

M-POWER Research Fellowship

Working Paper Series Chao Praya Call

Title: Dam and irrigation scheme and water governance regime, case study Nam Mang3 Hydropower Project, Lao PDR

No:

# Dam and irrigation scheme and water governance regime, case study Nam Mang3 Hydropower Project, Lao PDR

**Phimthong Kouangpalath**

Researcher and Lecturer of the Department of Rural Economics and Food  
Technology, Faculty of Agriculture, Nabong Campus, National University of Laos.

**Philip Hirsch**

Professor of Human Geography; Director, Mekong Research Group (AMRC)  
School of Geosciences, the University of Sydney, Australia

Mekong Program on Water, Environment and Resilience  
(M-POWER)

Research Fellowship Program (2011-2013)

15 June 2013

M-POWER stands for the Mekong Program on Water, Environment and Resilience. We are a network of collaborators undertaking action based research, facilitated dialogues and knowledge brokering to improve water governance in the Mekong Region in ways that support sustainable livelihoods and healthy communities and ecosystems.

Working Papers are available in electronic format at <http://www.mpowernetwork.org/>

Please address comments and/or queries for information to:

Phimthong Kouangpalath  
Email: [phimthongk@gmail.com](mailto:phimthongk@gmail.com)  
Chao Praya Call (2011-2013)

# Table of Content

TABLE OF CONTENT .....	3
ABSTRACT.....	4
LIST OF FIGURES .....	5
ACRONYMS AND ABBREVIATIONS .....	5
ACKNOWLEDGEMENTS .....	6
1. INTRODUCTION .....	7
2. THEORETICAL REVIEW.....	8
3. METHODOLOGY.....	9
3.1. Study sites .....	9
3.2. Research approach and methods .....	9
3.3. Data collection .....	10
4. RESULTS AND DISCUSSION .....	10
4.1. Background of Nam Mang3 Hydropower Project .....	10
4.2. Ownership Nam Mang3 Hydropower project.....	11
4.3. How NM3-irrigation scheme functions with dam operation? .....	12
4.4. How about the irrigated area in NM3-irrigation scheme .....	13
4.5. Who is in charge of Nam Mang 3 irrigation scheme over time? .....	13
4.6. Key stakeholders of NM3-irrigation water governance.....	14
4.7. NM3-irrigation issues and challenges .....	15
4.8. Irrigation scheme and good governance perceptions .....	16
5. CONCLUSIONS AND RECOMMENDATIONS .....	17
REFERENCES.....	20

## **Abstract**

A multi-purpose project involving hydropower and irrigation schemes Nam Mang3 Hydropower Project is one of trans-basin diversion scheme in 18 hydropower dams in operation in Laos and only project included electricity production and irrigation scheme. But, the project has caused number of negative impacts for farmer especially in downstream or Recipient River (Nam Nyam and Houay Hong Pheng).

This study aims to understand the water governance regime related between dam and irrigation scheme in order to find alternatives and to mitigate as much as possible the negative impact downstream of the dam, especially villages along the Nam Nyam valley or Napheng plain directly concerned water releases and benefit from irrigation. We used the key informant and focus group survey with various stakeholders of Nam Mang irrigation scheme and field work observation.

The findings show that farmer can grow a second season of rice production and other agricultural activities, but due to the electricity generation in raining season this causes a big flood of rice fields along the Nam Nyam valley. Sometime farmer in irrigated area do not have enough water for irrigation during dry season for rice production downstream of NM3 and Nam Nyam irrigation schemes, because of low precipitation in dry season and the water is stored for generating electricity. Also there is weak governance between the dam operator and TSC-NM3 office. Overall, the project has contributed to, rather than diminishing, poverty of people and increase socio differential in the area.

The study recommends a review of governance arrangements in negotiation of the 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. So the ownership in charge of dam operation and irrigation scheme have to create a dialogue by assistance from development partners or upper government to find best alternative to mitigate negative impacts in downstream areas. Also to push the dam operators for compensation to farmers to seek new activities or livelihood activities and provide the annual budget for operation cost and maintenance irrigation scheme in good statue.

## **Keywords**

Hydropower, Nam Mang3, irrigation, water, governance, downstream, impact,

## List of Figures

Figure 1: water governance chart.....	8
Figure 2: study area, within the layout of the Nam Mang 3 Project.....	9
Figure 3: Good organisation, management and governance.....	17

## Acronyms and abbreviations

DAFEO	District Agriculture and Forestry Extension Office
EDL	Electricité du Laos
EDL-Gen	Electricité du Laos- Generation Project Affected Persons
EIA	Environmental Impact Assessment
GOL	Government of Lao PDR
Lao PDR or Laos	Lao People's Democratic Republic
LDCs	Least Developed Countries
MAF	Ministry of Agriculture and Forestry
MDG	Millennium Development Goals
MEM	Ministry of Energy and Mining
MRC	Mekong River Commission
NBCAs	National Biodiversity Conservation Areas
NGPES	National Growth Poverty Eradication Strategy
NM3	Nam Mang 3
NM3HP	Nam Mang3 Hydropower Project
NM3-IPO	Nam Mang3 Irrigation Project Office
NT2	Nam Theun 2 Hydropower Project
NT-HB	Nam Theun-Hinboun Hydropower Project
NSEDP	National Socio-Economic Development Plan
NTFP	Non-timber Forest Products
PAFO	Provincial Agriculture and Forestry Office
PKK	Phou Khao Khouay
PKK-Mai	Phou Khao Khouay Mai village
TSC-NM3	Technical Service Centre Nam Mang 3 Office
WUG	Water User Group
<b>Lao Language</b>	<b>English</b>
<i>Khong Mai/Khong Nyai</i>	Primary canals irrigation
<i>Khong Xoy</i>	Secondary canals irrigation
<i>Khong sai kai</i>	Tertiary canals irrigation
<i>Kum Nyai/Kum xao na</i>	Big Group of Water User Group/Farmer Group
<i>Kum Nyoi/kum phu xom xai nam</i>	Sub-Group of Water User Group at irrigated village
<b>Exchange Rate</b>	
1\$ (American Dollar currency)	7,681 Kip - Lao Kip currency (15 June 2013)

## **Acknowledgements**

I wish to extend my sincere thanks to many individuals and organizations that assisted and encouraged me at different stages of this research. I would not have succeeded in completing this study without their assistance.

# Dam and irrigation scheme and water governance regime, case study Nam Mang3 Hydropower Project, Lao PDR

## 1. Introduction

Hydropower sector is one of national priority to meet the GOL's socio-economic development goal to reach MDGs in 2015, by five years NSEDP and achieving the goal set in 1996 by the 6th Party Congress, namely to exit from the ranks of LDCs by 2020 (GOL 2004). At present, the country has 18 hydropower plants in operation (small to big size), with 2,800 MW, 17 under construction for 3,000 MW. Another 25 plants are at planning stage (6,500 MW), while 35 more are undergoing feasibility studies stage for 10,600 MW (MEM 2013 March).

Existing and projected dams in Laos are widely debated for their impact on the environment, notably the changes in the ecology of the rivers (Duganp, Barlow et al. 2010), or their carbon footprint (Chanudet, Desclox et al. 2011). Socio-economic impacts are also likely to be important, which include: resettlement, flooded agricultural land, declining fishing activities, etc. (Scudder 2005, WCD 2008, Hirsch 2011, Bhatia, Cestti et al. eds, 2008, Molle, Foran et al. eds, 2009).

Nam Mang 3 hydropower Project (NM3HP) is a Multi-purpose project involving hydropower and irrigation schemes operated since January 2005. It is a trans-basin scheme (type NT2 and NT-HB dams), which diverts water from Nam<sup>1</sup> Nyong (donor River) on the Phou Khao Khouay (PKK) or PKK-NBCAs, into the Nam Nyam and Houay Hong Pheng (recipient Rivers). The 550 m of height difference provides a hydropower potential up to 40 MW, with an average energy production of 138 to 140 GWh/year, 1/3 of electricity is exported to Thailand. Discharges released downstream of the powerhouse are retained in a regulating pond to be used for irrigation purposes in the Nam Nyam valley, Thourakhom District, Vientiane province, supposed to irrigate more than 1 600 ha.

This research is located in downstream areas along the Nam Nyam valley with more than 10 villages (about 3,000 households). Most of the farmers rely on subsistence agriculture such as rice production, livestock, NTFPs gathering, fishing... However, due to the impacts of NM3HP, large paddy field and other agricultural lands have been flooded during raining season. Farmers are very vulnerable and encounter many livelihood difficulties. Although there is an EIA done before constructing the project, it stated that there would be very little social impacts; but after dam operation, many problems have emerged in the downstream areas. Fortunately, the project has included an irrigation scheme for downstream communities' areas. To this date, very little studies address the issue of water governance in Laos. Therefore, this is a critical study to analyze the water

---

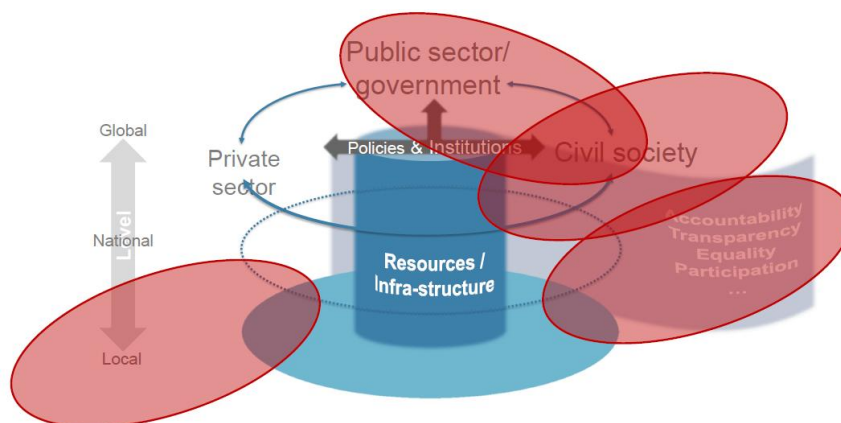
<sup>1</sup> Throughout this paper, the words “*Nam*”, “*Houay*” are used to “River or stream” and “*Ban*” to mean “Village”. To avoid repetition, the English word is not repeated after the Lao name.

governance regime in the case of NM3-irrigation scheme and to draw finally policy recommendations for improving water governance in the area of dams and irrigation in order to mitigate the negative impact, which is a crucial issue for Laos at a time when the number of hydropower dam projects is booming.

## 2. Theoretical review

The research project fits within the broader topic area of water governance, defined as “(...) *the range of political, social, economic and administrative systems that are in place to regulate development and management of water resources and provisions of water services at different levels of society*” (UNDP 2003). Analyzing water governance involves focusing on the actors that are involved in the management of water resources, *i.e.* traditional state actors but also non-state actors such as businesses and civil society [see Figure 1]. What is at stake, is to study changes in the identity of the actors (public and private) that are involved in the control and management of water as well as the institutions or organizations that may have emerged to take up this task.

Figure 1: water governance chart



Source: WeSenseIt Citizen Water Observatories <http://www.unesco-ihe.org>

According to the Global Water Partnership (GWP) water governance is defined as “*the range of political, social, economic and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society*”(OECD 2011 p.9)

Moreover, water governance is therefore the set of systems that control decision-making with regard to water resources development and management. It is therefore more about the way in which decisions are made (*i.e. how, by whom and under what conditions*) than about the decisions themselves (Moench, Dixit et al. 2003).

As highlighted by Neef (2009), many countries have experienced or are currently experiencing a transition towards natural resources management policies that are more collaborative, and rely more on the participation of local stakeholders. This global trend towards enhanced citizen participation in environmental governance is backed by the Principle 10 of the Rio Declaration. In Laos, alt-



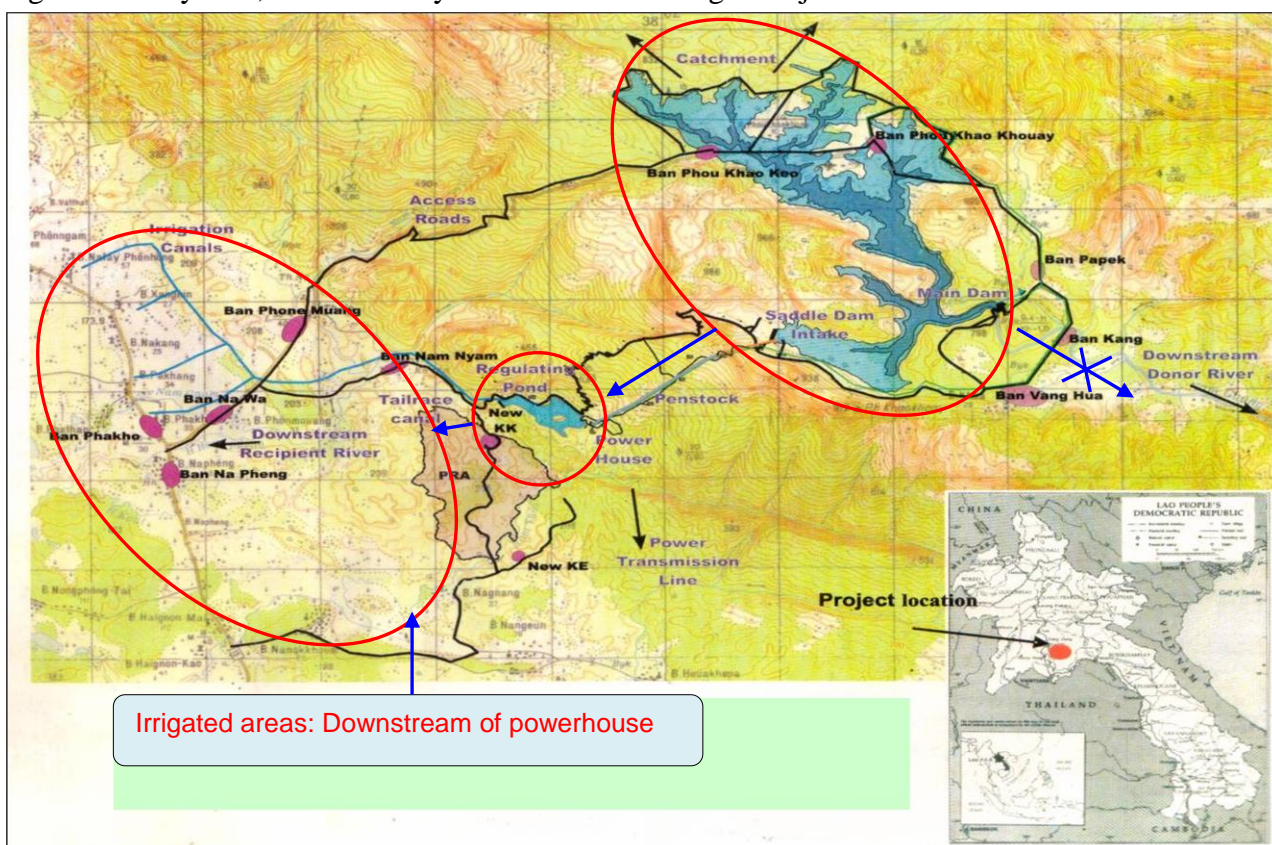
though some attempts to involve local stakeholders (farmers, WUG...) into irrigation schemes have recently been made through “participatory irrigation management”, nevertheless participation remains quite limited (Williams and Weale 2006).

### 3. Methodology

#### 3.1. Study sites

The study area comprises irrigation scheme areas along Nam Nyam valley downstream of trans-basin scheme of NM3HP Project. It is located administratively in Thourakhom district, Vientiane province, about 60 km North of Vientiane Capital, Laos

Figure 2: study area, within the layout of the Nam Mang 3 Project



Source: Electricité du Laos, 2005

#### 3.2. Research approach and methods

The first part of the research is aimed at understanding the governance of the irrigation scheme related to the NM3HP and its evolution. The purpose of this task is to show how the project has evolved over time: what topics of concern have emerged, by whom they were brought out as a relevant issue, how have they been tackled, what were the actors involved, etc.

A second part aims to bring together the perceptions of the irrigation and water governance process by the various stakeholders through focus groups. This enables us to better define and to identify different issues of the relevant groups of actors to be included in water governance:

upstream/downstream; district/village; women/men; fishermen/farmers; water users/dam operators; landowners/landless farmers; etc.

### **3.3. Data collection**

Both a qualitative and quantitative survey combined with a review of existing documents was used. The qualitative survey focuses on key stakeholders involved in the NM3-irrigation scheme by using guideline key informant surveys.

Also focus group surveys were conducted mainly at the village level: village authorities, village Water Users Group committee, women's and elder's groups...etc. by using specific guidelines. The survey of villages are located in irrigated areas up and downstream and indirectly linked irrigation schemes (concrete diversionary weirs) related to NM3-irrigation scheme.

## **4. Results and discussion**

### **4.1. Background of Nam Mang3 Hydropower Project**

More than three decades ago, the Interim Committee for Coordination of Investigations of the Lower Mekong Basin (LMB), what is now the Secretariat of the MRC, developed an indicative plan for developing hydropower in the Mekong basin, including small to big size (Mekong Secretariat 1990). Then, the GOL therefore requested the Mekong Secretariat to carry out a reconnaissance study on NM3 project on the Nam Nyong in 1987 in PKK, which concluded that NM3 project can be developed as a multi-purpose project with power generation and an irrigation scheme (Mekong secretariat 1987).

In 1992, a pre-feasibility study was carried out again. In 1994, another feasibility study, which had more information regarding the geographic, proposed various options. The conclusion from the feasibility study in 2001 considered more thoroughly environmental impacts (EDL 2005, EDL-Gen website 2013). However, the irrigation schemes downstream were not taken into account (IRN 2003). Actually, PAFO of Vientiane province have already conducted a feasibility survey for free gravity irrigation system<sup>2</sup> in 2000. This survey found that this system could irrigate around 2,220 ha surrounding Nam Nyam valley and along the road N° 10 and made a proposal to MAF. Finally, the construction of NM3HP began in early January 2002 and at the same time, MAF required EDL to include the irrigation scheme in downstream areas that have been surveyed by PAFO. During 2003/04, EDL got a loan from Chinese Government of US\$ 2.8 million for constructing irrigation scheme and for initial operation costs. The construction of the NM3HP and irrigation schemes has been concluded in 15 December 2004 and officially started production in January 2005.

---

<sup>2</sup> The survey carried out by a company to survey and design irrigation of Vientiane province

In fact, the NM3HP was financed by the GOL by loans. About US\$63 million for the hydropower and irrigation scheme and US\$27.7 millions for the substations and transmission line scheme; 80 percent of the fund came from a loan from the Export-Import Bank of China (interests of 2% per annum during 12 years) and the other 20 percent came from EDL. In addition, the contractor has used the fund (approx. US\$2.5 million) to finance the EIA and the mitigation measures (Jakob, Julia et al. 2009).

#### **4.2. Ownership Nam Mang3 Hydropower project**

Actually, NM3HP was under responsibility of EDL at the beginning and then since end of 2010 this project is under EDL-Generation Public Company as dam operator.

**Electricité du Laos (EDL)**: established initially in 1959 to supply the French military bases in Vientiane (World Bank 2012 b pp.4-5) and was established officially on December 18, 1961. Today, EDL is a state-owned corporation under the MEM which owns and operates the country's main generation, transmission and distribution assets in Laos, and manages electricity imports into its grids and exports from its stations. EDL also has a project development role and has been the implementing agency for government hydropower power projects and in the case of Independent Power Producer (IPP) projects is the Government's shareholder. It has been past practice for EDL to take over from MEM the responsibility for a project once a shareholders' agreement is executed and the project loans are closed (EDL website 2013).

In December 2010, the GOL has approved the privatization of EDL's power generation business and the establishment of EDL-Generation Public Company (EDL-Gen)<sup>3</sup> as owner/operator. It is the first public company in Laos. On the 15th December 2010 Ministry of Industry and Trade (Business Registration Office) issued the business license No.4637/BRO.MOIC, EDL-Gen became public company and listed in the Lao Stock Exchange<sup>4</sup>. EDL-GEN is owned 75% by EDL and 25% owned by public Investors (domestic and foreign investors) (EDL-Gen 2010).

Based on the Concession Agreement (CA) signed with the GOL on 15th December 2010, 7 projects<sup>5</sup> are under the management of the Company including NM3HP. The validation period is 30 years and can be negotiated to be extended to 10 years. After these periods the Company should transfer all assets used in generating electricity to the GOL. Moreover, this CA included mostly the electricity tariff and Land Lease Agreement.

---

<sup>3</sup> Decision No 180/PMO on the approval and certification of the creation of the EDL-Gen

<sup>4</sup> According to Decree No.526/PM on the registration of EDL-Gen in Lao Securities Exchange

<sup>5</sup> The EDL-Generation Public Company has 7 hydropower Plant in 2010: Nam Ngum 1 (155 MW), Xe Set 2 (76MW), Nam Leuk (60MW), Xe Set1 (45MW), Nam Mang3 (40MW) and Xe Labam.

### 4.3. How NM3-irrigation scheme functions with dam operation?

NM3 irrigation scheme is a gravity or reservoir irrigation scheme. It is a large size<sup>6</sup> irrigation related to power generation with water discharged from Regulating Pond used for irrigation schemes. NM3 irrigation schemes comprises today about 27 Km<sup>7</sup> of primary and secondary canals fed from a gated sluice on the Regulating Pond via a concrete lined canal of 2.3 Km.

Actually, the NM3 irrigation feeds also indirectly other existing concrete diversionary weir schemes along the Nam Nyam<sup>8</sup>, Nam Teng<sup>9</sup> and Houay Hong Pheng benefiting from water releases to Nam Nyam and Nam Teng and overflows of drained downstream rice fields. Before 2005, farmers along the Nam Nyam valley grew rice particularly in raining season (*Na pi*). Thanks to NM3 irrigation scheme, farmers in this area can practice the second season of rice production (*Na Xeng*) and other cash crops in dry season (November to April). So, rice production is the most represented in terms of cultivated areas; about 90 % and 6% are various vegetable gardens along the canal banks in the dry season. Another 4 % are for livestock activities, aquaculture and other purposes.

Indeed, about 95 % of irrigation users (farmers) need irrigation water during dry season and 5 % during raining season (May to October) only at the beginning of rice season in May (to prepare seeding) and flowering time in September.

In contrast, the powerhouse of NM3HP works mostly during the raining season (12-24 hours per day), and 6 hours per day during dry season to guarantee 6-GWh of energy production for every month of the year. The production serves also to meet the peak energy demand in the raining season as well as allowing additional energy production to be sold for hard currency to Thailand. It is expected to generate annual revenues of \$6.0 million<sup>10</sup>. Moreover, discharged water from the Regulating pond after power generation is sufficient to irrigate more than 1650 ha in dry season 2011/2012 (Matthouvang 2011) and not 2,900 ha as initially planned.

Naturally, NM3HP has a small Regulating Pond. Full Supply Level of this pond is 201.50 masl , with 0.2 Km<sup>2</sup> by a Concrete Dam across the Nam Teng. There is a spill way to discharge 22 m<sup>3</sup>/s and 4.7 m<sup>3</sup>/s maximum to the irrigation scheme. The concrete lined canal of 2.3 Km has two drops for releasing water to Nam Teng and Nam Nyam in raining season. In fact, when the powerhouse

---

<sup>6</sup> The size of irrigation schemes (article 18) of the Law on Agriculture N°105/PO (1998) is “*Small-scale irrigation [refers to] irrigation that serves a production area of less than 100 hectares; medium-scale irrigation [refers to] irrigation that serves a production area of 100 to 500 hectares; large-scale irrigation [refers to] irrigation that serves a production area exceeding 500 hectares*”.

<sup>7</sup> While, 17.3 Km is new canals network extension and it concluded at the beginning of 2012. This extension is about US\$ 7.8 million, funded by government.

<sup>8</sup> at Ban Namnyam, Nakeo and Nongphong

<sup>9</sup> At Ban Namnyam

<sup>10</sup> 26-55 Gwh is for export to Thailand with revenues of about US\$6 Million expected annually, which include US\$1.2 - 2.0 million from Thailand. The remaining 67-97 Gwh is for local use

works full capacity during raining season the dam has to release a big quantity of water downstream which causes flooding of rice fields along Nam Nyam valley and No.10 road. This happens because Nam Nyam valley forms a "U valley" and has poorly drained areas (180-200 m altitude), when small stream recipient (Nam Nyam) receive immediately water releases, rain flow, and drainage ways are interrupted by road and canal networks, dyke...etc. For example, raining season in 2011 caused flooding of more than 200 ha rice fields (Matthouvang 2011) and damaged already transplanted rice fields, seeding, fish ponds, broke irrigation canals, destroyed roads, village flooding ...etc. Today, many hectares of rice fields are abandoned. Well-off farmer can invest to other economic activities, but it causes difficulty for livelihood of poor farmers. In dry season, the water quantities of irrigation are not enough to supply the whole network downstream of NM-irrigation scheme such as Ban Phonkeo, Haiyorn, Phonhong. Also concrete diversionary weir schemes indirectly connected downstream of Nam Nyam and Houay Hong Pheng at Ban Napheng, Nakeo and Nongphong lack of water.

#### **4.4. How about the irrigated area in NM3-irrigation scheme**

The actual irrigated areas in the dry season 2011/2012 of 2,254 ha increased to 92 %, compared to the dry season 2005/06 (1,170 ha). All irrigated areas of direct or indirect schemes are counted: (i) NM3 irrigation (73% or 1650 ha); (ii) Ban Dong connected directly (7% or 150 ha), (iii) Nam Nyam and Nam Teng concrete weir at Ban Namnyam (2% or 54 ha); (iv) Concrete weir at Ban Napheng (2%, or 50 ha); (v) Concrete weir and Embankment Lake at Ban Nakeo (7% or 150 ha) and (vi) concrete weir and pumping scheme at ban Nongphong (9% or 200 ha).

#### **4.5. Who is in charge of Nam Mang 3 irrigation scheme over time?**

The NM3 irrigation scheme is excluded from EDL-Gen in terms of organization. EDL funded only US\$ 2.8 million for constructing the canal irrigation network, office, some vehicles, and initial cost operation. NM3HP ownership (EDL-Gen) is responsible for only 2.3 Km primary concrete canal for maintaining costs. Then, PAFO of Vientiane province has to be responsible for all the management of this irrigation scheme including operation cost and staff allocation. Of US\$ 2.8 million, 2 % were employed for operation costs during two years (2005-2007) and then NM3-irrigation scheme paid operation costs by collecting water fees only during the dry season; big maintaining works were subsidized by PAFO (government) as well.

The management started at NM3 Irrigation Project office (NM3-IPO) from 2005 to 2009, the staff came directly from PAFO of Vientiane province. The role of this office is to manage the irrigation system network such as being responsible to collect water fees for maintaining the irrigation system and manage operation costs of the office, also to promote rice production in the irrigated area. At that time the WUG at the village was not set up yet. There was only a Farmer Group "*Kum xao na*",

with 3 or 4 persons, who worked and coordinated closely with NM3-IPO and farmers. This group works as farmer's representative in charge of the registered farmers, resolving conflict problems, organizing meetings with farmers for irrigation scheduling, etc. Other concrete diversionary weir schemes are not involved with NM3-IPO in terms of operation and management. Those schemes are under the village authorities and supervision from DAFEO.

In 2010, PAFO decided to merge the Agriculture Technical Centre<sup>11</sup> and NM3-IPO as there were too many interrupting activities in the same area. This merge became the Technical Service Centre NM3 Office (TSC-NM3). The staffs in this office are from DAFEO and PAFO. The objectives are still the same, but whole irrigation scheme connecting indirectly with NM3-irrigation are administratively under TSC-NM3 office. Therefore, TSC-NM3 office formulated a specific regulation for managing the irrigation scheme, only in 2010 (17th February) by decree No. 071 of the District Governor on setting up "**Water User Group Committee**". Following, on 19th March 2010 other regulations on "**Role and Right of Water User Group committee**" and "**Usage and Management of NM3-irrigation scheme**" were registered finally on the paper (District Gouvernor 2010, Salyphoth and Mattouvong 2010, Saynirath 2010).

So after this institutional changing a new Head of TSC-NM3 and 2 members of WUG in each village were named. The Farmer group still exists and 80 % water user fees are managed by Farmer group as big WUG (*Kum Nyai*) and 20 % are managed by WUG at the village as Sub-Group (*Kum Nyoi*) for their remuneration<sup>12</sup> and basic operation cost.

#### **4.6. Key stakeholders of NM3-irrigation water governance**

**Dam operator (EDL- Generation public company):** Actually, the water discharges to the canal regularly feed the primary concrete canal with less than 1 m<sup>3</sup>/s for avoiding canals being broken. However, Dam operation is opposite to the rice production season. Dam operator concentrates on its own electricity production in raining season for example. Since this project started up, they don't stop any time their production to prevent the downstream flooding. The CA presents only the duration of handing over to government (30 years), electricity tariff, and Land Lease Agreement; there was not any mitigation measure for downstream impacts. The governance arrangements in negotiation with the operating regime for the dam do 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 this water diversion project.

---

<sup>11</sup> In 2008, the Nam Ngum River Basin Development Sector Project (NNRB) managed by NAFES supported DAFEO of Thourakhom district to create an Agriculture Technical Centre (ATC). This centre was next to NM3-IPO.

<sup>12</sup> WUG' member salary 500,000 kip/year, if some villages have less irrigated area, 20 % it not enough to ensure these amounts, so *Kum Nyai* have to subsidy their salary per year.

**Technical Service Centre Nam Mang 3 office:** is responsible for the whole NM3 irrigation scheme and other connected irrigation schemes by promoting agricultural production and to ensure the satisfaction of irrigated farmers or water user and maintaining the irrigation scheme. NM3 office staff from DAFEO and PAFO, working together and they have to report their monthly and annually activities separately between the staff from DAFEO and PAFO.

**Kum Nyai:** works closely with TSC-NM3 office (3 day/week in dry season)<sup>13</sup> and during the raining season it is irregular. Actually, *Kum Nyai* plays an important role for NM3-irrigation scheme governance as a good representative for the irrigated farmers and sub groups. They coordinate with NM3HP for requirements of water release based on traditional irrigation scheduling and with other stakeholders such as village authorities, DAFEO, PAFO etc. They are responsible for primary canal (*khong mai /khong nyai*) network water allocation and solve problems at the village level. Then, they are responsible for water fees management and collecting fees from each sub-group. For the maintenance, cleaning and rehabilitation of the primary canals especially, they have only 15 million kip each year.

**Kum Nyoi:** Normally, there are two persons per irrigated village according to regulation, but some villages have still 5 to 7 persons (Ban Nakeo and Nongphong). They are responsible for the measurement of the irrigated area after rice transplantation (January) and water fee collection (20,000 kip/Rai)<sup>14</sup> from farmers irrigating in dry season rice production. They are in charge for the second (*khong xoy*) and tertiary (*khong sai kai*) water allocation upstream and downstream of canal line, they solve problems in the village and coordinate vertically with village authorities, *kum nyai* and TSC-NM3. They have to inform also irrigating farmers to participate for canal cleaning and irrigation scheduling. If members of WUG at village grow rice, they have to pay water fees.

#### **4.7. NM3-irrigation issues and challenges**

**Water fees management:** since 2010/2011, 80 % of water fees of dry season rice were sent to Kum Nyai at TSC-NM3 office. But some WUG at the village didn't transfer yet water fees to Kum Nyai in 2011/12 like Ban Nongphong, because they are not sure if those amounts will contribute efficiently for irrigation reparation in their village. Some villages are not satisfied with this principle, they wish to manage all fees by themselves, they can use some amounts to contribute to village development activities such as road reparation, school construction (Ban Namnyam)...etc. The collection and transparent use of water user fees for maintenance are very needed and important for village authorities, WUGs and farmers. Actually, 15 million kip/year allowed for irrigation maintaining are not sufficient. The irrigation scheme breaks usually after each raining

---

<sup>13</sup> Their salary per year evolved 1,000,000 kip (200//5/06) to 3,000,000 kip/year in 2011/2012

<sup>14</sup> This water fee tariff has changed just in 2010/2011 season, before it was 15,000 kip/Rai or 1,600 m<sup>2</sup>

season, because of regularly flooding.

**Upstream and downstream farmers:** In the dry season the farmers downstream have less water to irrigate their field due to water deduced by upstream farmers. There were fewer problems with the upstream and downstream primary canals. The problems are along the *khong sai khai* dug by farmers themselves and the secondary canals, where there are many rice fields. These canals sometimes are not big enough or too long. They cross several parcels and don't have standardized level of canal and are too low between rice fields due to limited budget or poor design. The rice fields situated downstream risk to have a lower yield. Rice fields are located along the *khong mai/khong nyai* that can access easier to irrigation than rice fields next to *khong xoy* and *khong sai kai* canals. In the raining season, a new problem for the farmers downstream of irrigation network and Nam Nyam occurred, as there is too much water. In fact, farmers upstream have enough water and release water freely to the downstream parcels to avoid flooding of their parcels, as water gates can be closed and opened easily.

**Water releases:** the dam operation related to water releases is opposite to irrigated rice production. The water releases for hydropower production at NM3HP don't consider the downstream benefits and costs to the users of the water for irrigation, and impacts of flooding. The best solution to mitigate negative impacts downstream is to shut down or reduce the electricity generation when there is a hard rain in raining season, because the Regulating Pond is small and recipient river basin, too, as well as poor drained areas.

#### **4.8. Irrigation scheme and good governance perceptions**

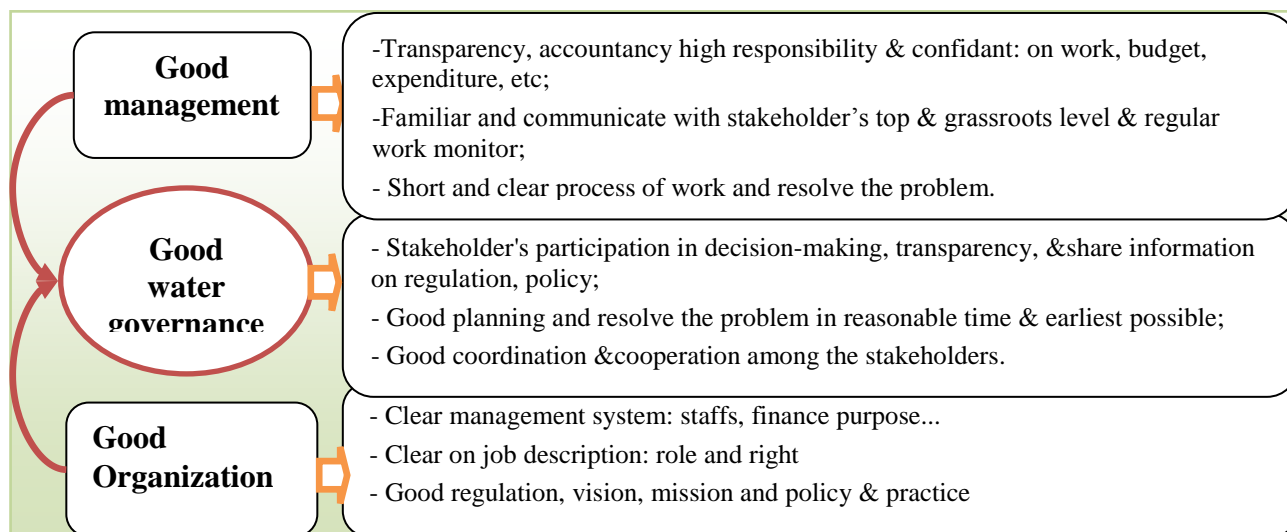
According the result key informant and focus group surveys with various stakeholders, related irrigation perception of a good irrigation scheme. So 63 %, they wish to have enough quantities of water during the dry season including upstream and downstream and also not too much water in the raining season. This is explained by the flooding issue during raining season downstream of the dam. 32 %, they wish to access easily to irrigation water. It explains the difficulty to access irrigation water for farmers due to poor irrigation scheme design, canal networks lower than rice fields, no drainage system, not enough secondary canal lines...etc. And then 5%, they need irrigation for the whole year especially for upland rice fields, gardens, and fish and pig farms, fishermen...etc. And other negligible perceptions are related to the agricultural promotion activities in irrigated areas: technical, extension, high yield seed, marketing, credit scheme...etc. They request a bridge crossing the primary canal line (to facilitate transport, avoiding damaging the canal), and to have enough budget for regularly maintaining and monitoring. Further they ask for installing a big



concrete tank crossed by the road and irrigation canal networks to facilitate water drainage during raining season.

Moreover, we tried to ask the question of what signifies good water governance to various stakeholders (EDL, PAFO, DAFEO, village authorities...). It is quiet difficult for our informants to define good water governance or governance. The answers are usually related to "what is good work" as TSC-NM3 office, *Kum Nyai*, *Kum nyoi*...etc. However, we found that the good governance is related with good management and good organisation:

Figure 3: Good organisation, management and governance



Source: author data from field survey

## 5. Conclusions and recommendations

NM3HP is a small dam, but it is an original one associated with the electricity production (export and domestic) and irrigation scheme. Before project, famers of downstream areas in this area can grow mainly raining season rice. With the project including a new irrigation system, they can practice a second season (dry season), but they have a big problem due to flooding of their rice field in raining season by electricity generation. Some farmers have abandoned their rice field and turned out to other activities, but livelihoods of vulnerable families encounter difficulties. In contrast, the irrigation scheme doesn't have enough water in dry season for the whole canal network especially downstream of canals and Nam Nyam (concrete weir schemes). This causes issues of conflict among users during dry season. Moreover, rice production in dry season needs high production cost for buying improved seeds, chemical fertilizer, paying irrigation fees, the prices of rice are lower than rice in wet season and the harvest period is risky because of the beginning raining season period that may create a postharvest issue or loss of quality. The compensation has taken place only for impacts upstream during the construction phase, but flooding in downstream areas doesn't have any compensation package from the dam operator. The governance of NM3-irrigation itself

concerned especially the water allocation upstream/downstream along irrigation channels, and collection and transparent use of water user fees for maintenance. The combination between dam operation and irrigation is done in a way not really considering the downstream benefits and costs to the users of the water for irrigation, and impacts of flooding. The budget of TSC-NM3 from water fees is not covered for maintenance costs. The irrigation scheme perceptions from various stakeholders are related particularly with flooding mitigation needed in raining season and a low quality standard of irrigation. Good water governance is finally linked with good management and good organization.

**Different type of concept design of hydropower** in Laos, such as storage reservoir dams, run-of-river or penstocks scheme...etc, consider effects upstream or in the reservoir areas, but downstream effects are often forgotten where there are usually live more people. NM3HP is a penstock scheme and there are various impacts downstream of the dam. An irrigation scheme is not enough for compensating or restoring livelihoods facing downstream impacts. The ministries and agencies concerned should take into account to mitigate this kind of problem and monitor the dam operation to respect the existing rules and regulations. **A policy dialogue for NM3-irrigation scheme governance** is very needed and necessary. It should include farmers, local authorities, rural development partners, DAFEO, PAFEO, concerned ministries and the dam operator for mitigating and taking into account the negative impacts caused by the dams for downstream communities. To share information, identify stakeholders and their interest, this means including them as early as possible in the project to avoid top-down decision-making and no transparency. This would help to ensure benefit sharing from projects by considering the social welfare of local communities and reinforce capacity building in the water governance chain. **To mitigate some of the negative impacts from the project** downstream along the Nam Nyam valley, the operator NM3HP should pay or compensate for flooding of rice fields, caused by dam operation "waters releases". The dam operator should stop or reduce its production when there was a hard rain in raining season to prevent the big flooding downstream. It should also allocate some annual budget for TSC-NM3 office for operation cost, training programme, field work cost and irrigation maintenance caused by flooding. In fact, 15 million kip per year from water fees are not enough for the whole irrigation scheme maintenance. So today, the government has to subsidy with hard budget for road and irrigation damaged after each raining season and villagers have to contribute also to those costs.

**Governor authority and local authority should work closely** on the negative impacts and should find solutions and alternatives for negative impacts. For example they should develop a policy "on irrigated land allocation" for farmers who don't have any irrigated paddy field in dry season or who have uncultivated paddy fields due to flooding in raining season. Mostly, well-off households have

irrigated paddy fields and benefit from the project. The poor households will be still poor, which increases inequality and a high socio-economic differentiation in the village. **The earliest possible, TSC-NM3** should have a contract or irrigation scheduling with the dam operator (EDL-Gen) on their operation during dry season and raining season. Because until now the dam operator can release water freely for its own electricity production, so there should be a rule for water releases. TSC-NM3 office, DAFEO and PAFO should help each other to improve irrigation service in a large scale irrigation scheme. Also reinforcement of cooperation and coordination is necessary. DAFEO and PAFO should allocate qualified staff to TSC-NM3 office and field work. Capacity building reinforcement is very important to improve the irrigation service performance by training programme, exchange experience, and include WUGs, farmer models in the province or other provinces or abroad if possible. The experiment and extension activities are very usefully for irrigating farmers to improve their technical skills, high yield seeds, and marketing. The transparency and accountancy on water fees management and usage is much needed for irrigating farmers and WUGs. The maintenance of the irrigation system should consider the priority tasks, because sometimes these tasks take too long. **Kum Nyai or farmer group**, is an active group and the most known in the irrigate area. Re-election each 4 years is necessary and to include young people to help for the water fees management, to calculate by machinery and learn good experience with them. This group should allocate its tasks to other units in TSC-NM3 office, because they are responsible for several tasks at the same time. **Village authorities should** inform more about the meetings and changes in water governance and other activities relevant to the villagers. They should help farmers to propose the negative impact by dam operation as flooding rice fields during raining season, increased water fees and other...**Water User Group (WUGs)**: this group is representative for farmers, but they don't know exactly their role. So they are like marionettes for Kum Nyai in particular and village authorities, since the village authorities still play an important role at the village. The WUGs should have the same size in all villages in NM3-irrigation scheme (2 persons per village) and have the same type of management in each village (no homogeneity or coordination and cooperation between villages). The member of WUGs should include woman to help in the account management and efficient budget expenditure. WUGs should participate in any program for training or experiences exchange with other irrigation schemes. **Farmers** should have a good solidarity for reporting the negative impact that they suffer from. The irrigating farmers should help other villagers in the village to allocate irrigated rice fields. The irrigating famers upstream should respect regulations to fairly access water to avoiding the conflict.

## References

### **Books**

- Scudder, T. (2005). *The Future Of Large Dams: Dealing with Social, Environmental, Institutional and Political Costs.* . London: Earthscan: 289 p.
- UNDP (2003). *Governing Water Wisely for Sustainable Development. Water for People, Water For Life:* . The UN World Water Development Report. Paris, United Nations Department of Economic and Social Affairs (UNDESA); UNDP; United Nations Economic Commission for Europe (UNECE).
- WCD (2008). *Dams and Development: A New Framework for Decision-Making.* London: Earthscan, World Commission on Dam: 404 p.
- Moench, M., et al. (2003) *The Fluid Mosaic, Water Governance in the Context of Variability, Uncertainty and Change.* 71 p
- Molle, F., et al. (eds, 2009). *Contested Waterscapes in the Mekong Region: Hydropower, Livelihoods and Governance.* London: Earthscan: 416 p.
- OECD (2011). *Water Governance in OECD Countries: A Multi-level Approach,* . OECD Studies on Water. Paris, OECD Publishing. <http://dx.doi.org/10.1787/9789264119284-en>: 245 p.

### **Papers and journals**

- Chanudet, V., et al. (2011). "Gross CO<sub>2</sub> and CH<sub>4</sub> Emissions from the Nam Ngum and Nam Leuk Sub-tropical Reservoirs in Lao PDR." **408**(24): pp. 5382-5391.
- Duganp, J., et al. (2010) *Fish Migration, Dams, and Loss of Ecosystem Services in the Mekong Basin.* pp. 344-348
- Hirsch, P. (2011). "China and the Cascading Geopolitics of Lower Mekong Dams." The Asia-Pacific Journal 9(20): 2 p.
- Neef, A. (2009). "Transforming Rural Water Governance: Towards Deliberative and Polycentric Models?" Water Alternatives [Vol. 2](1): pp 53-60.
- Williams, S. E. and J. C. Weale (2006) *Water Policy Briefing Series: Water governance in the Mekong region- the need for more informed policy-making.* [Vol. 22], 8 p
- WREA (2009). *National adaptation programme of action to climate change.* Vientiane, Water Resources and Environmental Administration-UNDP-GEF.

### **Government and project Documents**

- District Gouvernor (2010). Decree on the settlement of "Water User Committee" of Technical Service Center Nam Mang 3 (17 February). 071/District Governor of Thourakhom, Thourakhom District, Vientiane Province 3 p.
- EDL (2005). The Nam Mang 3 Hydropower Development Project Electricité du Laos and China International Water & Electric Corp. (CWE) 5 p.
- EDL-Gen (2010). Annual Report 2010. Vientiane, EDL-Generation Public Company [[http://www.edlgen.com.la/wp-content/uploads/2011/05/Annual\\_Report\\_2010\\_en.pdf](http://www.edlgen.com.la/wp-content/uploads/2011/05/Annual_Report_2010_en.pdf)]: 41 p.
- GOL (2004). National growth and poverty eradication strategy (NGPES). Vientiane, Ministère des Affaires Etrangères: 245 p.
- Matthouvong, T. (2011). Report the damage of inundation on the 25 June to 5 July 2011. Thourakhom District, Vientiane province, Technical Service Center Nam Mang 3 (TSC NM3): 6 p.
- Mekong secretariat (1987). Nam Mang N° 3 Multi-Purpose Project, Lao PDR. Reconnaissance Report, Interim Committee for Co-ordination of Investigations of the Lower Mekong Basin
- Mekong Secretariat (1990). Feasibility study on the Nam Mang N° 3 Multi-Purpose Project (Lao PDR), Interim Committee for Co-ordination of Investigation of Lower Mekong Basin: 10 p.
- MEM (2013 March). Electric Power Plans in Lao PDR. Vientiane, Department of Energy Business, Ministry of Energy and Mines [<http://www.laofab.org/document/view/2076>].
- Salyphoth, S. and T. Mattouvong (2010). Meeting record on the role and right of WUG and regulation of irrigation scheme management-use of Technical Service Center Nam Mang 3 (19 March 2010). Management-Use regulation of irrigation users. Thourakhom District, Vientiane province, TSC NM3: 6 p.
- Saynirath, O. (2010). Management-Use NM3-irrigation scheme regulation for TSC-NM3 Thourakhom district: 8 p.

### **Internet websites**

- EDL-Gen website (2013). "Nam Mang 3 Hydro Power Plants." Retrieved 10 May 2013, from <http://www.edlgen.com.la>
- EDL website (2013). "About EDL - Vision and mission." Electricite du Laos (EDL). Retrieved 30 May, 2013, from <http://www.edl.com.la>