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prepared by

Yayoi Fujita Lagerqvist, Avakat Phasouysaingam, Natalia Scurrah

*co-authors/
contributors/
collaborators*

Philip Hirsch, Silinthone Sacklokham, Oudom Phonekhampheng,
Souphap Khouangvichit, Bae Pheaxay

approved by

Dr Caroline Lemerle, Research Program Manager for Agricultural
Systems Management, ACIAR

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Contents

1	Acknowledgments	4
2	Executive summary	5
3	Background.....	7
4	Objectives	9
5	Methods and activities	10
6	Key results	12
6.1	Literature review.....	12
6.2	Discussions with key stakeholders	13
6.3	Pilot study in Feuang District	15
6.4	Project proposal development	18
7	Conclusions and recommendations	20
7.1	Conclusions.....	20
7.2	Recommendations	20
7.3	References cited in report.....	21
7.4	Publications produced by project.....	22
8	Appendixes	23
8.1	Appendix 1: June Workshop	23

1 Acknowledgments

We would like to thank District and village authorities in Feuang District, Vientiane Province, who supported our pilot research study of livelihood change and adaptation and provided significant input into the long term research design during the final workshop in June 2011. We would also like to thank villagers from Khon Leuang and Muang Feuang villages who generously gave their time to participate in the household survey and interviews. We are greatly indebted to the scholars and students from the National University of Laos who assisted with data collection, field supervision and organisation of the final workshop.

Finally, we would like to express our sincere appreciation to ACIAR's Agricultural Systems Management Program and two anonymous reviewers for providing helpful guidance in designing and structuring the SRA and long term project, and for commenting on earlier drafts of the proposal.

2 Executive summary

The main objective of the original Small Research Activity (SRA) was to design in detail a three year research project to explore the range of options and costs involved in mitigating and adapting to resource impacts of large scale resource development, specifically through a study of lost fish production from infrastructure-induced hydrological change within different agro-/ aqua-ecological zones. Through discussions with prospective Lao government partners at the on-set of the SRA, the focus and scope of the activities were altered to better reflect the partners' strategic priorities and to take account of the multifaceted character of rural livelihoods. The project's focus was thus expanded beyond the fisheries sector to include an examination of adaptation and mitigation in livelihood systems more broadly in the context of increased resource constraints, but also focused narrowly in its geographical purview. As we forged partnerships with the National University of Laos and the Nam Ngum River Basin Committee, this influenced the direction and design of the SRA and larger research project to be grounded in the Nam Ngum watershed where series of large-scale resource development has occurred during the last four decades. Part of the reason for grounding our SRA and long-term research activities to the Nam Ngum watershed is the need for a context-specific understanding of livelihood parameters by local communities, local authorities and other relevant institutional stakeholders, as most large resource projects base their livelihood adaptation approaches on generic assumptions, expectations and prescriptions by external experts.

To understand key issues around livelihood adaptation and mitigation, we conducted a pilot study in two villages located downstream of Nam Lik 1-2 hydropower dam in Feuang District, Vientiane Province, Lao PDR. The pilot study aimed to:

- Assess the main impacts (both positive and negative) of the Nam Lik 1-2 hydropower dam on household livelihoods taking into account differences in wealth/income, ethnicity, gender, age and location.
- Explore other key drivers of livelihood change in the two villages/ district.
- Investigate how different people have adapted their livelihoods to the changes.
- Develop and test a research approach and methodology that captures complex dynamics on livelihood change and adaptation and maximises livelihood adaptation opportunities for poor and vulnerable people in areas affected by large scale resource development projects.
- Facilitate the participation and input of local stakeholders into the research concept and design.

The pilot study confirmed that livelihood activities had been significantly impacted by the construction of the Nam Lik 1-2 hydropower dam. The main impacts included flooding of paddy fields and riverbank vegetable gardens, decline in river fisheries, and a deterioration of water quality to the point that it was deemed unsafe to drink by villagers. Moreover, the study found that households were also experiencing cumulative impacts from other development activities in the Nam Ngum watershed which placed additional pressure on resources, thus limiting the adaptive capacity of some households. The relocation of 1,053 families from Nam Ngum 2 hydropower dam to Feuang District, for example, increased competition over land, which in turn placed more pressure on other resources such as fish and non-timber forest products.

The pilot study also pointed to the uneven distribution of benefits and costs from Nam Lik 1-2 dam and other developments that are putting pressure on resources. The wealthier households tended to exhibited more resilience by taking advantage of opportunities brought by roads, reservoirs and other infrastructure provided by development projects to change and adapt their economic activities. However, poorer households who had a high

reliance on the collection of natural resources for food and income were more vulnerable to resource degradation and environmental shocks.

The study raised awareness and provided a non-threatening platform for discussion of increasing pressure on water, land and forest resources Nam Ngum watershed resulting from hydropower, mining and agro-industrial plantations. These issues are of great concern to local authorities in Feuang District who are unable to adequately plan and manage livelihood transitions required to absorb and adapt to landscape changes at this rate and scale. As such there is significant scope and support from District and other levels of government administration and academics in Lao PDR for a research project that seeks to maximise livelihood adaptation opportunities and reduce vulnerabilities of poor and vulnerable households impacted by development projects in the Nam Ngum watershed.

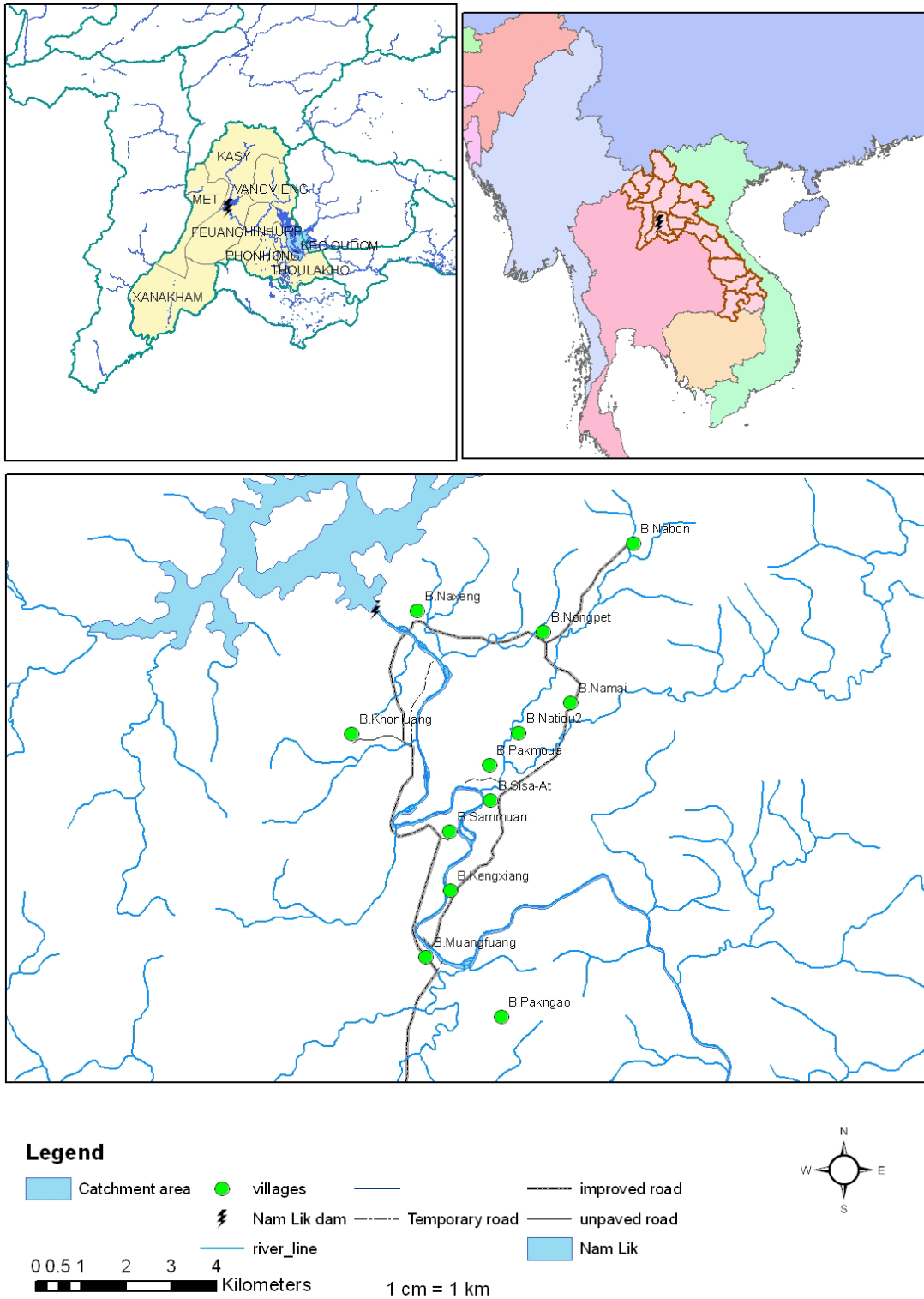
3 Background

The concept note for the SRA was put together in mid-2010 by ACIAR Agricultural Systems Management program and elaborated into a proposal by Hirsch (2010) as a project to be run through the Mekong Research Group (AMRC) at the School of Geosciences, University of Sydney. As the title of the SRA suggests, the study initially focused on assessing fisheries change and adaptation in the Lao PDR. Specifically, the study sought to examine the adaptation potential of fishers and possible mitigation options to replace benefits derived from fisheries in the context of hydrological change and declining fisheries resources.

Initial meetings held in January 2011 in Vientiane to table the project with prospective partners from relevant Government of Laos agencies indicated that, while there was support for livelihood adaptation and mitigation initiatives, the project needed to be reframed so as to better fit within the key priorities of the Water Resources and Environment Administration (WREA), namely mitigation and adaptation to a wide range of challenges and opportunities presented by resource use and environmental changes in Lao PDR. Further, WREA was undergoing major organisational restructuring during the first quarter of 2011 involving the formation of a new ministry, the Ministry of Environment and Natural Resources. This added to the challenge of planning for a long term project.

As a result of these developments during the early part of the SRA, the National University of Laos (NUoL) took a leading role in moving the project forward in Laos. In particular the Faculties of Agriculture and Environmental Science expressed a keen interest in linking the project with their existing work on livelihood change in areas impacted by hydropower development in the Nam Ngum basin (Charlet-Phommachanh and Furler 2010; Ducourtieux et al. forthcoming). The Nam Lik 1-2 hydropower Dam in northwestern Vientiane province of Feuang District was identified as an ideal case study for the SRA to explore livelihood adaptation and mitigation in the context of increasing resource constraints and to develop a larger three-year study (Figure 1). Based on the literature review and through the pilot study in Feuang district, the project team decided to expand the focus of the project beyond fisheries to include broader livelihood adaptation and mitigation responses to environmental and resource constraints.

Figure 1 Map of pilot study area for SRA



Map by: Avakat Phasouysaingam

4 Objectives

The original SRA initially had two main objectives:

- To establish the state of knowledge on fisheries impacts and mitigation options associated with hydrological changes that have implications for rural livelihoods in Lao PDR.
- To design in detail a three year research project to explore the range of options and costs involved in mitigating lost fish production within different agro/aqua-ecological systems of livelihoods.

As described in the previous section, the objectives were adjusted to reflect a change from the project's narrow focus on fisheries to an examination of adaptation and mitigation in livelihood systems more broadly in the context of resource pressures. The development of a pilot study in Feuang district, which lies in the Nam Ngum watershed, also influenced the activities carried out during the SRA and design of the long term research project. Based on the discussions that took place in January 2010, we re-adapted our SRA objectives and methods to understand the broader issues of livelihood adaptation and mitigation, and we began to re-frame the research to ask the following questions:

- How do people adapt their livelihoods in response to resource degradation and scarcity triggered by resource development projects?
- How do we understand and measure people's adaptation capacity, e.g. vulnerability/resilience to environmental changes and shocks?
- How can livelihoods be supported to ensure food and income opportunities are enhanced following large resource development projects?
- How can livelihood adaptation be better understood, planned and facilitated in areas impacted by resource development projects? How can the costs associated with livelihood adaptation be distributed more appropriately?

5 Methods and activities

The methods and activities applied for the SRA and key outputs are summarised in the table below.

Method	Activities	Timing of key activities	Outputs
Literature review and desk study	Literature review and desk study	Jan-Mar 2011	<ul style="list-style-type: none"> ▪ Key literature endnote database ▪ Summary of literature to inform SRA and larger project design
Meetings with key stakeholders	Meetings held in Laos and Australia with potential project partners and a range of organisations working on relevant issues including district officials and community members	Jan-Mar 2011 Aug -Sept 2011	<ul style="list-style-type: none"> ▪ Trip reports ▪ Meeting minutes ▪ Plan of activities
Pilot study	Pilot study on livelihood change and adaption to hydrological changes in two villages in Feuang District, culminating in a district-level workshop	April-June 2011 Workshop held 14-15 June 2011	<ul style="list-style-type: none"> ▪ Socioeconomic survey data collected on livelihood change and adaptation ▪ District workshop held to discuss/ brainstorm the scope and design of larger study with stakeholders. ▪ Workshop report (Lao/English) ▪ Pilot study report (Lao/English) ▪ Peer-reviewed journal article (English) ▪ Research methods and approach for long term study developed and support for project from key stakeholders gained

<p>Proposal development & writing</p>	<p>Proposal development workshops held in Lao PDR and Sydney.</p> <p>Month-long visit to Sydney by project partner to help draft concept note and full proposal.</p>	<p>June-Sep 2011</p>	<ul style="list-style-type: none"> ▪ Project scope, approach, method, organisation and budget determined with project partners ▪ Concept note ▪ Full proposal
<p>Review and finalisation of proposal</p>	<p>Response to external and in-house reviewer's comments.</p>	<p>Oct-Nov 2011 (and into January 2012)</p>	<ul style="list-style-type: none"> ▪ Finalisation and approval of full proposal

6 Key results

6.1 Literature review

Based on the original SRA proposal a literature review was undertaken during January-March 2011 to establish the state of knowledge on fisheries impacts and mitigation options associated with hydrological changes that have implications for rural livelihoods in Lao PDR. Key findings from the review are summarised below.

- **Capture fisheries is of immense value in terms of its contribution to the economy of Lao PDR as well as to household nutrition, food security and livelihood income.**
 - Capture fisheries contribute an estimated 6-8 per cent to Lao PDR's GDP. The direct value of capture fisheries in the domestic economy is estimated at between USD 66 million and USD 100 million per year (see Lorenzen et al. 2003). An abundance of research points to the importance of fisheries in rural livelihood strategies, particularly for the poorest. Fishing is almost everywhere integrated within agriculture and other resource-based livelihood systems in Lao PDR. In southern Laos more than 80 per cent of households take part in capture fisheries, with aquatic resources accounting for about 20 percent of gross income (see Baran and Ratner 2007). Fish and other aquatic animals are an important source of animal protein in Lao PDR, accounting for at least 43 per cent of total animal protein consumption or 25kg/capita/year (see Hortle 2007).
- **Dams are the biggest threat to capture fisheries**
 - It is now widely agreed that the principal and irreversible threats to the Mekong's fisheries involve activities that alter the natural flow regime, damage or destroy fish habitats, and/or block or restrict fish migrations. Dams and flood control schemes are the main threat to fisheries as they cause all of these impacts (see AMRC 2008; Baran et al. 2007). However, it is expected that climate change will cause additional changes in habitat temperatures and this will have a significant impact on fisheries in the Lao PDR (see Halls 2008), as will ongoing extractive pressures that require management.
 - There are no effective measures in the region to mitigate the impact of dams on fisheries.
- **There is no readily available substitute for fish in the diets of people in Lao PDR**
 - Despite being heavily promoted, aquaculture has not been widely adopted in Lao PDR. The added costs and skills associated with aquaculture, and the lack of willingness of farmers to invest in it points to the limited capacity of aquaculture to replace wild capture fisheries (see Bush and Kosy 2007).
 - Rice-fish systems are generally recognised as profitable, producing around 20 percent higher average net income when combined with integrated pest management activities (Frei and Becker 2005). Higher incomes are attributed to increasing rice yields caused by natural weed control and fertilisation, and the additional marketable product (fish) generated by the system. Of the rice fish systems the most efficient is concurrent rice-fish management which requires approximately 10% of the rice field to be converted into a fish refuge. Despite improving overall profitability of rice, there has only been marginal adoption of rice-fish systems to date, largely because of persisting education and skill barriers to (ibid), and an aversion to the risks associated with flood and drought (Ahmed, Garnett 2011).

- Reservoir fisheries, often considered a way to offset fisheries losses caused by damming, usually do not compensate for the loss of downstream fisheries. Out of the hundreds of species in the Mekong Basin, only nine are known to breed in reservoirs (see AMRC 2008; Baran and Ratner 2007).

In light of the above findings, the early literature review points out that many Environmental and Social Impact Assessments, Social Development Plans and other documents produced in association with hydropower projects continue to discuss dam impacts with the assumption that rural livelihoods can be easily mitigated and restored. Key issues based on this review of hydropower project documents in Lao PDR include the following:

- There is much faith placed on the capacity to mitigate and restore livelihoods of people impacted by dam development projects; yet, there is little evidence that livelihood mitigation and restoration programs are successful on the ground (see SEAL and TEAM 2005; IR 2008; Shoemaker 2000; Barney 2007).
- Monitoring and evaluation of livelihood mitigation and restoration programs are not publicly available or they are not based on independent assessments (see McDowell et al. 2010; IR 2010).
- There is a standard approach to livelihood mitigation and restoration for dam projects in Lao PDR which tend to be generically derived and follow prescriptive solutions designed by outside experts.
- Livelihood mitigation and restoration programs prepared for dam projects in Lao PDR often lack detail and do not go far enough in addressing the complex and multiple needs of villagers that have been dispossessed of both private and common property and suffering the trauma of relocation, which includes addressing their psychological needs, as well as livelihood needs (Blake 2005; 2010).
- The complex process of livelihood adaptation is not adequately understood or planned for in hydropower development projects, while there has been a substantial body of work carried out in Laos to understand the rural livelihoods (NAFRI 2006) A better understanding of livelihood systems and the costs involved in adaptation and mitigation could open the way for recognition of different livelihood replacement opportunities and circumstances.

The above literature review highlighted that most large resource projects base their livelihood adaptation approaches on generic assumptions, expectations and prescriptions by external experts rather than on the building of a context-specific understanding of livelihood parameters by local communities, local authorities and other relevant institutional stakeholders. This framed a significant part of the justification and design of the SRA and larger project.

6.2 Discussions with key stakeholders

Meetings were held with a range of stakeholders to establish partners for the SRA and larger research project and to determine how the proposed project can complement and strengthen ongoing initiatives in Lao PDR. Stakeholders consulted are listed in the table below. Meeting minutes are available in corresponding trip reports.

10-13 January 2011, <i>Vientiane</i>	20-25 March 2011, <i>Vientiane and Feuang District</i>	June 2011, <i>Vientiane and Feuang District</i>	August 2011, <i>Vientiane and Sydney</i>
Mrs. Khampeng Pholsena , Minister to the Prime Minister's Office, Head of Water	Follow up meetings with academics from the Faculty of Agriculture and Faculty of	Workshop in Feuang District with various stakeholders (see	Follow up meetings with academics from the Faculty of Agriculture, Faculty of Forestry, and

<p>Resources and Environment Agency (WREA), Chairperson of Lao National Mekong Committee (LNMC)</p> <p>Dr. Bounthan Bounvilay, Director, Water Resources and Environment Research Institute (WERI)</p> <p>Mrs. Bounkham Vorachit, Director General, ESIA Division, WREA</p> <p>Mr. Douangkham Singhanouvong, Head of Capture Fisheries Unit, Living Aquatic Resources Research Centre (LARReC)</p> <p>Mr. Bounthong, Deputy Director General, Department of Livestock and Fisheries</p> <p>Dr. Silinthone Sacklokhom and Dr. Oudom Phonekhampheng, Faculty of Agriculture, NUoL</p> <p>Assoc/Prof Souphab Khouangvichit, Dean, Faculty of Environmental Science, NUoL</p> <p>Mekong Futures group: John Dore, Mekong Region Water Resources Advisor to AusAID; Alex Marks, Second Secretary and Manager of Mekong Water and Infrastructure Unit, AusAID; Pech Sokhem, Chair, of M-POWER steering group; Kate Lazarus, Challenge Program on Water and Food; Alex Smaigl, Mekong Futures Program, CSIRO (based in Townsville).</p> <p>Victor Cowling, Freshwater Coordinator, WWF</p> <p>Khmalouang Kaewka, Country representative, Oxfam Australia</p>	<p>Environmental Science at NUoL to establish partnership for SRA and three-year project. Future research activities planned for SRA.</p> <p>Meeting with academics from Faculty of Forestry (Houngpeth Chanthavong, Khamla Phanvilay) to determine interested in collaborating in the project.</p> <p>Field visit to Feuang District to develop a pilot case study for the SRA. Meetings held with District Chief of Feuang District, and preliminary interviews with communities impacted by Nam Lik 1-2 and Nam Ngum 2 dams. Workshop planned for June 2011.</p> <p>Follow up meeting with Dr. Bounthan Bounvilay from WERI to update him on our collaboration with NUoL and the planned workshop in June.</p>	<p>section 6.3)</p> <p>Eric Baran, WorldFish Centre</p> <p>Lilao Bouaphao, social scientist, MRC Social Impact Monitoring</p> <p>Kate Lazarus, Challenge Program on Water and Food</p> <p>Dr. Sithong Thongmanivong and Thouthone Vongvisouk, Faculty of Forestry</p> <p>Lynda Worthaisong, Australian Ambassador to Laos</p> <p>Achaal Chanda, Nutritionist, World Food Programme</p> <p>Pierre Petit, Director of Institute of Sociology, University of Luxembourg</p> <p>Jutta Kranh, Nutritionist</p> <p>Jonathan Newby, Post-doctoral researcher, University of Queensland</p> <p>Sarinda Singh, Post-doctoral researcher, University of Queensland</p> <p>Michael Victor, Communications coordinator, IWMI</p> <p>Michaael Epprecht, Research scientist, Centre for Development and Environment, University of Bern</p> <p>Kono Yasuyuki, Center for Southeast Asian Studies, Kyoto University</p>	<p>Faculty of Environmental Science to discuss about partnership structures for the long-term project.</p> <p>Sonali Senaratna, Social Scientist, IWMI-Laos and Project Leader for Challenge Program on Water and Food's MK1 Project on Optimizing Reservoir management for Livelihoods.</p> <p>Philippa Sackett, Project Management Advisor, Burnet Institute, Laos</p> <p>Megan Gayford, nutritionist, World Food Program, Laos</p> <p>Amanda Justice, nutrition expert, International Health Services, Albion Street Centre, Sydney</p>
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6.3 Pilot study in Feuang District

6.3.1 Aim and objectives

Following a preliminary field visit to areas impacted by the Nam Lik 1-2 hydropower dam in Feuang District in March 2011, a pilot study on livelihood adaptation to hydrological change was developed in collaboration with the Faculty of Agriculture and Faculty of Environmental Science. The primary goal of the pilot study was to assist in the development of a long-term research approach and methodology that is suitable in exploring processes of livelihood adaptation in places impacted by large scale resources development projects. More specifically, the objectives of the pilot study were:

- To examine and assessment of the main impacts (both positive and negative) of the Nam Lik 1-2 hydropower dam on local people's livelihoods, taking into account differences in wealth/income, ethnicity, gender, age.
- To examine how different people have adapted their livelihoods to the changes
- To test and develop a research approach and methods that adequately captures complex dynamics in livelihood change and adaptation in areas affected by large scale resource development projects.
- To get feedback and input on long-term study from a wide range of stakeholders.

6.3.2 Methods

The pilot study was conducted from May-August 2011 using following methods:

1) Secondary data collection and literature review

The research group consisting of academics and students from the faculties of agriculture and environmental science reviewed project documents and other relevant literature on natural resource use and management, livelihoods, history of settlement and demographic change in Feuang District and Nam Ngum River basin. Relevant land-use change maps and socioeconomic data collected by previous research activities in the area was also reviewed.

2) Fieldwork in Feuang district

Two villages located downstream of the new Nam Lik 1-2 hydropower dam were selected for the study based on existing evidence that they have been impacted by the dam and because research partners had established relationships with those communities through previous educational programs and research activities (see Charlet-Phommachanh and Furler 2010; Ducourtieux forthcoming).

Two sets of focus group discussions were carried out per village consisting of village administrative leaders and villagers representing different socio-economic groups. Each focus group consisted of 8-10 people. Main topics covered in discussions included: history of village and settlement; past and present land-use practices; changes in village life since the construction of Nam Lik 1-2; key livelihood activities and their relative importance, when the activities take place during the year, how their livelihoods have changed over time. The results of the focus group sessions further informed the selection of sample households for interview.

The research group sampled a total of 71 households in the two villages or approximately 25 percent of total households in each village. Household selection was geared at reflecting socioeconomic differences. The household survey collected information on livelihood activities and household income (consumption and expenditure), and asked householders' perception of livelihood changes (pre-and post- dam construction) and their responses. The research group entered results of the survey into an excel spreadsheet for further analysis.

3) Transect walk

The research group also conducted transect walks across the sites with villagers to explore land-use and vegetation changes in the area and ask specific questions about the livelihood impacts from hydrological changes caused by the Nam Lik1-2 dam.

6.3.3 Results

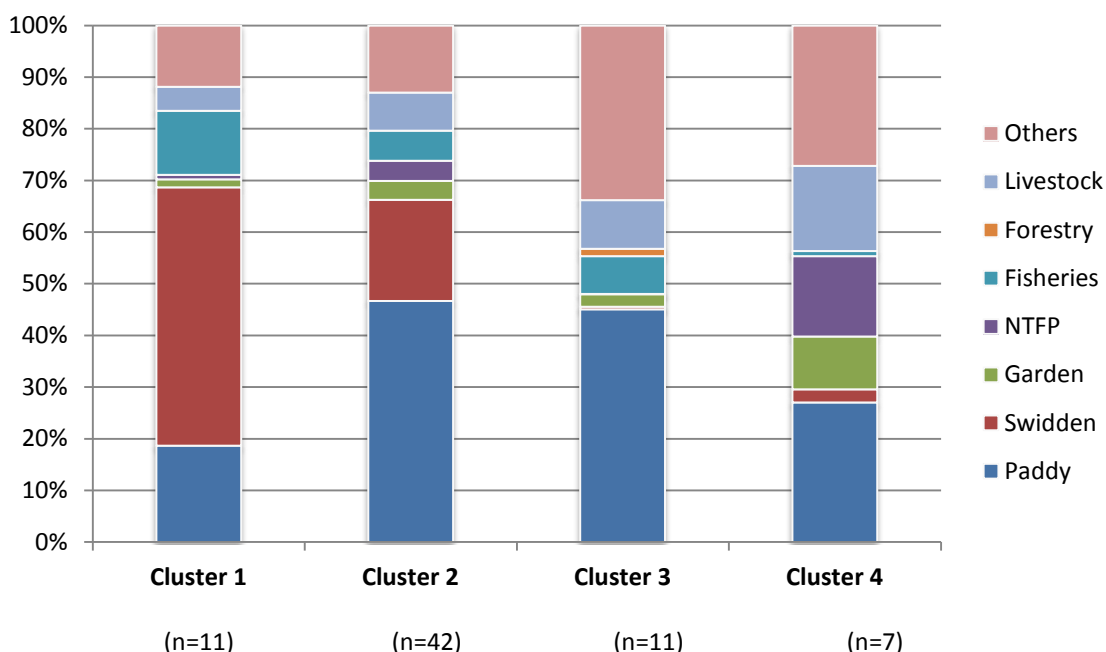
Results from the pilot study indicate that land, water, forests and other natural resources in Feuang District are under considerable pressure and altering household livelihood activities and affecting people's daily food sources. Resource pressures in the district have been further aggravated by the construction of Nam Lik 1-2 hydropower dam in 2009-2010, which has engendered new environmental risks (notably extended flooding, loss of fertile agricultural land and a reduction in fisheries), and the relocation of 1,053 families from the Nam Ngum 2 dam in 2010 which increased the district's population by about 20 percent (SEAL 2005; Phasouysaingam 2011).

Both of these projects have provided adaptation opportunities for new and old local residents through road construction, electricity connection, and better access to schools, hospitals and other infrastructure provided by the projects. Rural roads in particular have improved the connectivity of people in Feuang District and expanded markets to bigger towns and the capital, Vientiane. There is also an increasing opportunity for rural farmers to produce cash crops and become engaged in commercial fisheries.

However, these new production options are also intensifying the demand for arable land and access to commercially valuable resources. Competition for increasingly scarce land and forest resources has also intensified with the accommodation of resettled people from Nam Ngum 2 project (ibid).

Results of the household surveys indicate that household income is highly variable across socioeconomic groups (Figure 2). Our sample shows that households that are relatively less well-off (Clusters 1 and 2) have less access to paddy land and are more directly dependent on the collection of non-timber forest products (NTFPs) and fisheries for both household consumption and income (Figure 2 and Table 1).

Figure 2 Composition of household livelihoods by economic clusters



Note: Cluster 1 includes households with estimated household income below 10 million kip (approximately 1,200 USD) per year, Cluster 2 includes households with income ranging between 10 and 30 million kip (between 1,200-3,700 USD) per year, Cluster 3 includes households with income ranging between 30-60 million (between 3,700-7,300 USD) kip per year, and finally Cluster 4 households whose income is over 60 million kip (approximately above 7,300 USD) per year.

Source: Pilot study in Feuang District (June 2011)

Table 1 Average household access to land

Unit: ha

HH clusters	Paddy	Swidden	Garden	Grazing	Total
Cluster 1	0.71	0.58	0.04	0.55	1.87
Cluster 2	1.37	0.20	0.40	1.26	3.22
Cluster 3	2.08	0.08	0.45	2.62	5.23
Cluster 4	2.33	0.21	1.16	3.69	7.39

Source: Pilot study in Feuang District (June 2011)

Preliminary survey results show that river fisheries have declined since the construction of Nam Lik 1-2 dam and the new reservoir fisheries are accessible only to those people with motorboats and specialised fishing gear. Furthermore, NTFP varieties collected by surveyed households have declined in recent years (ibid). Some households are not adapting well to the changed hydrological and natural resource conditions and are less able to take advantage of new livelihood opportunities presented by the project. More broadly, the pilot study showed that people in Feuang District are experiencing cumulative impacts and flow-on effects from a number of development projects and activities taking

place throughout the Nam Ngum watershed (e.g. hydropower and mining projects, agro-industrial plantations, shifting cultivation eradication programs).

6.3.4 Outcomes

The pilot study had three main outcomes:

1. Established a collaborative basis for ongoing engaged research through stakeholder workshop in Feuang District, 14-15 June 2011

The pilot study culminated in a workshop attended by district and village authorities, representatives from the provincial forestry and agriculture department, company staff from Nam Ngum 2 and Nam Lik 1-2 hydropower, Nam Theun 2 projects and academics from NUoL and the University of Sydney (see Appendix 1). The workshop was an opportunity to share results of the pilot study and discuss what livelihood changes are occurring in the district as a result of large resource development projects. Participants brainstormed ideas on how livelihoods could be supported to overcome existing barriers to adaptation and reduce vulnerabilities, as well as how a long-term research project could be designed to address such an objective.

During the workshop it became clear that district authorities have limited capacity to assess the spatial land use changes occurring in the district on its own, let alone facilitate people's adaptation to changed resource regimes. District and village authorities therefore expressed a keen interest in supporting a research project aimed at optimising livelihood adaptation opportunities for people who are least able to cope with the changes. The positive response to our research focus and direction, and the existing relationships between NUoL staff and Feuang authorities and residents, provided a unique opportunity to focus the three-year study in Feuang District within the larger Nam Ngum basin. The process also exemplified the need to strengthen institutional capacities of local communities and district governments in dealing with constraints on people's livelihoods, and developing an adaptive management framework across the wider Nam Ngum basin.

2. Enhanced interdisciplinary academic capacity and ownership of research results in Lao PDR through report and seminar

A report on the results of the pilot study was drafted by the leader of the research group, Avakat Phasouyasaingam from the Faculty of Agriculture. Avakat also presented the results of the study at a Southeast Asian Seminar at the University of Sydney in August 2011

3. Disseminated findings in the wider scientific community

A journal article has been drafted and submitted for publication to the *Australian Geographer*.

6.4 Project proposal development

A concept note for the long-term project was developed during June and August 2011. Following the in-house review, researchers from the University of Sydney and the National University of Laos organised a number of proposal development workshops in Sydney and Vientiane during August and September 2011.

Avakat Phasouyasaingam from the Faculty of Agriculture, NUoL, arrived in Sydney on 14 August, and was later joined by Dr. Oudom Phonekhampheng from the same institution on 29 August 2011. The Lao researchers worked with research partners from the University of Sydney (AMRC and Sydney School of Public Health) to write up the results of pilot study and develop the research proposal. A series of meetings took place from mid-August until 3 September 2011 to develop the research proposal after which both Lao research partners departed Sydney.

In September 2011 SRA research assistant from the University of Sydney (Natalia Scurrah) attended a meeting in Vientiane with NUoL academics from the Faculty of Agriculture, Faculty of Environmental Science and Faculty of Forestry to discuss how to the long term project would be structured to facilitate interdisciplinary collaboration. Different options for organising, managing and coordinating project activities between the faculties at NUoL were discussed, including budget allocation and distribution.

Project proposal development timeline

Period	Stages
June – August 2011	Development of concept note, and submission on 2 August
August - October 2011	Development of full proposal and submission for external review on 14 October
October - November 2011	Submission of revised full proposal for in-house review with response to external reviewers' comments on 21 November
December - January 2012	Final submission of revised full proposal with response to int-house review on 13 January
February 2012	Awaiting ACIAR approval of the project

7 Conclusions and recommendations

7.1 Conclusions

The scope and focus of the original SRA proposal was modified to better match the priorities of local partners. In particular, the scope of the study was expanded beyond a single sector (fisheries) and set to examine a range of livelihood adaptation strategies and mitigation options in the context of large scale landscape change and increased resource pressure and to match the multi-faceted character of rural livelihoods. A pilot study in two villages in Feuang District was undertaken to identify ways of assessing and monitoring livelihood change and adaptation, and to inform the design of a three-year research project aimed at maximising livelihood adaptation opportunities and reducing vulnerabilities of poor households.

Results from the pilot study confirmed that livelihood activities of households in the two pilot villages had been impacted by the construction of the Nam Lik 1-2 hydropower dam. Flooding of paddy land and riverbank vegetable gardens, loss in river fisheries, and a deterioration of water quality were some of main impacts experienced by villagers (Phasouysaingam 2011). Moreover, the study found that some households were also experiencing cumulative impacts from other development activities in the broader Nam Ngum basin which placed additional pressure on land, water and forest resources, thus limiting the adaptive capacity of households. The relocation of 1,053 families from Nam Ngum 2 hydropower dam to Feuang District, for example, was found to contribute to competition over land and other resources, which placed more pressure on alternative sources of food and income, such as NTFPs. Indeed, the study found some varieties of NTFPs previously collected by households had declined considerably (ibid).

The pilot study also pointed to the uneven distribution of the benefits and costs from Nam Lik 1-2 dam and other developments that are putting pressure on resources. Some households exhibit resilience by taking advantage of opportunities brought by roads, reservoirs and other infrastructure provided by development projects to change and adapt their economic activities. Other households, namely those which originally had little or no access to paddy land and were highly dependent on fisheries and forest products for food, exhibit greater vulnerability as they find it harder to find sufficient food and/or generate income for their families.

The increasing pressure on land, forest and water resources in Feuang District is of great concern to district and village authorities, who openly say they are unable to adequately plan and manage the kind of livelihood transitions required to absorb and adapt to landscape changes at this rate and scale. As such there is significant scope and support for a larger research project that seeks to maximise livelihood adaptation opportunities for poor and vulnerable households, drawing at least in part on the economic benefits derived from large resource and infrastructure investments. At the same time, responses that seek to maximise livelihood adaptation opportunities for local people need to take into account the complex and interlinking drivers of livelihood change not only at the village and district level, but also at a wider level. In this sense, we suggest moving away from project-specific impact assessments and 'fish for fish' approach to livelihood replacement and instead embrace a broader and multidisciplinary view of livelihood adaptation options, and support adaptive management of resources at different scale.

7.2 Recommendations

A number of lessons that came out of the SRA should be considered for the long term project:

- Adequate provisions need to be made under each research activity to train local researchers in data collection and management, including training in conducting socioeconomic surveys, nutrition surveys, qualitative interviews, ethnographic-based techniques, and action research methodologies. Training can be provided by project research leaders or expertise can be brought in from outside.
- Literature on climate change mitigation and adaptation should be consulted when developing the framework and methodology for assessing and measuring livelihood change and adaptation.
- Involving three faculties from National University of Laos, in addition to the other two project partners adds complexity to the project. Project management arrangements and communication strategy needs to be further clarified to facilitate coordination and flow of information, including developing reporting and publication guidelines.
- The precise mechanisms by which the project will build the institutional and professional capacity of the NNRBC to partake in project activities needs to be elaborated.
- It is envisaged that the project team will work with the larger development projects as a pathway to wider impact. This will require close scrutiny during project implementation to ensure wider impact is achieved.

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8 Appendixes

8.1 Appendix 1: June Workshop

Workshop on rural livelihood adaptation to hydrological and resource change in Muang Feuang, Lao PDR (14-15 June 2011)

Background

Rural livelihoods in Lao PDR and the wider Mekong Region depend significantly on rivers in many ways. Fisheries, river bank and floodplain agriculture and settlement all depend on flows that vary seasonally under natural conditions. With the rapid economic development of Lao PDR under its national development plan, and with changing natural conditions, many of the country's rivers are undergoing significant change in terms of flow regime, water quality and the kinds of economic activity that they support. The causes of these changes include long-term climate change, medium-term change in land cover as a result of agricultural and forestry activities in catchment areas, industrial projects that pollute and discharge sediment into rivers, and most obviously dams that block rivers, impound water and change seasonal flows and flood regimes. These changes often lead to resource scarcity on the ground, which puts pressure on households that depend on natural resources for consumption and income generation.

In the wider Mekong Region, the policy discussion around livelihood adaptation to changing resources regimes has often been compartmentalised according to the resources base in question (e.g. forestry, water, agricultural land) and its topographic settings (e.g. upland, lowland). This is in spite of the complex and inter-related causes that constitute rural livelihoods and people's wellbeing. With regards to water in particular, discussions on dams and other projects that affect rivers has not only been discussed in isolation from the influences of other factors but has also been quite polarized. Dams are discussed in terms of their economic benefits and costs: the question most often discussed is to build or not to build. Most studies on the implications of dams are carried out prior to project development, in the form of environmental and social impact assessment (EIA and SIA). They are often based on quite a limited and superficial understanding of livelihoods and the nature of livelihood dependence on river flows. This has in turn left us with a limited understanding of how rural livelihoods change in response to altered river flows, to what extent people are/are not able to adapt to new challenges and opportunities afforded by a new resources regime, and what factors may contribute to ensuring that livelihood opportunities can be maintained or enhanced in the face of significant environmental change.

We hope to address that knowledge gap through our current ACIAR-funded research project. Our aim during this initial phase of the research (2011) is to design a future research that investigates livelihood changes and monitors adaptation processes of rural households in areas affected by hydrological and other resource changes in the Lao PDR. The long-term goal of our research is to elucidate the complex and inter-related factors that affect rural livelihoods and to gain a better understanding of the way in which rural people strategize and adapt their livelihoods to hydrological changes and shifting governance of natural resources over time and space.

For the current workshop, we have two main aims. The first is to share the results of a preliminary pilot study in Muang Feuang, which aims to highlight key livelihood changes and adaptation processes of rural households following the construction of Nam Lik 1-2 dam and resettlement from Nam Ngum 2 dam that had significantly affected the natural resource base in the district. The second aim is to incorporate ideas from participants on critical livelihoods issues that need to be incorporated into our future research, and how

best to design our research so that it captures the immediate and long-term challenges and opportunities of livelihoods adaptation in different sites across Lao PDR.

Objectives

The purpose of this workshop is to draw on respective experiences and knowledge to discuss and analyse how complex livelihood changes occur as a result of altered river flow regimes and how people adapt to changing livelihood challenges and opportunities. More specifically we hope to achieve the following two main objectives which address key questions:

Objective 1. Identify ways to assess and monitor livelihood change and adaptation in response to hydrological changes through the case study in Muang Feuang.

What does our study tell us about ways in which livelihoods in Muang Feuang, particularly income and food opportunities, can be maintained or enhanced following the changes that have affected the district?

Objective 2. Brainstorming research design that best addresses the process of livelihoods change and adaptation across time and space.

How do we use the pilot study in Muang Feuang to design a longer term study drawing on the full range of experience of livelihood change and adaptation along affected rivers in different parts of Lao PDR?

Anticipated outputs

We anticipate following sets of outputs from the current workshop;

- 1) Feedback on the pilot study in Muang Feuang
 - Usefulness and significance of the pilot study
 - Issues that need to be further addressed in the future through research

- 2) Ideas on research design and concept
 - Approach and methods to understand and measure livelihood change and adaptation
 - Site selection and key issues
 - Who participates in the research and how
 - Research, policy and action linkages

8.1.1 Workshop Agenda

14 June, Tuesday

Morning

- 1) Introduction and general overview of the project (District governor, NUoL, Phil)
- 2) Presentation of preliminary findings of pilot study and discussion: Main aim is to highlight key issues around livelihood change and adaptation in the Muang Feuang/ Nam Lik case study. First part of this session is preliminary findings of the pilot study presented by A. Avakat, followed by reflection and responses of district and village authorities.

Key question for the district authority: What role does the district play in helping local people adjust to livelihood changes? How does the district authority deal with various demands on resources?

Key question for village authorities: Has the research team reported accurately on the changes you have experienced? Is there anything that has been missed?

Opening of workshop and presentation



Photos by: Michael Dibley

Afternoon

- 3) Field visit: Provide three key questions for groups to consider during the field visit.
Question 1: what livelihood changes do you observe? How are people coping with these changes?
Question 2: what livelihood issues were not addressed by the pilot study?
Question 3: how do we assess and measure livelihood changes based on personal stories?

Field visits to Nam Lik reservoir and communities



Photos by: Michael Dibley

15 June, Wednesday

Morning

- 4) Discussion: divide participants into respective groups to discuss a list of questions. (Suggestion – three groups of questions and a blank poster will be posted in the meeting room and participants can choose their own group depending on their preference.)

Questions regarding the role and challenges of district and village authorities

What are the key challenges facing district and village authorities dealing with environmental and social changes following Nam Lik and Nam Ngum 2 relocation?

Who is responsible for supporting livelihoods improvement and adaptation? What are the challenges and how have the challenges changed over time?

Can research projects such as this one be useful for the district and/or village authorities? If so, how can it be best designed?

Questions regarding the role of companies

How do companies take into account livelihoods impact into project planning and implementation?

What on-going roles do companies play in ensuring people's livelihoods adapt to new circumstances? How do companies assess and monitor livelihood changes and adaptation?

How do companies formulate resettlement and compensation schemes? Are 'successful' models used for guidance?

What challenges do companies face in terms of livelihood change and adaptation?

How can information generated by research projects such as this one be useful for companies?

Questions regarding the role of research

How do we measure and assess anticipated and on-going changes at different scales (both quantitative and qualitative changes) over time? What indices do we use to assess these changes?

How do we define adaptation? How do we measure different groups' mechanism of adaptation to changes?

What criteria should be used to select sites and household samples?

How can research processes and outcomes contribute to policy making and action?

Who should become involved in different phases of research process?

- 5) Presentation of group discussions: representatives from each group present three key points emerging from the group discussions back to everyone.
- 6) Plenary discussion: returning to the two main questions of the workshop (see Objectives) to discuss with all participants.
- 7) Summary and closing of workshop

Group discussions



Photos by: Michael Dibley