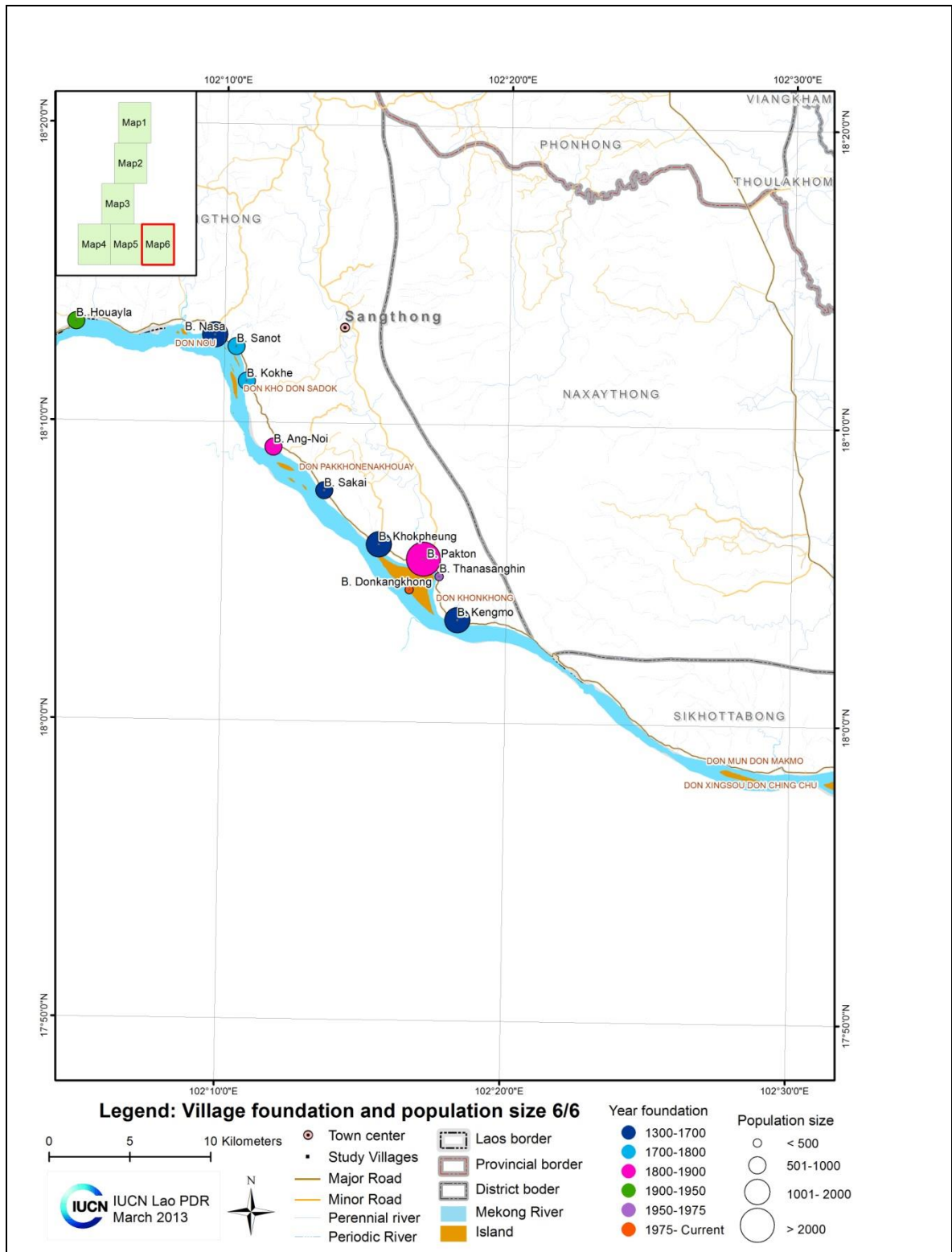
# Annex 17: Population size and villages foundations part 4 of the study area



# Annex 18: Population size and villages foundations part 5 of the study area

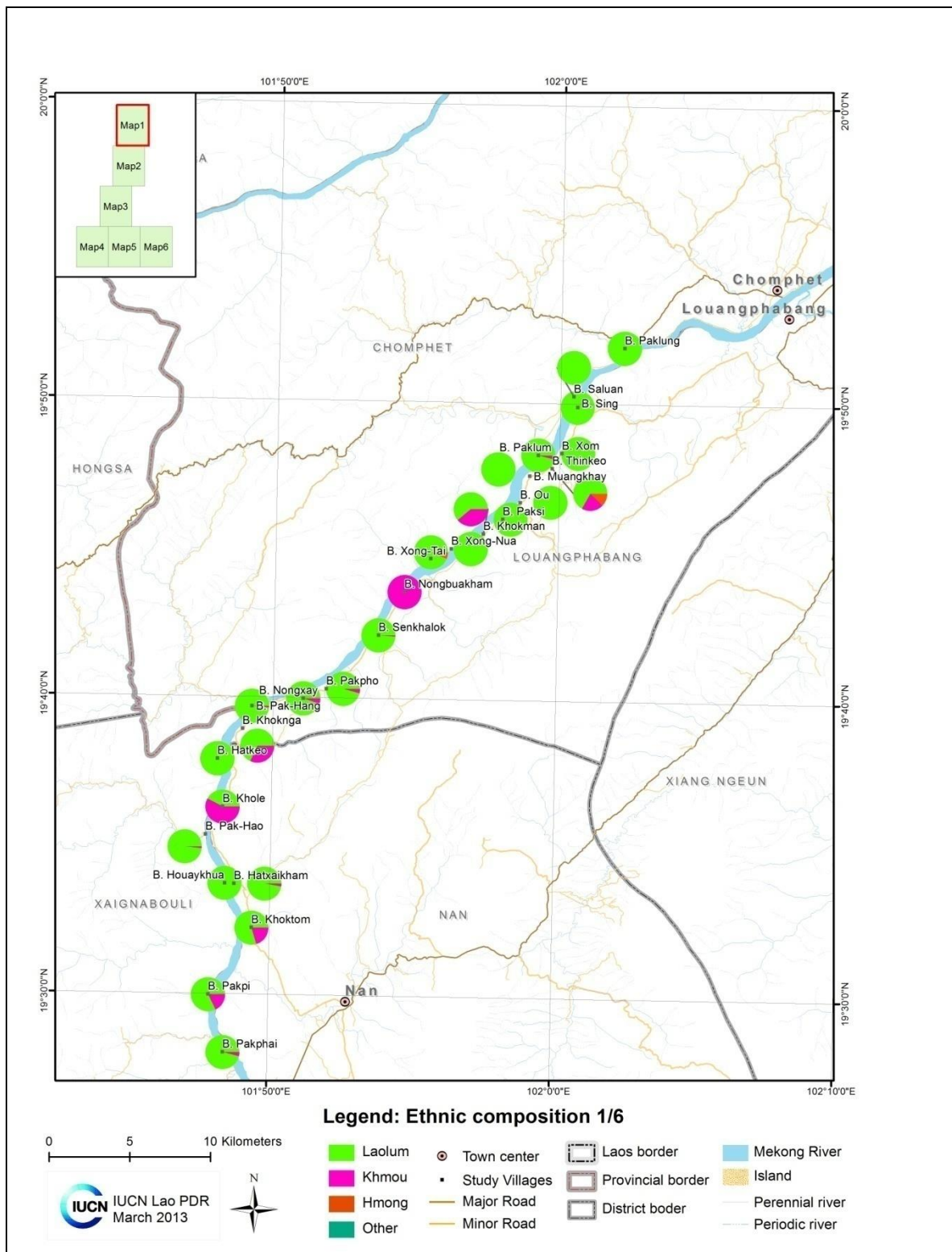


# Annex 19: Population size and villages foundations part 6 of the study area

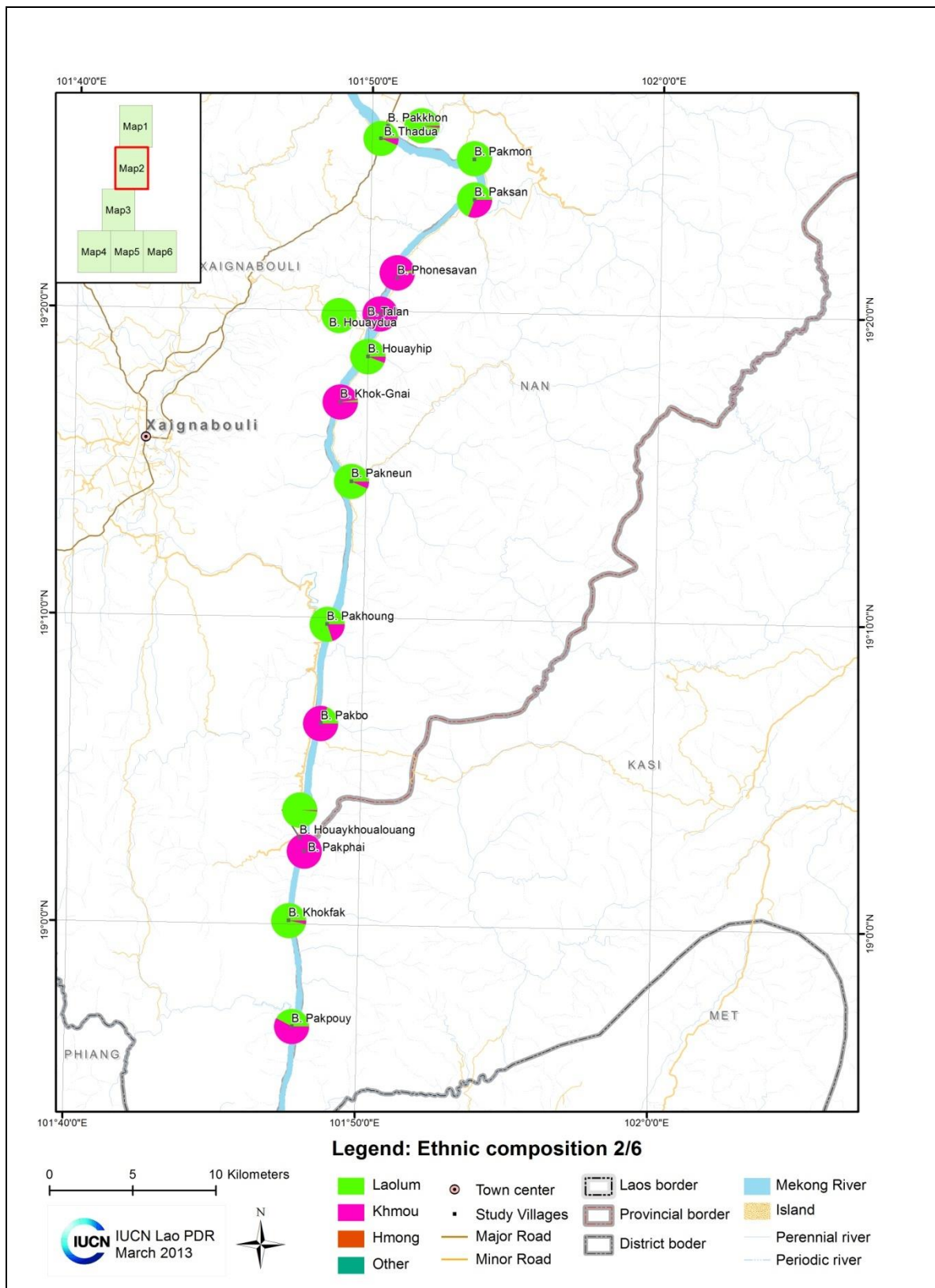




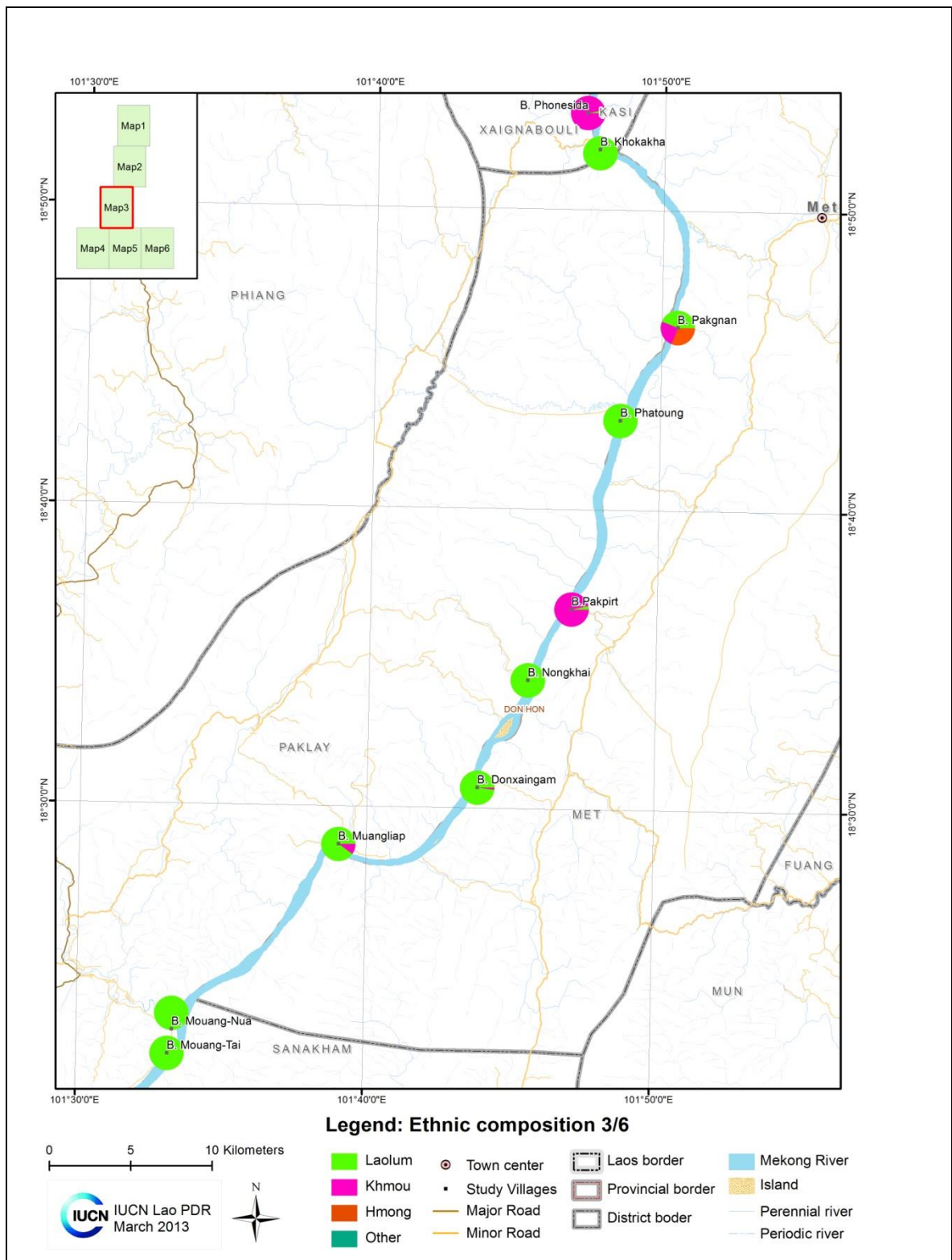
## Annex 20: Ethnic composition part 1 of the study area



## Annex 21: Ethnic composition part 2 of the study area

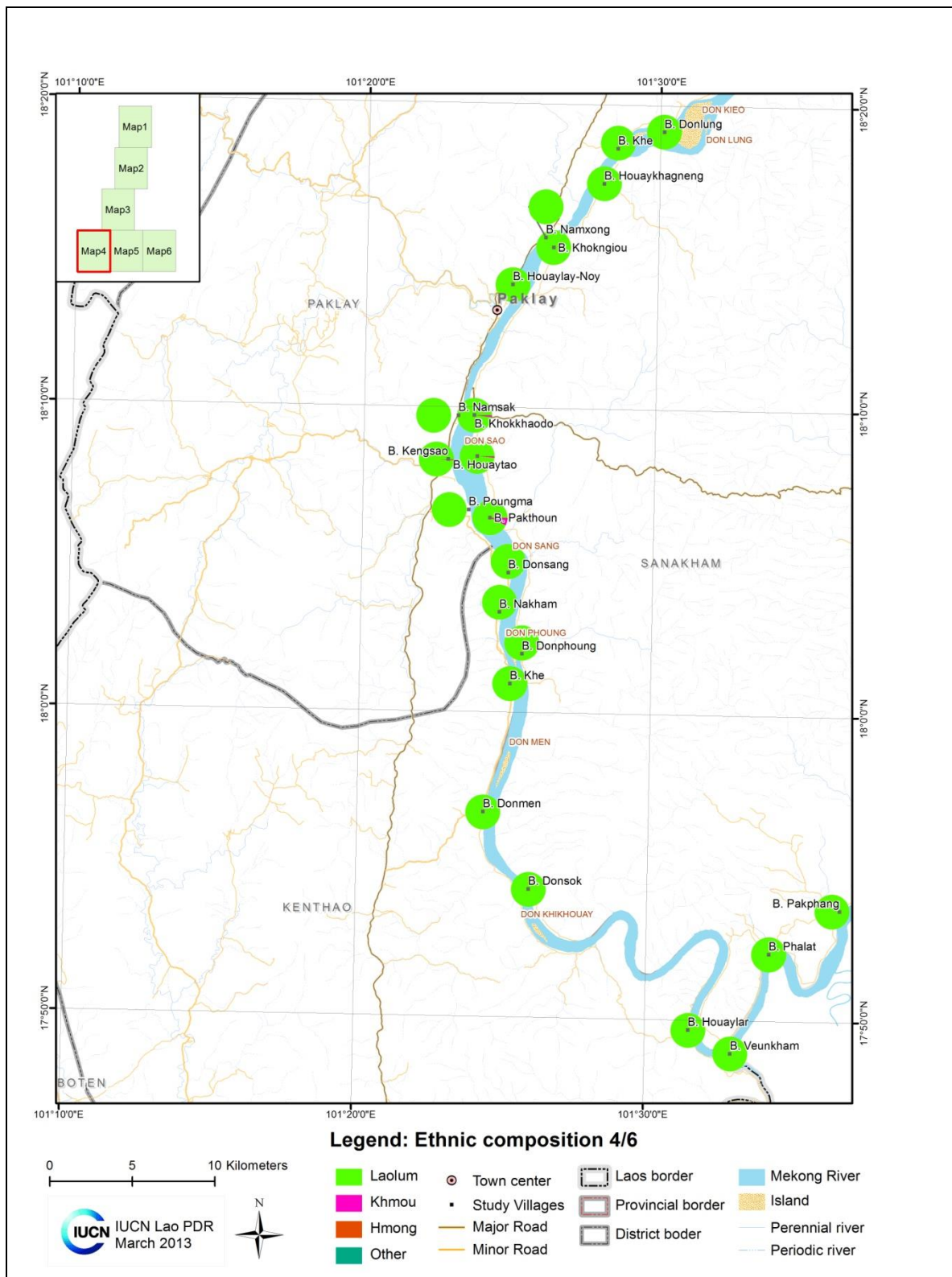


## Annex 22: Ethnic composition part 3 of the study area



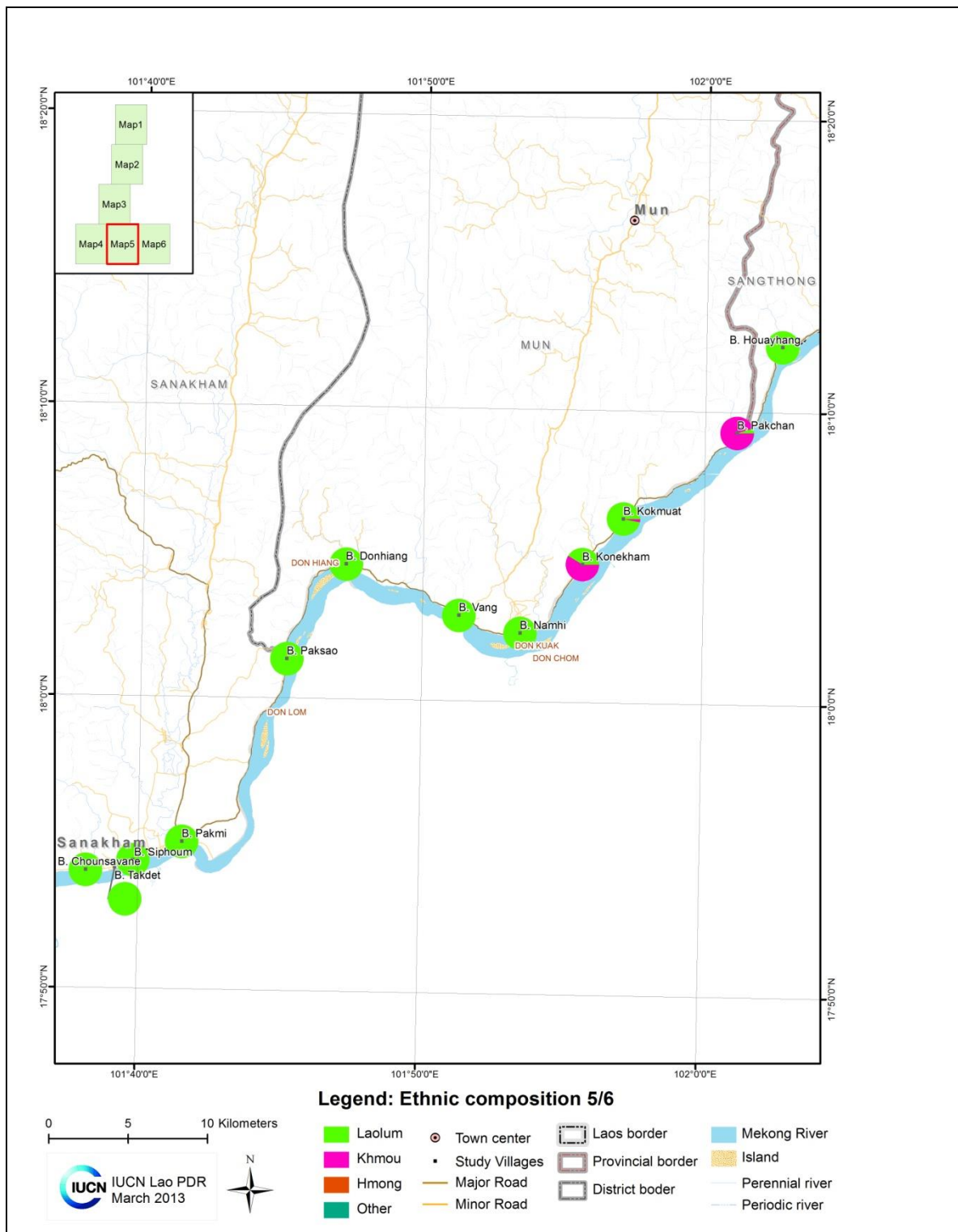


## Annex 23: Ethnic composition part 4 of the study area

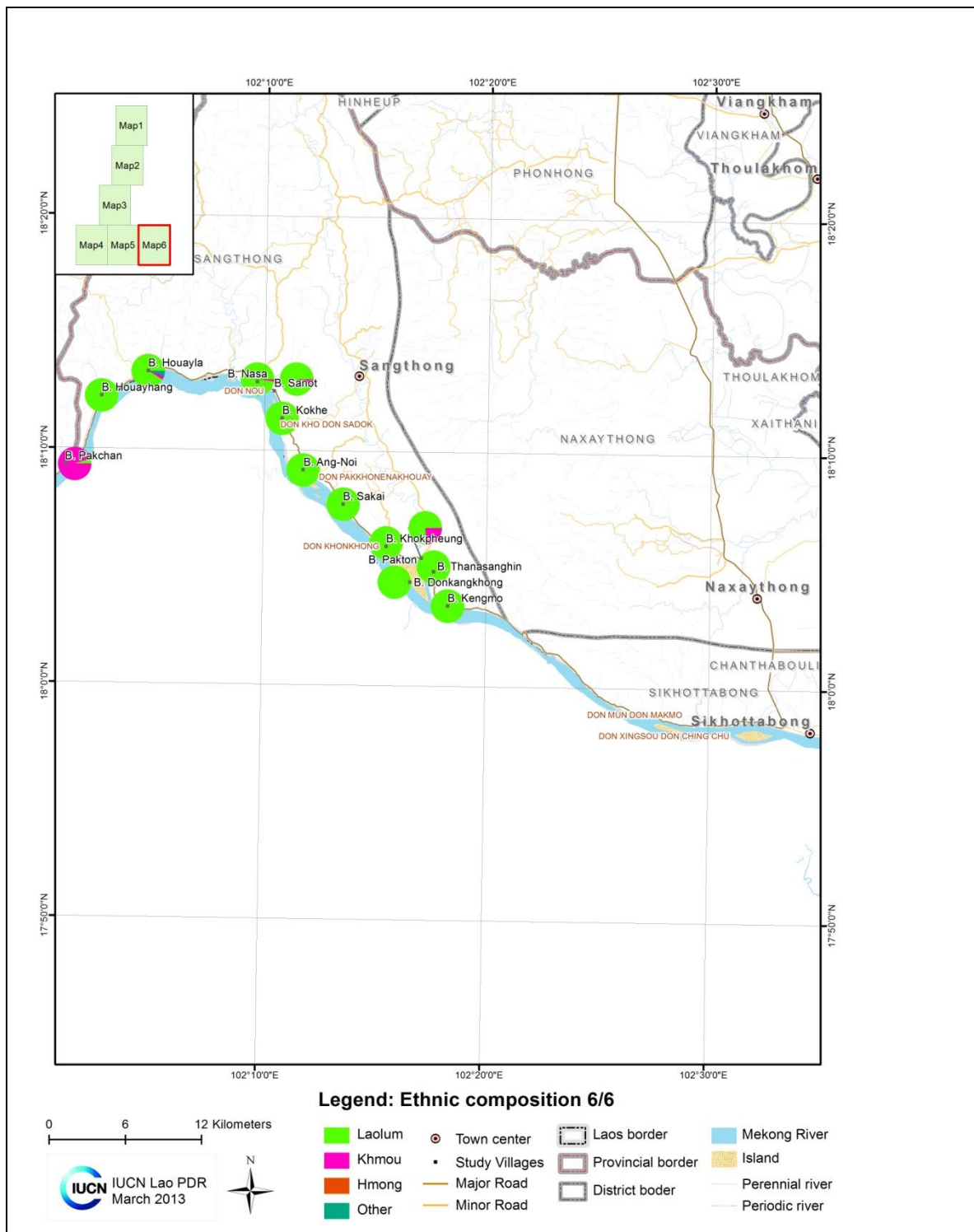




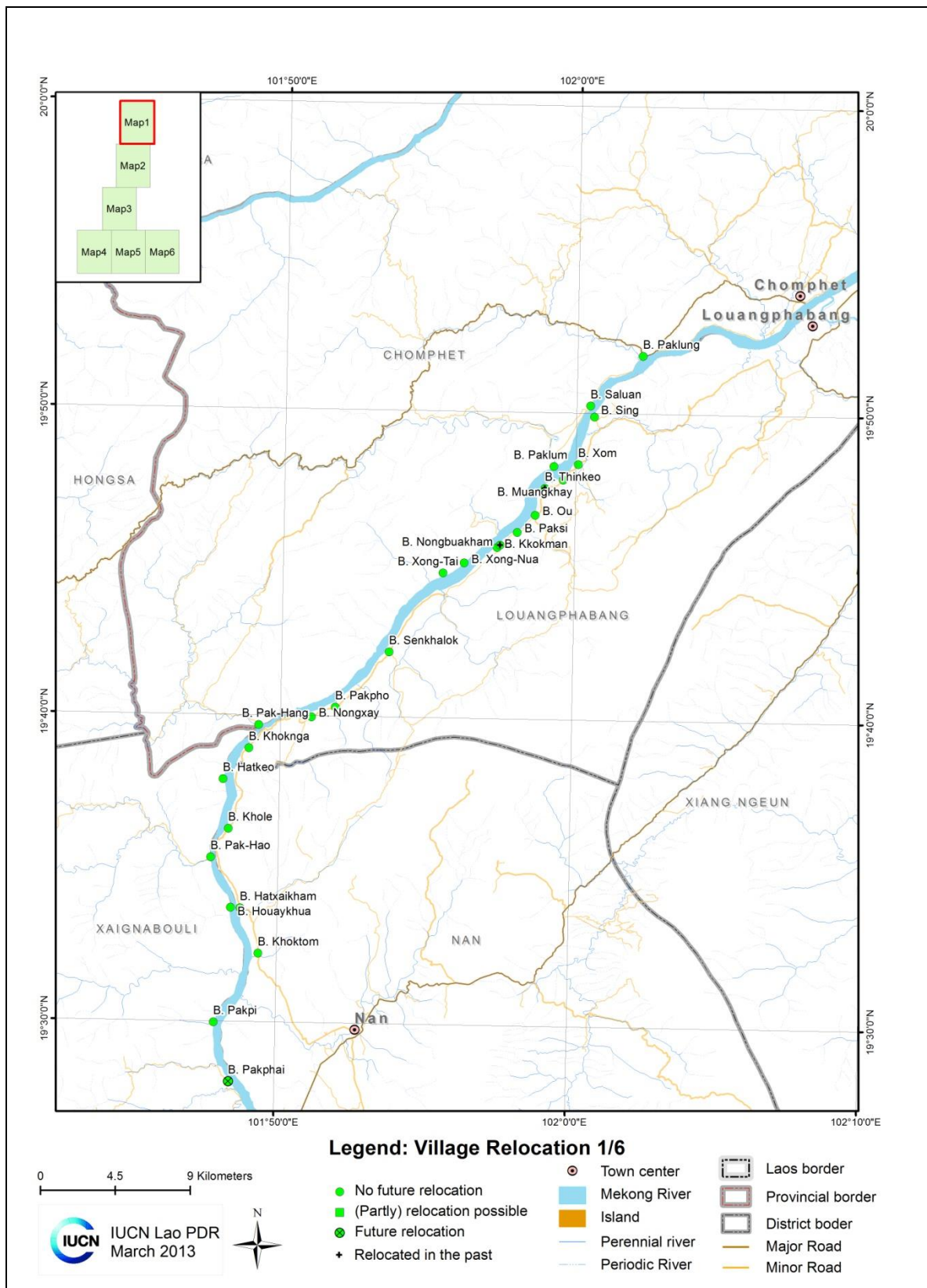
## Annex 24: Ethnic composition part 5 of the study area



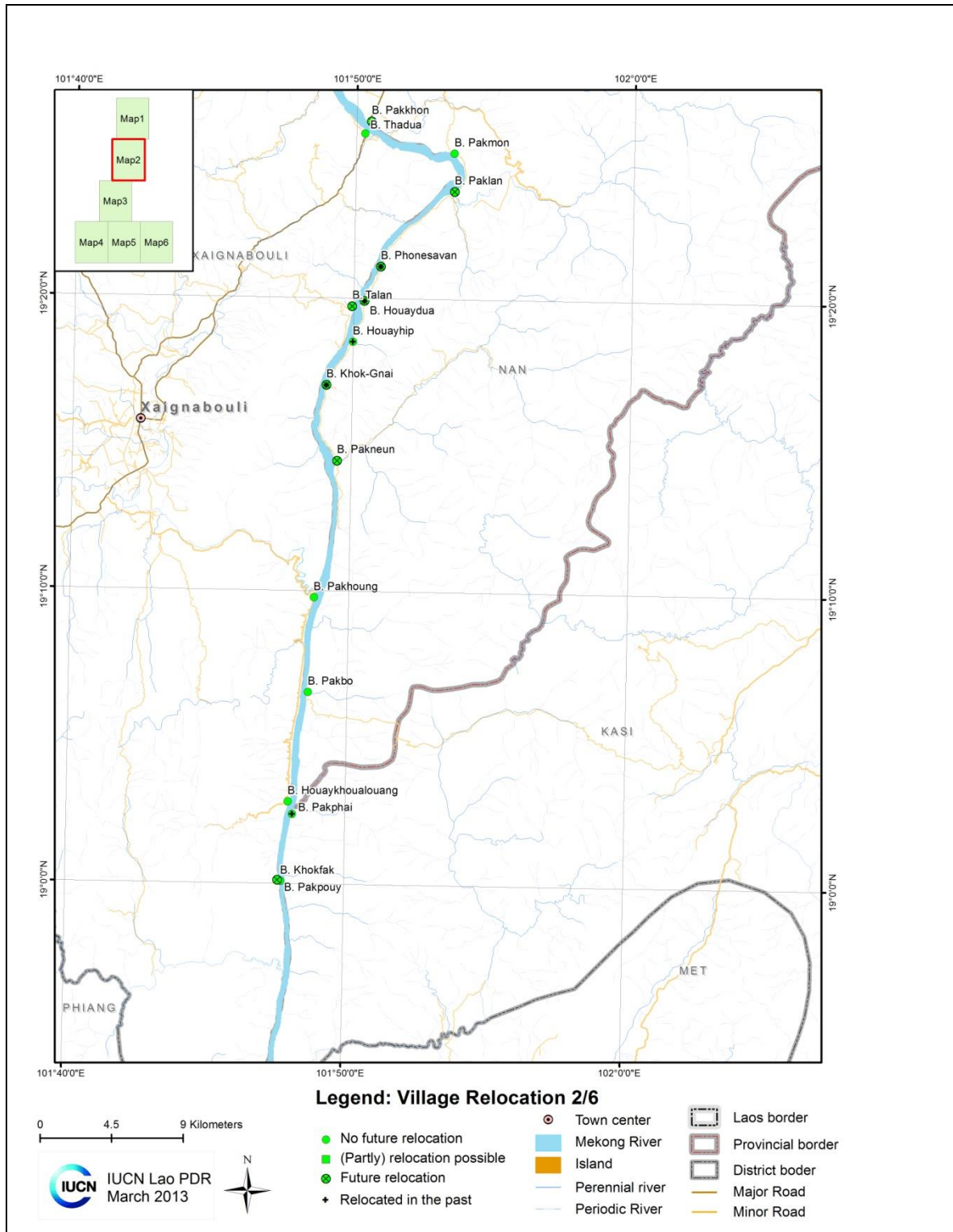
## Annex 25: Ethnic composition part 6 of the study area



## Annex 26: Village relocations in part 1 of the study area

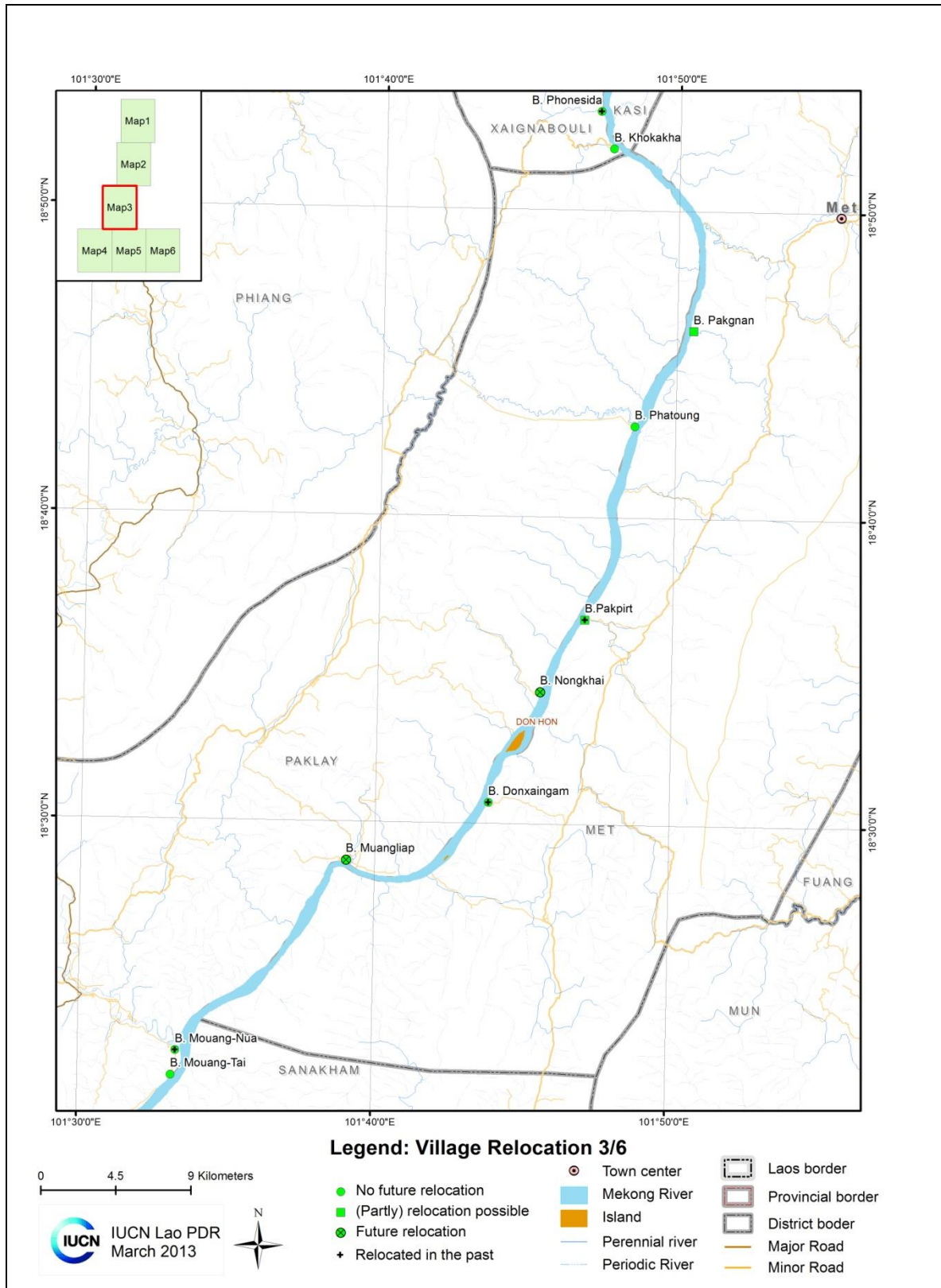


## Annex 27: Village relocations in part 2 of the study area

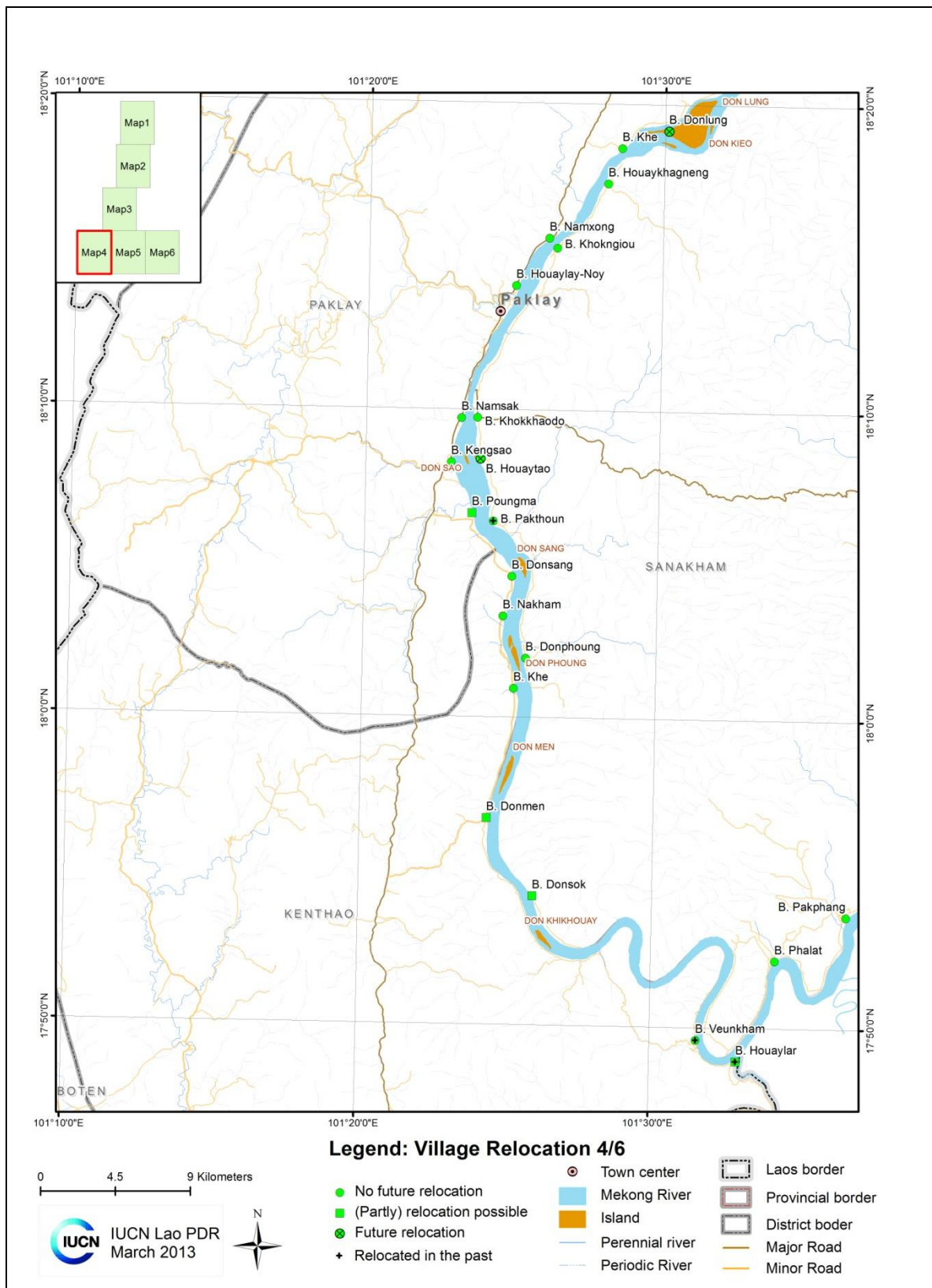




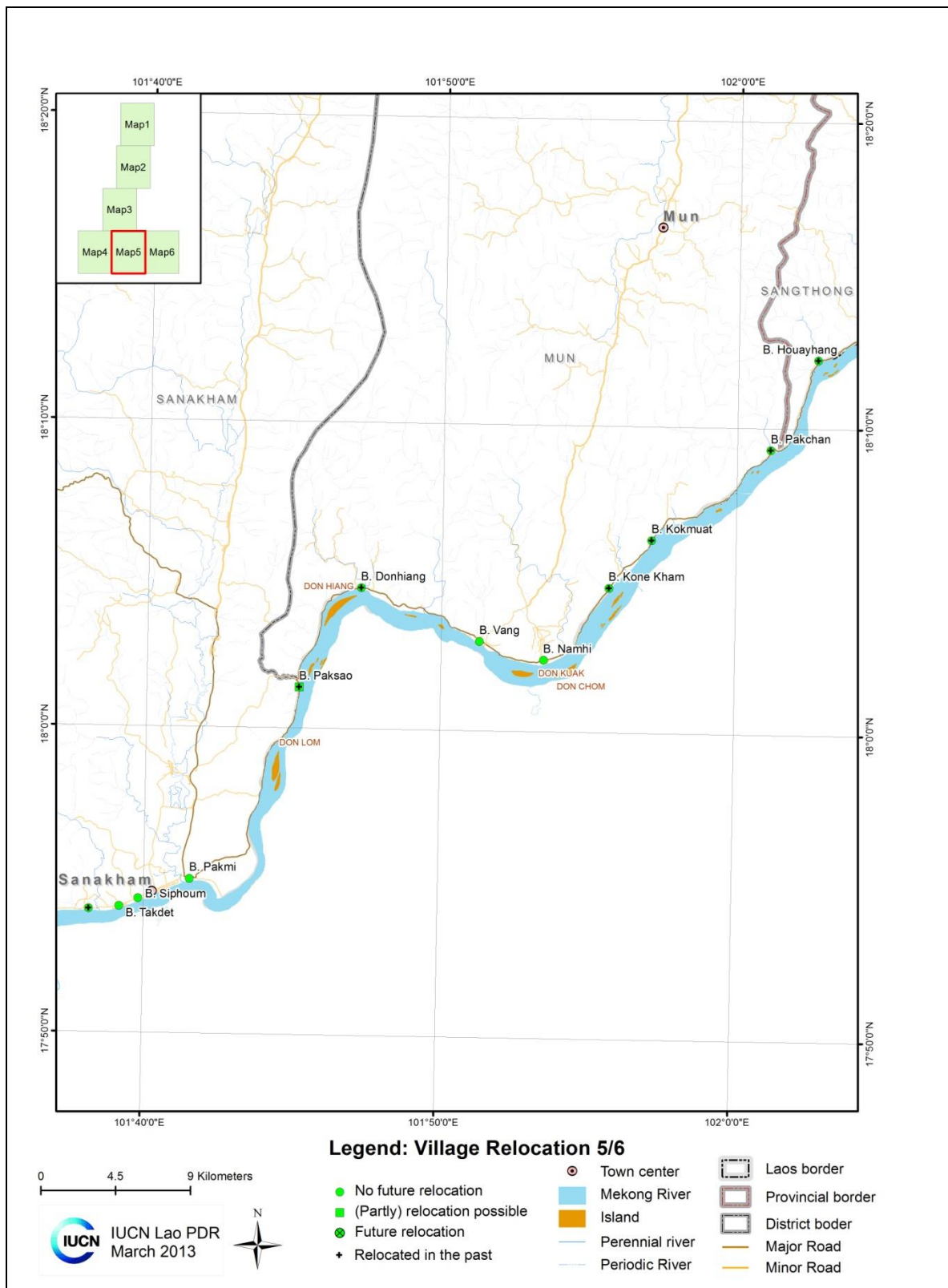
## Annex 28: Village relocations in part 3 of the study area



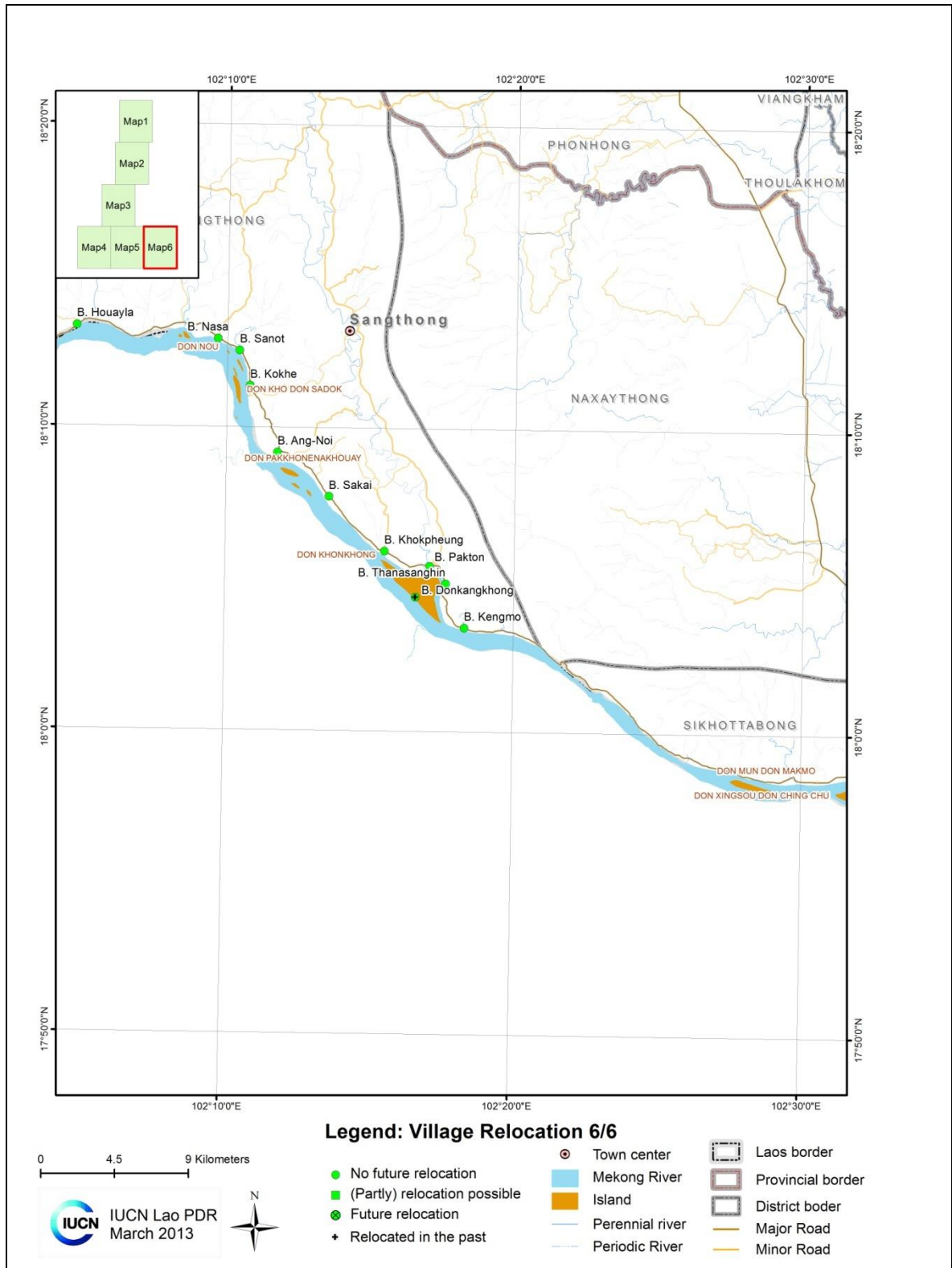
## Annex 29: Village relocations in part 4 of the study area



## Annex 30: Village relocations in part 5 of the study area



# Annex 31: Village relocations in part 6 of the study area







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