

# Water governance and management in multipurpose hydropower and irrigation schemes: Case study of the Nam Mang 3 Project in Laos

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## Introduction

❑ The 40 MW Nam Mang 3 Hydropower Project is:

- only multipurpose project for hydropower and irrigation in Laos.
- a trans-basin hydropower scheme (similar to Nam Theun 2).
- developed via the diversion of the flow of the Nam Nyong (main river) from the Phou Khao Khouay plateau down to the Nam Nyam river (subsidiary river) in Vientiane plain [see Fig 1].
- planned to irrigate more than 2,000 ha.

❑ The operation of dam involved:

- directly irrigated farmers (in 10 villages) [see Map 1] and other stakeholders.
- flooding of large paddy fields and other agricultural lands during the rainy season (June to August) along the Nam Nyam valley.
- water governance and management.

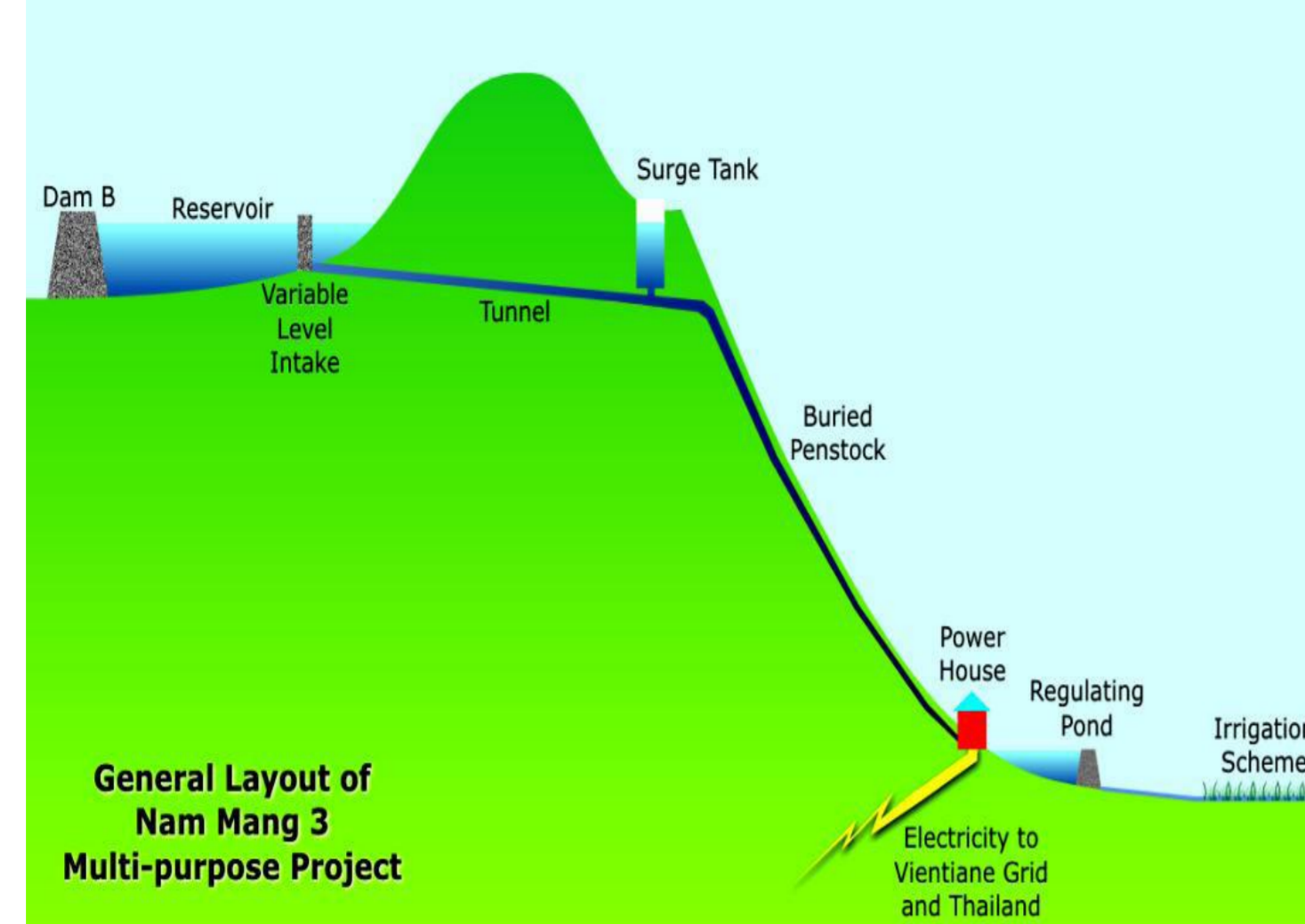
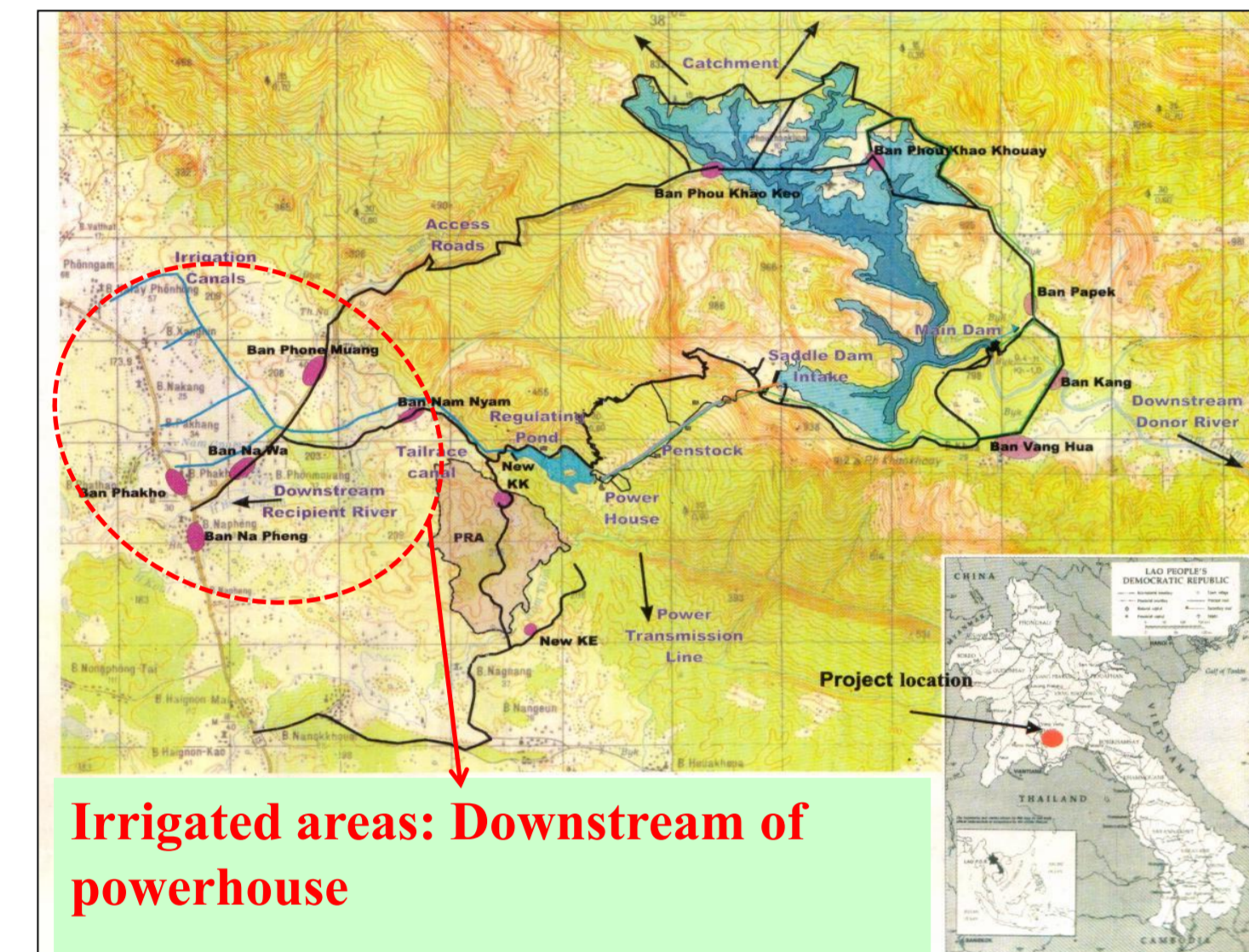


Fig 1: Trans-basin hydropower scheme



Map 1: Layout of the Nam Mang 3 Project

## Research Questions

❑ To address those issues by asking the following research questions:

1. How is the functioning of the combined hydropower and irrigation scheme?
2. What are benefits and challenges of the multipurpose hydropower?
3. How could we improve the nexus of hydropower and irrigation to ensure food security?

## Research approach

❑ The first part of the research aimed to understand :

- the operation of dam and the combination of hydropower and irrigation, and
- to understand behaviour of key stakeholders over time by meeting various key informants (using key informants survey)

❑ The second part aimed to understand :

- the benefits and challenges of the multipurpose hydropower by surveying the various stakeholders through focus groups (village authorities, irrigated farmers (upstream & downstream, irrigation channel, Water User Group, women,...etc) and field observation.

## Results

### 1. Dam operation & water usage

- The electricity generation runs mainly during the RS [see Tab 1], to meet the peak energy demand & to be sold to Thailand (US\$6 million annual revenues)
- But, about 95% of farmers need irrigation water during DS.

### 2. Benefits

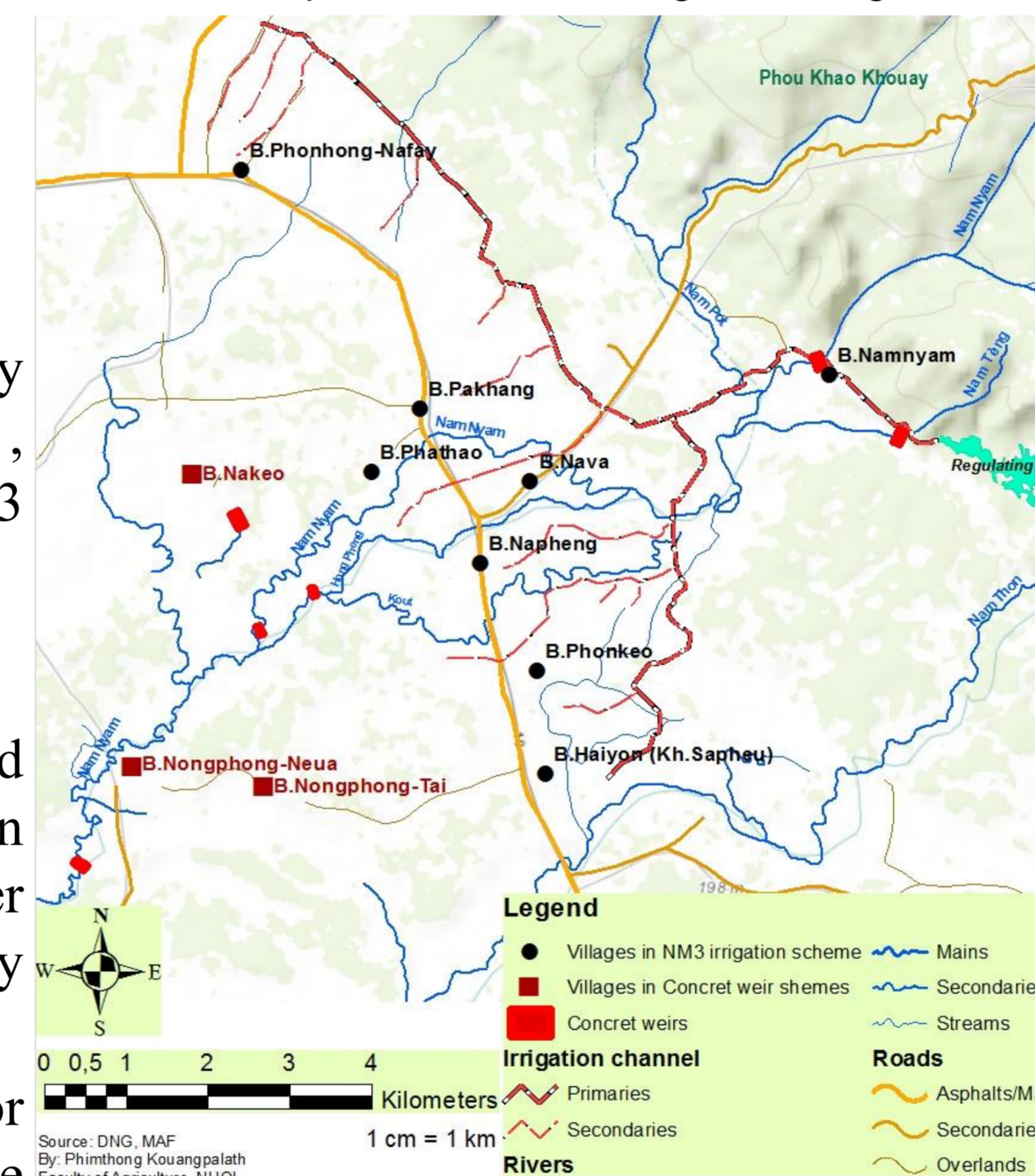
- Since the project started operations in 2005, farmers along Nam Nyam valley & road N°10 can grow second rice crop.
- More than 1,600 ha of paddy field directly irrigated by Nam Mang 3 irrigation scheme in DS (in 8 villages).
- About 300 ha of paddy indirectly irrigated by concrete weir schemes, profit from water release in DS (in 3 villages) [see Map 2].

### 3. Challenges

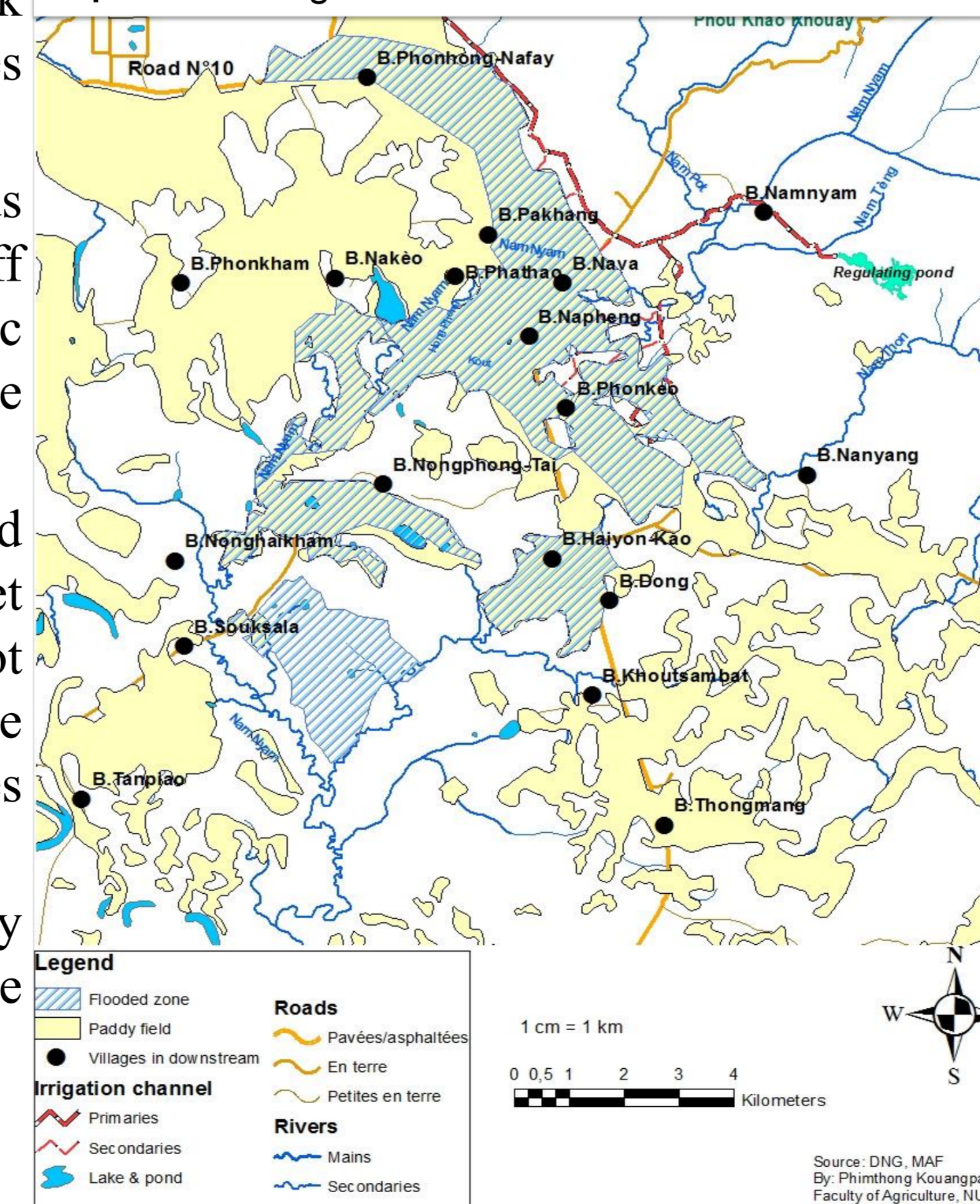
- More than 500 ha of paddy fields and other agricultural lands have been flooded during the RS due to water releases for generating electricity [see Map 3].
- But in the DS, the water quantity for irrigation is not enough to supply the direct & indirect irrigation network (concrete diversionary weir schemes along the subsidiary river).
- Today, many hectares of paddy fields are abandoned. The more well-off farmers can invest in other economic activities, but poor farmers face livelihood problems.
- The irrigation channel was damaged each RS. Only 1,500 € budget allocated for maintaining is not enough, so farmers have to contribute more & the transparency of water fees used need for farmers
- Recently there aren't any rules or any measures to mitigate the negative impacts in downstream.

Dry season (DS)				Rainy season (RS)						DS	
Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Dam operation (0-6 hours/day)				12-24 hours/day						0-6 hours/day	
Dry season rice crop				Rainy season rice crop							
Vegetable garden											
aquaculture, livestock, and fishing											
Take a bath, wash clothing and others											

Tab. 1: Dam operation & water irrigation usage



Map 2: NM3 irrigation and concrete weir schemes



Map 3: Flooded zone and paddy field distribution

## Discussion

❑ It is possible to set up the rule for dam operation in order to maximum this nexus & mitigate negative impacts to ensure food security in downstream of the dam:

- For example: the water releases for hydropower production do not consider the downstream benefits and costs to the users of the water for irrigation, and impacts of flooding. The coordination between dam operator & irrigation scheme manager is relatively poor.
- Don't shut down or reduce the electricity generation especially when there is a heavy rain, because the regulating pond is small released rapidly and the downstream areas are poorly drained.
- The compensation: It has taken place only for impacts upstream (reservoir area) during the construction phase. But, during the operation phase, farmers how face flooding in downstream areas especially in the Nam Nyam valley do not receive any compensation from project owner (Electricité du Laos, EDL).
- EDL should allocate some annual budget for maintaining irrigation scheme caused by flooding
- The dam operating regime for the dam, which does not seem to have been done in a transparent way, making it difficult to take into account the multiple benefits and costs to different stakeholders in such a water diversion project.
- A small in size, could cause a big flooding in downstream.
- It will be great to have a policy for "irrigated land allocation" for farmers who don't have any irrigated paddy field in the DS or who have uncultivated paddy fields due to flooding in RS.
- Mostly, well-off households have irrigated paddy fields & benefit from the project. The poor households will be still poor, which increases inequality in the village

## Conclusion

- ❑ The multipurpose hydropower created benefits, but also many challenges.
- ❑ With new irrigation scheme infrastructure as for compensation, farmers can grow a second (DS) rice crop. But coupled with this benefit, they often face serious problems of flooding of their rice fields in the RS due to releases of water from the dam.
- ❑ In contrast, the irrigation scheme doesn't have enough water in the DS for the whole channel network especially downstream of the channel & Nam Nyam (concrete weir schemes)
- ❑ The governance & management of the irrigation scheme itself, concerning the water allocation upstream/downstream along irrigation channels, collection and transparent use of water user fees for maintenance.
- ❑ The research showed the need to apply good water governance & management to specific projects in dealing with problems of managing different needs of different uses (hydropower & irrigation) & users (the multiple stakeholders within communities such as upstream/downstream irrigators, between agricultural communities and others, and between private dam operators and public authorities)

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