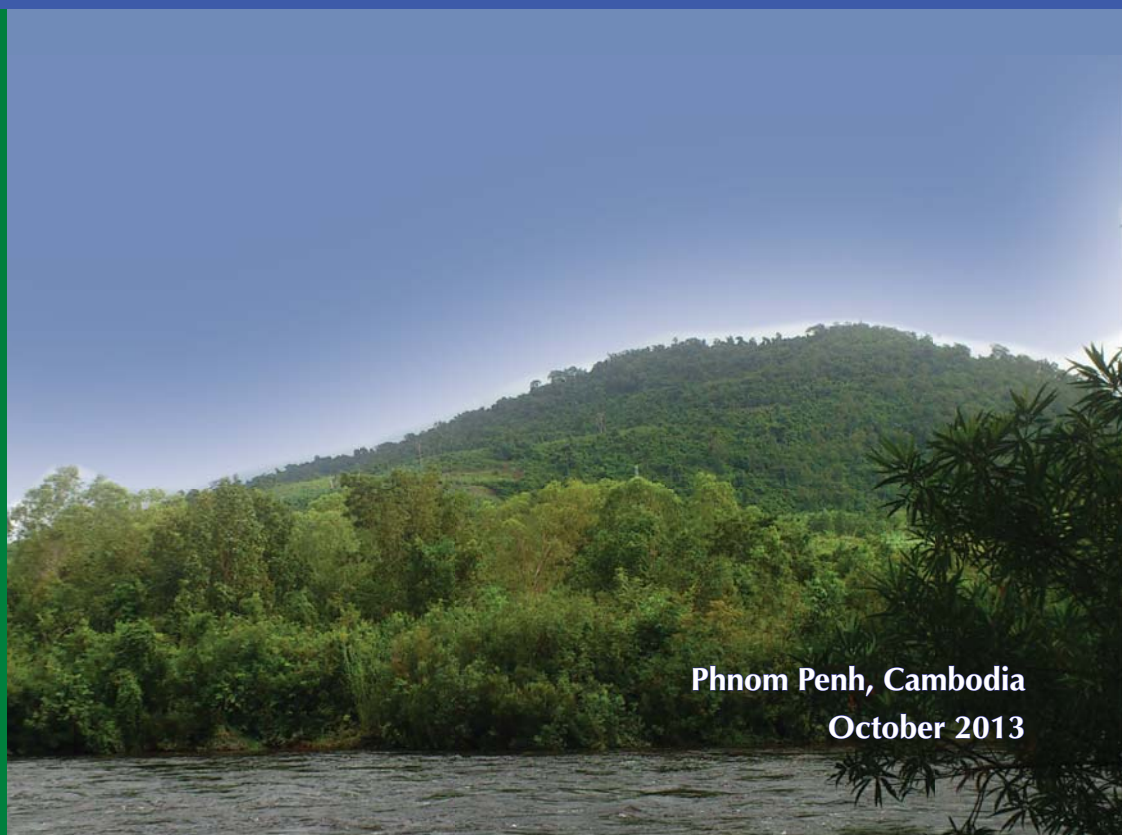
វេទិកាស្រែអង្គការមិនមែនរដ្ឋាភិបាល ស្តីពីកម្ពុជា
The NGO Forum on Cambodia
ធ្វើការរួមគ្នាដើម្បីការប្រែសើរឡើង
Working Together for Positive Change

The Kamchay Hydropower Dam:

An Assessment of the Dam's Impacts on Local Communities and the Environment



Phnom Penh, Cambodia
October 2013

The Kamchay Hydropower Dam:
An Assessment of the Dam's Impacts on Local Communities and the Environment

Front page photos: Basket production in O'Touch Village (left); the Kamchay Dam seen from outside the fence that guards it from visitors (center); Dying trees submerged by the reservoir of the Kamchay Dam (right) and Teuk Chhou Landscape (big picture)

Printed Date: October 2013
Published by: The NGO Forum on Cambodia, Environment Program
(The Community Rights on Hydropower Development Project and the Agriculture Policy Monitoring Project)

Researched by: Mr. Pelle Gätke and Mr. Un Borin
Research Coordinated by: Ms. Sao Vicheka, Research Officer
Layout Designed by: Mr. Phourn Yu, Information and Publication Officer

All photographs in this report are taken by Mr. Pelle Gätke except where otherwise indicated.

ACKNOWLEDGEMENTS

First of all thanks to The NGO Forum on Cambodia, including the Community Rights on Hydropower Development Project and the Agriculture Policy Monitoring Project, for enabling this study. The kind support and collaboration by the team of the Environment Program and the NGO Forum Research Officer, throughout the conduct of this research, has been highly appreciated.

Special thanks go to those community members and local authorities in the communes Andoung Khmer, Kampong Kreng and Mak Prang who took the time to participate in the interviews that comprise a central element of this research. Specifically, the affected people in O'Touch, Moet Peam, Andoung Chimoeun, Snam Prampir and Thvi Khang Choeung villages, who have allowed us insight into their lives and livelihoods and have been important sources for this study. Thanks also to the field survey team, led by Mr. Un Borin, for thorough and timely conduct of the household survey.

Further, we are thankful to the government authorities who took the time to share their knowledge and point of views. Sinohydro Corporation Ltd. also kindly provided information and facilitated a visit to the dam structure. Civil society organizations in Kampot, including LICADHO and ADHOC, also kindly shared information for this study and members of the Rivers Coalition in Cambodia provided feedback on the research findings.

Thanks also to Ms. Ame Trandem, Mr. Mark Grimsditch, Mr. Chhith Sam Ath, Mr. Tek Vannara, Ms. Chea Phallika, Ms. Sao Vicheka, Mr. Sao Vibol and Aruna Technology Ltd. for their contributions of information and feedback.

CONTENTS

LIST OF TABLES AND FIGURES

List of Figures

List of Tables

ACRONYMS

ADHOC	The Cambodian Human Rights & Development Association
BNP	Bokor National Park
CDM	Clean Development Mechanism
CSO	Civil Society Organization
DIME	Department of Industry, Mines and Energy
DoA	Department of Agriculture
DoE	Department of Environment
DoWRaM	Department of Water Resources and Meteorology
EAC	Electricity Authority of Cambodia
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
FGD	Focus Group Discussion
FiA	Fisheries Administration
GHG	Greenhouse gas
GWh	Gigawatt hour
Ha	Hectare
IESIA	Initial Environmental and Social Impact Assessment
KES	Kampot Electricity Supply
Km	Kilometer
Km^2	Square kilometer
KWS	Kampot Water Supply
LICADHO	Cambodian League for the Promotion and Defense of Human Rights
MAFF	Ministry of Agriculture, Forestry and Fisheries
Masl	Meters above sea level
MIME	Ministry of Industry, Mines and Energy
MoE	Ministry of Environment
MoWRaM	Ministry of Water Resources and Meteorology
MW	Megawatt
NGO	Non-Governmental Organization
NGOF	The NGO Forum on Cambodia
NTFP	Non-Timber Forest Product
PFiA	Provincial Fisheries Administration
RGC	Royal Government of Cambodia
Riel	Cambodian currency ($1 = approximately 4,000 Riel)
$	US dollars
TCTS	Teuk Chhou Tourist Site
WCD	World Commission on Dams

EXECUTIVE SUMMARY

Being the first large-scale hydropower project in Cambodia the Kamchay Dam should be considered an important test case which can provide valuable insight into the appropriateness of the regulatory framework and the associated implementation procedures. This study focuses on some of the post-project social and environmental impacts associated with the dam's construction. The implementation of mitigation measures stated in the Environmental and Social Impact Assessment (ESIA) is examined and the impacts experienced by local communities are researched and analyzed.

Approved in July 2012, around five years after the dam's construction commenced, the ESIA report came too late to serve its purpose to inform the decision-making process. Considering the legal framework and guidelines for EIAs in Cambodia, the dam's construction started prematurely. In line with this, the Environmental Management Plan (EMP), which is supposed to guide the implementation of mitigation measures to avoid unnecessary impacts, was apparently not in place prior to the project's commencement. In general it is found that the implementation of social and environmental safeguards is at a minimum, and far below what is required based on the late ESIA.

The benefits of the dam and its electricity generation are largely reaped by populations and industries far from the dam. Locally, however, the construction of the dam has caused loss of forest and alteration of a natural river habitat in the southeastern corner of the Bokor National Park (BNP). The lost forest included very productive bamboo areas traditionally utilized by local communities. Further, the popular Teuk Chhou Tourist Site (TCTS) was seriously affected by reduced visitor numbers. As a result of the dam's construction, a number of social and environmental impacts cause negative changes to the livelihoods of people living in the area. Communities experience a decrease in their livelihoods, but have received little support from local government authorities, who seem to be dominated by their superiors and unable to assist. Further, the project developer Sinohydro does little to rectify the situation.

Through comprehensive field research and interviews with a number of key stakeholders, this study finds that local community members have largely been left out of any participatory processes related to the dam's construction, and that they lack knowledge about the dam. A survey of 100 households that depend on bamboo collection and income from tourism at TCTS reveals that these groups

have experienced a significant reduction in income due to the construction of the dam. A sharp decrease in the number of visitors during the construction phase, from about 278,000 in 2006 to about 65,000 in 2011, resulted in decreased incomes of those depending on tourism for their livelihoods. They are now earning on average 28% of what they did prior to the dam's construction. The reduction in visitors was primarily caused by a deterioration of water quality and lack of water in the river during construction.

The average bamboo-collecting family has seen its income reduced from around 15,000 to 25,000 Riel per day prior to the construction of the dam to around 10,000 to 20,000 Riel per day now. The income of 79% of the bamboo-collecting families surveyed is now 20,000 Riel or less per day, compared to 53% prior to the dam's construction. This reduction can be subscribed to the increased difficulties in accessing sufficient amounts of bamboo, as well as the increased time and costs of collection and transportation. A steep decrease in family-scale fish catch downstream from the dam is another negative impact.

It was found that women in local communities are significantly impacted by the dam's construction. Those from bamboo-collecting families are impacted on their collection pattern (from collectors to non-collectors), and women depending on tourism experience a serious reduction in income and access to money. Further, many women are now experiencing an increased burden as temporarily single caretakers of families and homes because the bamboo-collecting men have to stay overnight in the forest. Men do so in order to be able to collect sufficient amounts of bamboo. Gendered analysis of impacts was found to be lacking in the ESIA and ought to be included in future assessments.

Inadequate removal of wood from the reservoir prior to its filling has brought temporary benefits to a number of families who have taken up wood collection and selling as a new livelihood strategy. The inadequate clearing of trees and other organic materials in the reservoir, however, causes unnecessarily high greenhouse gas emissions, which may continue for several decades and contribute to climate change. If Sinohydro and the Royal Government of Cambodia (RGC) had adhered to the EMP measures this situation would not have arisen.

Despite some focus on agriculture in the ESIA no initiatives to develop irrigation have been conducted so far. Increased dry season freshwater availability in the river downstream from the dam may, however, help to increase agricultural production from fruit trees. Concurrently, an expected reduction in floods and

their severity will reduce the risk of losing fruit trees and may enable growth of trees in new areas.

The compensation cases of at least ten families impacted by the construction of power transmission lines remain unresolved. The affected households were told that it is dangerous to live under the grid and that they should move. But nine months after being informed by the provincial authorities, the families are yet to receive clear information regarding their compensation. People who try to raise their cases with the local authorities receive little support. In general any communication between the communities and Sinohydro goes through government authorities. This method hinders people from communicating directly with the company, and thus decreases the transparency of the project.

In several local communities, the majority of households remain without electricity supply, but the price of electricity has decreased by around 16% to 23% for households already connected to the public grid. Infrastructure built as part of the dam project, especially roads, has not met the expectations of the local communities, who expect the company to repair the already worn out roads. Temporary structures used during the construction of the dam are left partly disassembled in the area near the dam, spoiling the beauty of the area.

If Sinohydro and the RGC had paid more attention to the decreased livelihoods of those depending on tourism, as well as the negative impacts on bamboo and NTFP collectors, they could have, at least partially, remedied the situation by implementing the mitigation measures stated in the ESIA/EMP. One million $ is supposed to have been allocated to compensate for the decrease in tourism and for the loss of income from forest products. Some of this money could have been used to reconstruct a suspension bridge at TCTS, which collapsed in 2009 during the construction of the dam. For the bamboo collectors, access to remaining bamboo forest areas could be improved by constructing a three to four km long road. Unfortunately, the affected communities have not yet received any assistance or benefits from the money that was allocated as compensation.

Sinohydro and the RGC have also failed to perform proper monitoring of changes to water quality and hydrology, salinity levels and fisheries. This makes it difficult to apply timely mitigation measures to limit the impacts of these changes. The inadequate implementation of the EMP further reduces the opportunity to acquire valuable best practice lessons from the Kamchay Dam project. Rather the project exemplifies some of the pitfalls that developers and the RGC should heed for future hydropower projects. The implementation process of the project reveals

that there is an imminent need to bridge the gap between the legally required measures and the reality of hydropower project implementation. This situation calls for a review of this type of projects in the country.

With Sinohydro so far willing neither to abide to the standards outlined in the EMP of the ESIA, nor to implement the necessary mitigation measures and monitoring required, a huge responsibility fall on the RGC to take the lead. Given that the ESIA was to help inform the RGC whether they should approve the project, conducting the assessment during the construction phase was too late. A misperception of many government authorities is that the livelihoods of people in the areas below the dam have improved due to the construction of the dam. They mistakenly believe that bamboo collectors now have better access to the resource they depend on for their livelihoods. However, contrary to the RGC's policy of pro-poor inclusive growth, the Kamchay Dam project is pushing a large part of the local community members towards increased poverty.

The poor record of implementation of the required mitigation measures means that immediate action to remedy the project's negative impacts is needed. While the dam has already caused much harm to the livelihoods of hundreds of local families, it is still possible to reduce the future environmental and social impacts of the project. This, however, requires firm action from both Sinohydro and the RGC to ensure the implementation of all mitigation measures. Given the many large-scale hydropower development projects being planned or constructed in Cambodia, it is important that the RGC raises the bar and commits to actively apply its EIA framework to these projects. Its poor record of low participation and lack of transparency and accountability must improve. Otherwise, affected communities may again be neglected in future projects, and end up worse off as a result of Cambodia's hydropower development.

Key Recommendations to the Royal Government of Cambodia:

- All stakeholders, including local communities, should be invited to participate in the EIA/ESIA process.
- Completion and approval of the full EIA/ESIA, including clearly defined and agreed mitigation measures, should take place prior to project approval. Further, reports should be published in a timely manner.
- The responsibilities of the company and involved government agencies should be clearly defined.
- Existing, formal and informal, procedures and regulations concerning hydropower development in Cambodia should be reviewed. The legal

framework for EIAs should be strengthened and measures taken to ensure future compliance, by both project developers and the RGC itself.

- Project monitoring should be improved to ensure compliance with EIA/ESIA requirements.
- Environmental and social concerns should be put at the forefront of future EIA/ESIA processes; so no persons are left worse off after the implementation of a development project.
- Legislation ensuring the sharing of project benefits with affected communities should be considered.

The implementation of the required mitigation measures for the Kamchay Dam project has been constrained by the lack of a clear delegation of responsibilities between Sinohydro and the RGC. This situation needs to be rectified before any significant improvement can be expected. It is therefore also recommended for the RGC to:

- Arrange a high-level meeting for all responsible ministries and departments. The meeting should clearly define the division of responsibilities between Sinohydro and the RGC, as well as the allocation of necessary monitoring and evaluation funds needed to carry out the responsibilities.
- Publish the finalized division of responsibilities and a clear plan for the implementation of the mitigation measures. Convey this information to local communities at village level meetings.
- Ensure that Sinohydro implements the promised mitigation measures, including compensation for loss of access to forest products, and from loss of income from the decrease in tourism.

Key Recommendations to Sinohydro Corporation Ltd.:

In order to rectify, at least partly, the negative impacts experienced by the local communities affected by the dam, it is recommended for Sinohydro to:

- Be proactive and request a high-level meeting with the RGC in order to obtain a clear definition of its responsibilities for the execution of the mitigation measures.
- Fulfill its responsibility towards the local communities by engaging directly in dialogues with affected villagers.
- Make all information on environmental and social mitigation measures publicly available, and implement all of the measures outlined in the ESIA/EMP.

- Establish a grievance mechanism that allows local communities to raise issues directly with the company.

To mitigate the negative impacts experienced by the affected communities, some immediate measures that Sinohydro could take include:

- Build a road to improve access to bamboo and other NTFP resources.
- Build a new suspension bridge at Teuk Chhou Tourist Site.
- Make the dam a tourist attraction by allowing visits to the dam site.

Key Recommendations to Civil Society:

- Monitor the implementation of mitigation measures closely, including the replanting of forest, to ensure that Sinohydro and the RGC fulfill their responsibilities.
- Assist local communities in bringing forward their concerns and needs to the RGC and Sinohydro.
- Request Sinohydro and the RGC to implement mitigation measures to compensate for loss of access to forest products and loss from the decrease in tourism at the TCTS. Civil society should help to check that these promises are fulfilled.
- Call for the publishing of the ESIA.

The full set of recommendations is found at the end of this report.

INTRODUCTION

Having a very low level of national power generation, and faced with high prices and extremely low electrification coverage outside its major cities, the RGC views hydropower as a way to enhance national electricity generation in Cambodia. In 2011 the national electrification rate was 34% and only 14% of rural households had access to the national electricity grid. Imported electricity accounted for 45% of the total and more than 50% came from domestic fuel powered generation. While the number of hydropower and coal plants, and the amount of electricity generated from these sources, is increasing, the total amounted to only about three percent[1] of the total production in 2011, prior to the operation of the Kamchay Hydropower Dam.[2]

A 2003 plan, developed by MIME with support from the Mekong River Commission, estimated that the hydropower potential of Cambodia from damming rivers across the country is about 10,000 MW.[3] In 2011 approximately 1,000 MW, or ten percent of the potential, was already under construction and Memorandums of Understanding for an additional 2,200 MW have been signed.[4] Several of the planned dams may come with high environmental and social costs and impacts, as they are situated either in national parks and wildlife sanctuaries or in areas where communities upstream and downstream are dependent on the rivers and natural resources, which would be affected by the dams.

Other recent studies on the Kamchay Dam project have examined the linkages between Chinese investments and hydropower in Cambodia.[5] This study focuses on the social and environmental impacts of the dam and especially the consequences for the local communities who for generations have depended on access to a now flooded forest area and the natural resources which were abundant there. The project includes a number of mitigation measures outlined

[1] MIME 2012
[2] Following the operation of the Kamchay Hydropower Dam since the end of 2011, and with a number of other dams and coal plants currently being constructed, the power generation from these sources will increase significantly in the coming years.
[3] IPS 2008
[4] MIME 2012
[5] See for example Grimsditch, M. 2012; Hensengerth, O. 2012; and Middleton, C. 2008

in the ESIA[6] and its EMP. These measures will be addressed in this study to evaluate the efforts of Sinohydro and the RGC to implement them.

The benefits of hydropower dam construction come in form of increased power production and better opportunities for water management in relation to irrigation and flood control. The negative impacts are less tangible and harder to predict and assess. Blocking waterways, however, is known to seriously impact a river's hydrology and the related flood regimes, obstructing fish migration, and limiting the distribution of nutrient-rich sediments. Fish species that depend on natural river flows for their spawning may vanish, and agricultural production may diminish due to a lack of natural floods and reduced fertility of the land. Another aspect to consider as Cambodia develops its hydropower potential is that reservoir emissions of greenhouse gasses contribute to climate change, especially in tropical areas, and therefore cannot automatically be considered as a clean energy source.

One of the key priorities mentioned by the RGC at the Cambodia Outlook 2012 conference in Phnom Penh in February 2012 was the policy of pro-poor inclusive growth. It is in this context, of a combined targeting of poverty reduction and growth, that this research assesses the impacts of the dam's construction on local communities and the environment. It examines how some of the poorer citizens of the country may, or may not, have benefitted from the $280 million development of the Kamchay Dam. Concurrently, the commitment of the RGC and Sinohydro to enact pro-poor and sustainable development policies is discussed. As an incentive to relevant stakeholders and decision-makers, recommendations on how to establish and strengthen mechanisms to safeguard against social and environmental impacts from dam development in Cambodia are provided at the end of the report.

1. The Studied Area

The Kamchay Dam is situated in Mak Prang Commune in Teuk Chhou District of Kampot Province. The dam is located in the BNP near the southeastern border of the park. According to the Department of National Parks, it is located in a "sustainable use zone", a designation used for national park areas where collection of NTFPs, Community Forestry, some investment, and Community Protected Areas are allowed. Sinohydro was allowed to develop hydropower and

[6] The latest available version of the ESIA is dated April 2011. This report has been commonly known to be the final ESIA. However, according to the MoE EIA Department, the ESIA for the Kamchay Hydropower Dam was approved in July 2012. This approved report has not been shared by the MoE and thus it remains unknown to the public whether this report is identical with the report dated April 2011.

eco-tourism on a total of 2,200 ha of the BNP.[7] While no resettlement was required, as there were no villages located upstream from the dam, the flooded area was previously a very productive mixed bamboo forest which provided the raw materials for basket-making to more than 500 families living below the dam.[8] Collection of other NTFPs such as rattan and seasonal wild fruits were also an integrated part of many villagers' lives, contributing an important additional source of income, especially for the poorer families.[9] A map of the reservoir and the downstream villages is found in Appendix A.

The area impacted by the dam's construction covers Mak Prang, Kampong Kreng and Andoung Khmer communes. In total there are 13 villages in the communes, but not all villages have been impacted by the dam. Five of the most affected villages have been selected for this study. Table 1 provides an overview of the three studied communes. In Mak Prang Commune, the villages Moet Peam and Snam Prampir are directly affected by the dam's construction. Though the villages in Andoung Khmer Commune are located over ten km away from the dam, the two villages O'Touch and Thvi Khang Choeung are highly affected by the dam, as many villagers there depended on bamboo from the forest that was flooded by the reservoir.[10] The impacts on people living in Kampong Kreng Commune are limited, but Andoung Chimoeun Village has seen some impacts from the construction of a transmission line leading the power away from the dam. Table 2 provides an overview of the studied villages.

Table 1: The studied communes[11]

Commune	Number of families	Population	Number of women
Mak Prang	1,063	5,186	2,638
Andoung Khmer	2,165	10,047	5,336
Kampong Kreng	1,397	6,758	3,488

[7] MoE, Department of National Parks 9/10/2012
[8] Andoung Khmer Commune 20/8/2012
[9] NGOF 2007
[10] Mak Prang Commune 15/8/2012; Andoung Khmer Commune 20/8/2012
[11] Mak Prang Commune Chief Phone Conversation 24/12/2012; Andoung Khmer Commune 20/8/2012; Kampong Kreng Commune 16/8/2012; Kampong Kreng Commune Phone Conversation 24/11/2012

Table 2: The studied villages[12]

Village	Commune	Number of families	Population	Number of women
Snam Prampir	Mak Prang	655	3,103	1,574
Moet Peam	Mak Prang	308	1,475	765
O'Touch	Andoung Khmer	435	2,175	1,151
Thvi Khang Choeung	Andoung Khmer	445	2,380	1,232
Andoung Chimoeun	Kampong Kreng	353	1,744	909

Characteristics of the Five Villages

Snam Prampir Village: Fruit tree plantations and some rice fields dominate the landscape of this village. The TCTS is located in the village and many people do business related to tourism, primarily selling of food, fruit and drinks. 198 families have rice farm land of less than one ha in size and 431 families have no rice farm land at all. 298 families have fruit plantation land of less than one ha in size and 318 families have no fruit plantation land at all. The main occupation of 57 persons, 16 of them women, is NTFP collection. Vegetable growing, livestock raising and fishing are other less common occupations in Snam Prampir Village.[13] Of those who go to collect NTFPs or wood in the forest every day an estimated 70% collect wood and 30% collect NTFPs. Only a few people from Snam Prampir collect bamboo.[14]

Moet Peam Village: About 70% have their own fruit tree plantations and about ten percent are workers in plantations. Few people go to sell fruits, drinks or food to the tourists at TCTS. While most people do not rely on forest products, there are about 30 families who make a living from collecting bamboo and weaving baskets for steaming fish. Around 20%, mostly those who own very little land, go to collect NTFPs at the mountain. Villagers used to do some fishing in the Kamchay River, but only as a supplementary activity.[15]

Andoung Chimoeun Village: The village is dominated by rice fields and fruit plantations and there is some production of palm sugar from palm trees growing

[12] Mak Prang Commune Chief Phone Conversation 24/12/2012; Andoung Khmer Commune Chief Phone Conversation 12/12/2012; Thvi Khang Choeung Vice Village Chief 27/8/2012; Kampong Kreng Commune Chief Phone Conversation 12/12/2012
[13] Snam Prampir Village Statistics 2011
[14] FGD Snam Prampir 22/8/2012
[15] Moet Peam Village Chief 18/8/2012

in the area. In general people from the village do not go into the forest to collect NTFPs and there is no bamboo collection or production of baskets in the village. Tourism is also not prevalent and people are not involved in doing business at TCTS.[16]

Thvi Khang Choeung and O'Touch villages: Both of these neighboring villages are characterized by a high dependency on NTFPs, especially bamboo. Some villagers have rice fields, but most of them are very small fields, which leave the families unable to feed themselves. According to the Commune Chief in Andoung Khmer there are 347 bamboo-collecting families in O'Touch and 160 bamboo-collecting families in Thvi Khang Choeung. There are few families who fish, and those who do so fish at the sea and not in the Kamchay River. People from the two villages do not work at TCTS.[17]

In O'Touch Village there is a total of 68.8 ha of rice fields and the average family has less than half a ha. An estimated 70% to 90% of the families in O'Touch collect bamboo and weave baskets, most of them as their primary occupation.[18] In Thvi Khang Choeung about 20 families do rice farming and half of these also collect bamboo. Most of these families have less than one ha of rice field. Another ten families have fruit plantations, such as durian and banana. As the village is located close to Kampot City people in one part of the village is more involved with doing business.[19]

2. The Kamchay Hydropower Dam

The Kamchay Dam is located about 15 km from Kampot City in the Southeastern corner of the BNP, and about four and a half km upstream from TCTS. Downstream from the main dam is a second re-regulator dam, which is located just 300 meters upstream from TCTS. In addition to providing water for electricity production, another objective of the dam was to provide a source for water supply and irrigation of agricultural land. The dam is a remarkably long 44 years Build-Operate-Transfer project, which was agreed between the RGC and Sinohydro Corporation Ltd. on February 2006.[20] The approval process occurred during closed-door negotiations[21] and the dam appears to have been pushed through swiftly, based primarily on a financial and energy development

[16] Visit at Andoung Chimoeun Village 30/8/2012
[17] Andoung Khmer Commune 20/8/2012
[18] O'Touch Village Chief 18/8/2012; Andoung Khmer Commune 20/8/2012; FGD O'Touch Village 29/8/2012
[19] Thvi Khang Choeung Vice Village Chief 27/8/2012
[20] ESIA April 2011 English Summary, p. 4
[21] http://www.internationalrivers.org/campaigns/cambodia - Accessed 4/12/2012

perspective while hardly taking into account environmental and social concerns. The dam was the first major hydropower project approved in Cambodia.

Photos: The Kamchay Hydropower Dam

The capacity of the dam is 194 MW and the expected annual power generation is 498 GWh[22] (498,000,000 kWh). However, according to a February 2013 speech by Prime Minister Samdech Hun Sen, the dry season capacity may be as low as 60 MW.[23] The majority of the power is being generated via three turbines receiving water from the dam through an underground tunnel.[24] The dam is a 112 meter high structure, which brings the water level to a maximum 152 meter above sea level (masl). The reservoir's full supply level and the minimum operating level are 150 and 130 masl, respectively. When the site was visited in August 2012 the water level at the reservoir was at 148 masl.[25] Despite stated plans to develop the dam site into a tourist attraction, it is currently protected by soldiers and a fence with barbwire, and there is no public access to the dam.

The location of the dam in the BNP has sparked protests due to the loss of forest, wildlife and biodiversity in the area, and the impact on the hydrology of the Kamchay River and its water quality. The approximately 2,000 ha (20 km^2) of land that was lost to the reservoir is, however, comparatively small to other planned hydropower projects, such as the recently approved 400 MW Lower Sesan 2 Dam in Stung Treng Province. This dam is expected to flood an incredible 34,308 ha.[26] If that project moves ahead as planned, it could flood an area over 17 times the size of the Kamchay Dam reservoir, while producing just over the double amount of electricity. This raises the question of how to best

[22] ESIA April 2011 English Summary, p.15
[23] http://cnv.org.kh/en/?p=3495 - Accessed 11/3/2013
[24] ESIA April 2011 English Summary, p. 4; Sinohydro 9/10/2012
[25] Sinohydro 2007; Visit on the Kamchay Hydropower Dam 29/8/2012
[26] The Cambodia Daily 24-25/11/2012

make use of land, an issue that ought to be discussed in relation to other planned hydropower dams. From a land use perspective, an advantage of the location of the Kamchay Dam is the comparatively smaller area that is flooded. This advantage, however, does little to remedy the impacts that occur in the affected area.

3. Methodology

3.1 Fieldwork and Interviews

Fieldwork was carried out in the periods from August 14 to 31, September 14 to 18 and from October 17 to 20, 2012, in three communes located in areas impacted by the Kamchay Dam in Kampot Province. The information in this report is based on a literature review and in-depth interviews and consultations with affected community members, civil society, Sinohydro, and government authorities. (Please see Appendix B for the list of interviewees.)

As part of the fieldwork, the research team conducted a survey of 100 households from communities in the affected area. 78 bamboo collectors from the three villages O'Touch, Thvi Khang Choeung and Moet Peam; and 22 vendors at TCTS were interviewed to understand about the positive and negative effects from the dam's construction. To understand and include the viewpoints of all stakeholders in this study, the team attempted to interview a broad range of relevant authorities, including ministries and provincial departments. However, due to various reasons out of the control of the research team, a number of these relevant stakeholders refused to provide information for the study.

To obtain information from as many affected community members as possible, both individual and group interviews were conducted. The team selected interview locations based on information from desk studies, including the Initial Environmental and Social Impact Assessment (IESIA) from 2006 and the ESIA from April 2011[27], and information obtained from key individuals knowledgeable on the area and the affected communities. Interviewees were primarily chosen by on-site selection in the villages and surrounding areas, and based on information provided by local stakeholders. In the preparations and during interviews, the team focused on obtaining gender specific information. Generally the local authorities in the communities were interviewed first and then the team conducted in-depth interviews and Focus Group Discussions (FGDs) with

[27] Both the IESIA and the ESIA were prepared by SAWAC Consultants for Development for Sinohydro Corporation Ltd. According to the EIA Department at the MoE the final ESIA for the Kamchay Hydropower Dam was approved in July 2012. Despite many attempts it proved impossible to obtain a copy of the report from the MoE.

affected villagers. In addition to the household survey, more than 45 interviews were conducted and observations were made in the area. To obtain an on-site understanding of the impacts to the area, the team also visited the reservoir.

3.2 The Challenge of Access to Information

The process of obtaining information about the Kamchay Dam, and of the role of the various government institutions, proved challenging at times. Several ministries failed to respond to requests for interviews and other institutions, at both national and provincial level, refused to provide information. A common reason for rejecting interviews was that the project is a national-level project. At the national level, however, relevant authorities ignored or rebuffed requests for interviews or meetings.

3.3 Presentation and Validation of Findings from the Field

Following the fieldwork and interviews in the project area, consultations with local community members and local authorities were arranged in form of two debriefing sessions held on October 19, 2012 in Kampot. These were conducted with the dual purposes of informing the local stakeholders of the findings of the research and, at the same time, having the obtained data confirmed or clarified. The debriefing for local communities saw lively discussions following the presentation, and several points were clarified at the event. The 15 community members who attended eagerly shared their experiences during the discussion.[28] In addition to the presentation for local community members, which was held in the morning, local authorities were invited for an afternoon debriefing of the findings. Regrettably, only one out of an expected ten persons showed up for this meeting.[29] In an attempt to pass on the findings from the study to the local decision-makers, the team delivered copies of the presentation to some local authorities. ADHOC Kampot, LICADHO Kampot and The NGO Forum on Cambodia participated in the debriefing sessions as representatives of civil society.

[28] Debriefing for Local Communities, Kampot 19/10/2012
[29] Debriefing for Local Authorities, Kampot 19/10/2012

CONTEXT OF HYDROPOWER DEVELOPMENT IN CAMBODIA

1. Perspectives on Hydropower Development in Cambodia

Oliver Hensengerth studied the level of adherence to international and national environmental and social standards by Chinese companies investing in hydropower in Cambodia. Further, he examined the roles played by the Cambodian and the Chinese actors respectively. In his 2012 report he questions the thoroughness of the environmental supervision regime applied in the Cambodian context and whether the RGC actually monitors Sinohydro who operates the Kamchay Dam.[30] Seven hydropower stations are being built or are about to be built by Chinese companies as part of the MIME Hydropower Development Plan.[31] The extent to which these companies cooperate with the RGC and the affected people, in terms of social and environmental safeguarding before, during and after construction of these infrastructures, will be of high importance. This assessment of the social and environmental impacts from the Kamchay Dam examines more in depth the roles played by the RGC and Sinohydro, and thus complements the findings of Hensengerth.

In 2007 about 90% of the electricity generated in the country was based on imported fuel.[32] The low electrification level and high fuel prices illustrate the need for increased, and more sustainable, self-supply of power. These reasons seem to be the driving force for the RGCs' desire to develop hydropower. However, in the process of securing access to a reliable electricity supply to meet the needs of an expanding economy, Cambodia cannot afford to sidestep environmental and social concerns related to large-scale hydropower development.

In its report in 2000, the World Commission on Dams (WCD) expressed the need for transforming dam management from pursuing technical goals only, to also encompass and prioritize development-oriented goals, including social and environmental considerations. This recommendation was based on the commissions' comprehensive review, which covered roughly 1,000 large dams worldwide.[33] Though inconvenient from a purely technical and economic point

[30] Hensengerth, O. 2012, p. 4
[31] Hensengerth, O. 2012, p. 5
[32] MIME July 2009; MIME 2012
[33] WCD 2000, p. iii

of view, applying an adaptive management style, where operational decisions are adjusted to the changing context of environmental, social and physical conditions is important. To accommodate other needs than solely power production dam operators must be willing to communicate and cooperate well with other stakeholders, including local communities.[34]

The hydropower sector in Cambodia is developing rapidly. But since the country does not possess the required skills and experience to construct large dams on its own, it is currently relying primarily on Chinese companies to develop them. Likewise, Cambodia has little experience with ensuring adequate environmental and social safeguards for these large high impact development projects. Another finding of the WCD was the lack of formal processes for evaluation of large dam projects around the world.[35] Given the limited experience in Cambodia, there is a considerable risk of repeating past mistakes by making inappropriate decisions based on an insufficient level of knowledge.

Cambodia's rivers, and its related natural resources and rich fisheries, are invaluable assets, vital to the country's rural population. Middleton warns, "*Poorly conceived hydropower development could irreparably damage these resources*"[36] and therefore advocates for the RGC to adopt the recommendations of the WCD report. The WCD also encouraged that compensation be paid "*for any loss of livelihood, such as the loss of fishing opportunities.*"[37] Following this path, loss of opportunity to collect bamboo or other NTFPs should likewise be subject to compensation. In line with this, International Rivers also recommends that hydropower projects should provide rights to those affected, in order to improve their livelihoods.[38] The efforts of the RGC to supervise and monitor the Kamchay Dam project implementation, and to ensure that environmental and social safeguard mechanisms are adhered to, are examined in this study.

2. The EIA Process in Cambodia

The legal framework for EIAs sets out directions for the process of conducting and approving EIAs. According to a 2009 Guideline for Writing EIAs in Cambodia the full EIA is conducted to ensure that measures are taken to limit the

[34] WCD 2000, p. 274
[35] WCD 2000, p. 312
[36] Middleton 2008, p. 5
[37] WCD 2000, p. 272
[38] http://www.internationalrivers.org/resources/the-world-commission-on-dams-framework-a-brief-introduction-2654 - Accessed 4/12/2012

negative impacts and enhance the positive impacts.[39] However, flaws exist in the implementation of the EIA framework, and as an example, issues related to participation remain unclear and mostly unimplemented. In a 2008 study of the Kamchay Dam, Middleton found that key reports related to the managing of environmental and social impacts of the dam's construction had not been publicly disclosed. Consequently, any plans for livelihood restoration or environmental management were unavailable to the public. This lack of disclosure left concerned stakeholders unable to determine whether the project contained any benefits for local communities affected by the development.[40]

The 2009 Guideline states that the EMP should include a "*schedule for environmental examination during the construction process, implementation of the project and completion of the project…*" Further, the project implementer should identify who will monitor the project and what environmental standards or guidelines are to be followed.[41] Clearly, the EIA/ESIA and the integrated EMP must before beginning a project so that they can be used to monitor the project during the construction phase. This was not the case for the Kamchay Dam development, where the guidelines for the EIA process seem to have been sidelined.

The importance of applying high standards for the Kamchay Dam is highlighted by Middleton, who points out that "*an accountable decision-making process, transparent dissemination of relevant information, and wide public participation amongst local affected people and civil society organizations*" should be ensured to achieve this.[42] The aspirations of having the RGC adopt high standards for the project were however dashed due to the company's failure to produce the ESIA, let alone have it approved, before the construction of the dam began. In fact, the final approval of the ESIA came around seven months after the inauguration of the dam[43], and too late to play any role in the decision-making process. This disregard of the ESIA report and the opaque process of its development bode poorly for future hydropower development in the country. If the Kamchay Dam project approval process has become precedence in this sector, it may already have negatively affected other hydropower projects currently being constructed.

[39] Proclamation on General Guideline for Writing a Preliminary and Final Report on Environmental Impact Assessment, Annex 1
[40] Middleton, C. 2008, p. 66
[41] Proclamation on General Guideline for Writing a Preliminary and Final Report on Environmental Impact Assessment, Annex 1
[42] Middleton, C. 2008, p. 66
[43] MoE, EIA Department 10/10-2012

As a consequence of the late approval of the ESIA on July 6, 2012, the EIA Department of the MoE suggested that assessing the post-project impacts of the Kamchay Dam, as this study does, was too early. More disturbingly, the EIA Department was of the opinion that the implementation of the EMP should start from January 2013, six months after approval of the ESIA report.[44] Following this logic, that implementation of the EMP shall follow six months after EIA/ESIA approval, the response to social and environmental impacts during the construction phase would be effectively ignored. Accordingly, mitigation efforts to reduce environmental impacts and loss of income among affected communities would be implemented significantly too late to serve their original purposes.

The ability of the EIA process to protect the environment and serve as an effective social safeguard is further weakened by the short time frame provided for the RGC to review an EIA. A 30-day period is provided in the law for the RGC to review a report during which it should include a period of public consultation. Following this time period a decision is made on whether to approve a project.[45] A shortcoming in relation to this provision is that *"if the MoE fails to respond [to] its findings and recommendations [within 30 days], the Project Approval Ministry/Institution will assume that the revised IEIA or EIA report has complied with the criteria of this sub-decree."*[46] Kavenagh worries about the possible consequences of this provision: "*Hence, if no review is made, the EIA is considered to be approved… Given the limited capacity of the Ministry of Environment to review EIAs, this is a disturbing legal perspective.*"[47]

2.1 The Future Direction of the EIA Process

In November 2012, the MoE informed that out of an estimated 2,000 major development projects taking place in the period from 2004 to 2011, only 110 projects were submitted to the EIA Department. This lack of compliance with the EIA process confirms the need to update the EIA framework and to strengthen its implementation. A major challenge is that the existing legislation is not strong enough to ensure that companies conduct the required environmental checks prior to commencing their work. One of the main reasons for the low level of compliance may be the lack of penalties for those who fail to submit EIAs.[48] Apparently, provisions in a proposed new draft EIA law contain legal sanctions

[44] MoE, EIA Department 10/10-2012
[45] NGOF/Kavenagh, M. et al. 2012, p. 16
[46] Sub-Decree on Environmental Impact Assessment Process 1999, Article 18
[47] NGOF/Kavenagh, M. et al. 2012, p. 17
[48] The Cambodia Daily 23/11/2012

for companies and individuals, and the requirement of consultation with affected communities may be further emphasized. As an important step for enabling public participation, firms would be obliged to publish their EIA reports online where they would then be increasingly available to the public. Most importantly, in the current Cambodian context, the new law may also state the requirement of all projects and activities to abide by the law, despite having permission from other ministries. The MoE regards the new draft law as key to avoid conflicts between companies and communities.[49]

In a comment to the compensation and resettlement arrangements for villagers in relation to the recently approved Lower Sesan 2 hydropower dam, a Council of Ministers spokesman informed that the government "*wishes these things to be sorted out between the people and the company…*" Accordingly, the government "*does not want to interfere…*" but "*wants to give the right to the company developer and the people to agree.*" Further, the use of the courts to settle any disputes was recommended by the spokesman, saying "*this is why we suggest these cases are taken to the court.*"[50] When weighing the suitability and possible benefits or disadvantages of such a policy, the low negotiation capacity of rural villagers on the verge of being displaced from their land should be considered. Many villagers have very limited means, network, and experience, and thus are in a weak position to challenge a company or project developer who has political connections and much better access to legal advice. Villagers are unlikely to be able to contest such a court case.

[49] The Cambodia Daily 23/11/2012
[50] Mr. Phay Siphan, Council of Ministers Spokesman, Phnom Penh Post 29/11/2012

1. Impacts on Livelihoods and Income

The construction of the Kamchay Dam affects the income and livelihoods of hundreds of local community members. Especially bamboo and NTFP collectors, and vendors at the TCTS, are negatively impacted by the changes brought about by the dam's construction. The flooding of the most important and productive bamboo and NTFP collection area at Teuk Chhou, to make way for the dam's reservoir, complicates and reduces access to the natural resources which the local communities depend on for their livelihoods. Concurrently, vendors at the TCTS saw the number of visitors dwindle as the dam's construction significantly reduced the water level and resulted in water pollution. More than 500 families collecting bamboo for their living now need to travel farther distances from their homes to collect, because of the flooding of the reservoir. Moreover, many bamboo collectors now find it necessary to stay overnight in the forest due to the long travel time.[51]

1.1 Impacts Experienced by Bamboo Collectors

1.1.1 Collection, Effort and Time Use

Before the dam's construction, the large majority of bamboo collectors used bicycles as the means of transportation to collect and transport back bamboo from Teuk Chhou. The survey of 78 bamboo collectors from O'Touch, Thvi Khang Choeung and Moet Peam villages shows that 97% of them went to collect bamboo by bicycle before the dam's construction. After the dam's construction, only 33% of them collect bamboo by bicycle and 36% use motorbikes. Further, 81% now have to use ferry to cross the reservoir and 78% have to use rented cars to bring back the bamboo. People cross the reservoir, to access an area with relatively more bamboo than below the dam. The changes in collection methods are presented in Figure 1.

Changes to Collection Areas and Time Use

According to many bamboo collectors from O'Touch and Thvi Khang Choeung the size of the bamboo area lost to the reservoir was larger than that of the remaining bamboo collection areas.[52] The Vice Village Chief from Thvi Khang

[51] Mak Prang Commune 15/8/2012; Moet Peam Village Chief 18/8/2012; Snam Prampir Village Chief 17/8/2012
[52] Male Bamboo Collector from O'Touch Village 20/8/2012; Bamboo Family from O'Touch Village 22/8/2012; Female Basket Weaver from Thvi Khang Choeung Village 17/8/2012; FGD Thvi Khang Choeung Village 27/8/2012; FGD O'Touch Village 29/8/2012

Choeung estimated that around 20% of the total bamboo collection area was lost to the reservoir. But he also informed, that when comparing the remaining bamboo in the area near and below the dam, which can be accessed in one day, there is much less now than there was in the now flooded area. Before they could collect bamboo in low-lying areas and did not have to climb mountains and hillsides, as they do now. Despite the difficulties experienced the Vice Village Chief in Thvi Khang Choeung has not seen people stop collecting NTFPs. He stated, "*Their main job is to collect bamboo and weave baskets, so how can they stop?*"[53] The Village Chief of O'Touch explained that now people have to travel further to collect bamboo and they need to wake up earlier. While access up to the dam is easier now with the new road, the collectors have to walk further from the place they cut the bamboo to their bicycles.[54]

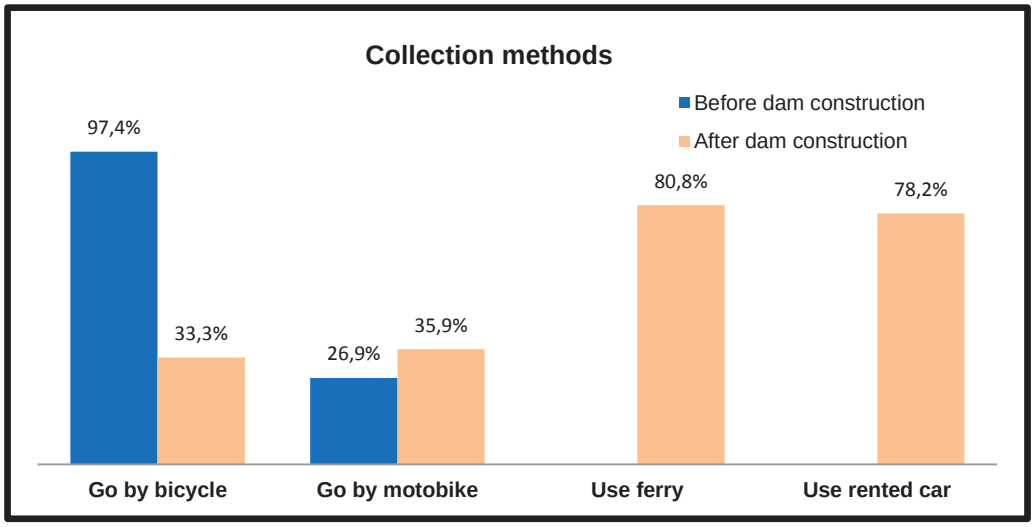


Figure 1: Collection methods before and after the dam's construction

Before the dam's construction, all bamboo collectors collected bamboo at the now flooded area at Teuk Chhou. They used to be able to collect plenty of bamboo in that area year round, as the bamboo forest was thick and very productive there due to the lowland location along the Kamchay River. The director of the MoE Department of National Parks explained that there used to be most bamboo along the stream and least up the hillsides.[55] Now the bamboo collectors have to collect bamboo either on the hillsides near the dam or in the area around the reservoir. The largest and most productive area left is located on

[53] Thvi Khang Choeung Vice Village Chief 27/8/2012
[54] O'Touch Village Chief 18/8/2012
[55] MoE, Department of National Parks 9/10/2012

the other side of the approximately 2,000 ha (20 km^2) large reservoir. This area is only accessible by boat or ferry.[56] According to the survey of bamboo collectors, 97% of them told that the bamboo area is now farther away. The large majority of collectors have to cross the reservoir to collect bamboo, and only 24% of them collect on the hillsides in the area near the dam, where they can access with bicycles.

Photo: Bamboo collector with his bicycle near the Kamchay Dam

When collecting on the other side of the reservoir they have to walk for at least one to three hours to reach the bamboo areas. The areas on the hillsides near the dam, where the bamboo is more scattered, are difficult to access and the bamboo there is less productive and of an inferior quality. Now bamboo is harder to find and most collectors bring back less bamboo compared to before or have to spend more time obtaining the same amount.[57] Before the dam's construction, collectors had to walk about 40 to 400 meter and used at most 30 minutes to an hour to bring back the bamboo to the road and their bicycles. However, after the dam was built, those collecting bamboo on the hillsides near the dam have to walk much further: 57% of them spend two to three hours more than before to collect, and 30% spend more than three hours more than they did before. Those who cross the reservoir to collect bamboo have to travel by ferry for at least two hours and typically stay in the forest for about two to four nights. They have to stay overnight due to the long transportation time, and to collect enough bamboo to make the trip profitable.[58]

Despite the increased hardship of the bamboo collectors, neither the company nor the government has made much of an effort to address these changes in bamboo accessibility and the reduction in the amounts of bamboo available. During several interviews, officials even showed a sense of ignorance regarding the challenges experienced by the bamboo collectors following the construction of the dam; an ignorance that may stem from lack of knowledge of the situation

[56] FGD O'Touch Village 29/8/2012; FGD Thvi Khang Choeung Village 27/8/2012; Male Bamboo Collector from O'Touch Village 20/8/2012; Bamboo Family from O'Touch Village 22/8/2012; Female Basket Weaver from Thvi Khang Choeung Village 17/8/2012; Male Bamboo Collector 20/10/2012
[57] FGD O'Touch Village 29/8/2012; FGD Thvi Khang Choeung Village 27/8/2012; Male Bamboo Collector from O'Touch Village 20/8/2012; Bamboo Family from O'Touch Village 22/8/2012; Female Basket-Weaver from Thvi Khang Choeung Village 17/8/2012; Male Bamboo Collector 20/10/2012
[58] NTFP Survey 14-18/9/2012; Wood Collector and Ferry Operator 20/10/2012

faced by the communities. For example, several officials informed that bamboo collection had become easier now, due to the construction of a new road below the dam, and the fact that the collectors can float the bamboo on the water in the reservoir.[59] They failed to explain, however, how exactly the new road helps the collectors, who used to collect in the now flooded area. The road leads to the dam, but access to the former collection area is effectively blocked by the dam. Further, the floating of bamboo is of little comfort to the collectors, as the bamboo must first be transported from the collection area on the other side of the reservoir and then from the ferry landing site, which is located at the shore of the reservoir on the mountain at the right side of the dam.

Photos: A typical ferry transporting bamboo collectors on the reservoir (left), and bamboo collectors loading the days harvest on their motorbike (right)

1.1.2 Earnings and Dependence on Bamboo

The process of basket-making begins with the collection of bamboo. Typically the husband goes to collect bamboo for around ten baskets, depending on the size of the baskets they produce. Then the wife and husband, sometimes with the assistance of children, cut and prepare the bamboo and weave the baskets at home. In about two days, a family is typically able to produce ten baskets which they can sell for about 40,000 Riel, equaling a family income of 20,000 Riel per day for two persons' work. This cycle of collection and production is repeated continuously and has been carried out for generations.[60] Middlemen usually buy the baskets and then sell them in other provinces. During the fishing season, there is a large demand in the Tonle Sap region.

[59] Andoung Khmer Commune 20/8/2012; MoE, Department of National Parks 9/10/2012; Kampot Department of Environment 18/10/2012; O'Touch Village Chief 18/8/2012

[60] Thvi Khang Choeung Vice Village Chief 27/8/2012; Female Basket-Weaver from Thvi Khang Choeung Village 17/8/2012; Bamboo Family from O'Touch Village 31/8/2012

According to the survey, the large majority have faced a loss in income from bamboo collection following the construction of the dam. The income primarily decreased due to the more difficulty and time spent to access to the bamboo. At the same time, a high increase in the costs of collecting (e.g. for ferry and car rental) has led to a reduction in the earnings from basket production. When comparing the income before the dam's construction with the income now, bamboo collectors experienced a decrease in income of about three percent on average.[61] The impact of this seemingly minor reduction in income on the livelihoods of the bamboo collectors is not immediately apparent. To understand the actual impact, the change in expenses of the families must be included. Here the survey showed that where they used to spend an average 4,100 Riel per trip (one day) to collect bamboo, they now spend an average 37,250 Riel per trip (one to four days).[62] These additional costs related to bamboo collection impact severely upon the earnings of the families.

Examining the differences in income of individual families reveals that many families have experienced a significant reduction in their income, while a few have been able to increase their income considerably. The consequence of this is increased inequality in the access to resources and in family earnings. This is contrary to the governments' target of inclusive pro-poor growth. The income of the surveyed bamboo-collecting families before and after the dam's construction, respectively, is shown in Figures 2, 3 and 4 below here.[63]

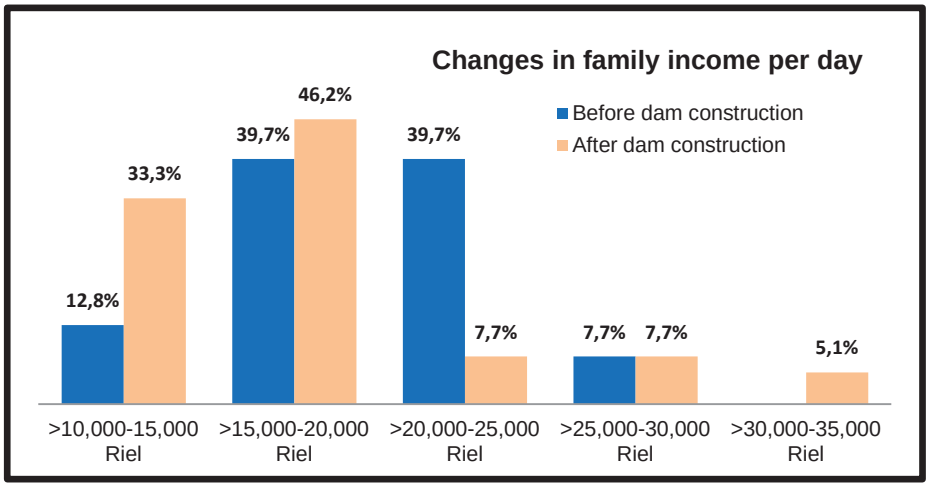


Figure 2: Changes in the income of bamboo-collecting families

[61] NTFP Survey 14-18/9/2012
[62] NTFP Survey 14-18/9/2012
[63] NTFP Survey 14-18/9/2012. The income shown in figures 2, 3 and 4 is before deducting the costs associated with collection.

The survey results reveal a severe impact on the income distribution among the surveyed community members. Whereas 47% of the families earned more than 20,000 Riel per day before the dam's construction, only 21% earn more than 20,000 Riel per day after the dam's construction. The number of families earning only 10,000 to 20,000 Riel per day increased from 53% before the dam's construction to 79% after the dam's construction (see Figure 3 and 4). A few families (five percent) now earn 30,000 to 35,000 Riel per day, which is more than anyone earned per day before.[64] The large majority's reduction in income impacts their ability to spend money on buying food and paying for their children's education. Thus the impacts from the dam harm the opportunities of these families to enhance their livelihoods.

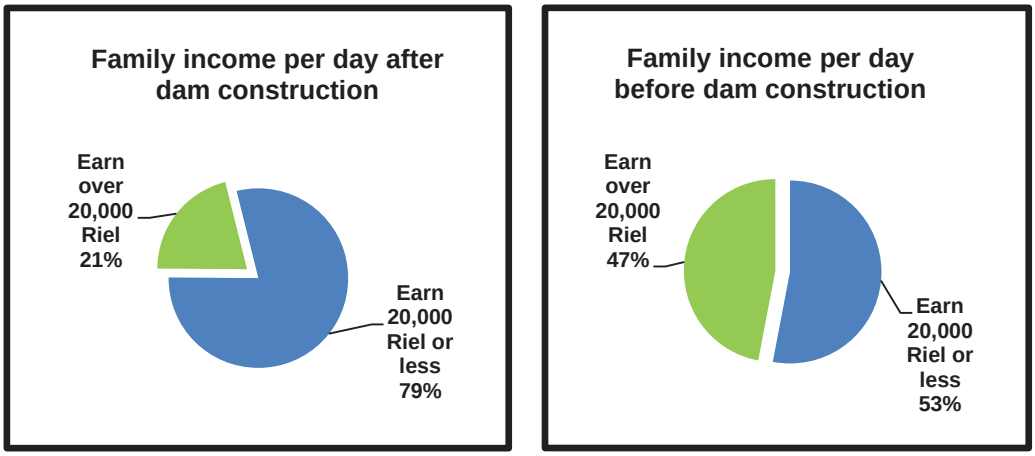


Figure 3 and 4: Daily income of bamboo-collecting families before and after the dam's construction

Dependence on the Income from Bamboo

For all of the bamboo-collecting families surveyed, bamboo comprises the most important NTFP for their livelihood. 94% acquire more than half of their income from NTFPs and for 60%, bamboo and other NTFPs constitute more than 75% of their income. Meanwhile, only five percent of the collectors have fruit plantations and 29% have small rice fields. Those with land are mostly unable to grow enough rice to feed their families, indicating that their dependence on bamboo is very high. The Andoung Khmer Commune Chief stated, "*Bamboo is necessary to provide income for the families who collect. Without bamboo, people will face difficulties because they only have small pieces of land.*"[65] The

[64] NTFP Survey 14-18/9/2012
[65] Andoung Khmer Commune 20/8/2012

study also found that other villagers, such as shop owners in the bamboo-dependent villages of O'Touch and Thvi Khang Choeung also depend on bamboo, because their income is gained from purchases of bamboo collectors.[66] While the earnings of bamboo collectors changed considerably due to the dam's construction, the number of family members depending on income from bamboo has remained stable, as has the involvement of men and women in bamboo work.[67] Figure 5 shows some consequences of the reduced incomes from bamboo collection.[68]

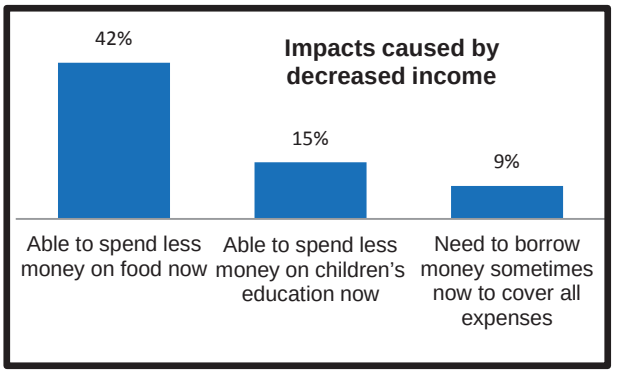


Figure 5: Consequences of the reduced income from bamboo collection

1.1.3 Women's Participation and the Future of Bamboo Collection

Before the dam's construction many women went to collect bamboo at Teuk Chhou, but now it is few and it is rare. Some women still want to go now, but their husbands stop them, because it is further away and more difficult. Women also sometimes stop their older husbands if they are weak or not so healthy, even if they want to go.[69] It was found that the most significant impacts experienced by women are changes to their collection pattern, as they move from being collectors to non-collectors. Before the dam, both men and women, including older people, could easily collect bamboo at Teuk Chhou. Now it is hard for the older and for women to collect bamboo, as they have to climb steep hills, or cross the reservoir and sleep in the forest.[70] The survey shows that women now face more difficulties to collect and to stay in the forest overnight.[71]

Future of Bamboo Collection

The recent trend is that there is no longer enough bamboo to collect at Teuk Chhou near the dam. Therefore more collectors consider crossing the reservoir. This development makes the bamboo collectors concerned whether there will be

[66] Shop-Owner in Thvi Khang Choeung Village 17/8/2012
[67] NTFP Survey 14-18/9/2012
[68] NTFP Survey 14-18/9/2012
[69] Debriefing for Local Communities, Kampot 19/10/2012
[70] FGD O'Touch Village 29/8/2012; FGD Thvi Khang Choeung Village 27/8/2012; Male Bamboo Collector 20/10/2012
[71] NTFP Survey 14-18/9/2012

enough bamboo for them to continue their traditional livelihoods in the future. Another concern of the bamboo-dependent families is that the earnings they can make from the collection nowadays and in the future will be insufficient. Before the dam's construction the income they earned from bamboo went into their own pockets. After the dam's construction, and the loss of access to the forest at Teuk Chhou, the situation is that they now need to spend a considerable sum of money on ferries and truck rentals. Some collectors expressed dissatisfaction with the fact that a large part of their income now goes into the pockets of other, more affluent, people.

It was learned from interviews with community members that many bamboo collectors feel highly attached to their profession and that they see few alternatives to collecting bamboo and weaving baskets. Several factors complicate a possible move towards alternative livelihood options. These include limited job opportunities; lack of skills among bamboo collectors; lack of agricultural land; and the cultural or habitual barrier of working within a fixed framework, in for example a factory, when being used to define their own working patterns.

Photos: Young man working on a large basket, O'Touch Village (left), and women weaving baskets for fish steaming, Moet Peam Village (right)

1.2 Bamboo Community in O'Touch

Considering the loss of bamboo at Teuk Chhou, a bamboo project initiated in O'Touch Village by an NGO in 2006 or 2007 could potentially help to reduce the negative impacts from the loss of bamboo at the reservoir area. An area on Teuk Chenh Mountain, which is part of the BNP, was provided to the community as a Community Protected Area. The bamboo, however, does not seem to grow well. Half of the area, at most, was planted with bamboo, rattan and some trees,

but 50% to 80% of the planted bamboo died. Even if the whole area was planted and grew well it would only be able to supply enough bamboo for the O'Touch collectors for one month a year.[72] The project is on standby, as there is no funding to reassume the planting.[73] The DoE told that the Bamboo Community was created to reduce harvest of bamboo from the National Park, and that the size of the allocated area is 473 ha.[74] Some people in O'Touch thought that the project was connected to the building of the dam. But it is clear that Sinohydro is not involved in any way, also not with funding support.[75]

1.3 Reduction in NTFP Collection

While bamboo is the single most important NTFP resource for the majority of collectors in O'Touch, Thvi Khang Choeung and Moet Peam, community members there, and in some other villages in the area, including Snam Prampir, have also traditionally collected rattan, samrong, krolayn, khos, akao, mak prang fruits and resin in the now flooded area. Rattan is used to produce the handles of bamboo-baskets, while most of the other NTFPs are sold to middlemen. Most of the fruits are seasonal and can be harvested in a one to three months period, and thus they represent a temporary and less consistent income for the communities.[76]

Lost to the reservoir were an estimated 50% to 70% of the samrong trees previously found in the forest areas accessible to the communities. People may still be able to collect some of this valuable fruit in the future, but access to the remaining trees is now more difficult than before, as they have to cross the reservoir and stay overnight in the forest.[77] Samrong trees may provide fruits for one or two years and then there can be up to five years with no fruits. Following the construction of the dam they have not yet had a season with fruits. A normal income at the peak of the season was 40,000 to 200,000 Riel per day and a few could even collect enough to earn 400,000 Riel in a day. Hitherto, in the season the word spread and people came from different parts of Kampot, as well as from

[72] O'Touch Village Chief 18/8/2012; Bamboo Family from O'Touch Village 22/8/2012; FGD O'Touch Village 29/8/2012
[73] Chief of Bamboo Community in O'Touch Village 22/8/2012; Male Bamboo Collector from O'Touch 20/8/2012
[74] Kampot Department of Environment 18/10/2012
[75] Sinohydro Kampot 29/8/2012
[76] Snam Prampir Village Chief 17/8/2012; FGD Snam Prampir Village 22/8/2012
[77] FGD Snam Prampir Village 22/8/2012

Kampong Speu, Phrah Sihanouk and Takeo provinces. It was usually very crowded with at least 1,000 people collecting per day.[78]

A woman in Snam Prampir used to collect samrong in the forest at Teuk Chhou, but she is no longer able to collect after the reservoir flooded the forest. Before the dam's construction nearly all families from Snam Prampir collected samrong and they used to make a good income from that. She recalled, as an example, that if three people went into the forest for three days and nights they could earn 1,000,000 Riel each. One kilo of samrong typically sold for 20,000 to 30,000 Riel.[79]

While other NTFPs, than bamboo, do not comprise the main income for villagers, they do contribute as a welcome additional income source, and they provide an alternative to bamboo for people to diversify their livelihood activities.[80] One day of rattan collection may bring in around 10,000 to 20,000 Riel, whereas akao may give up to 40,000 to 60,000 Riel. Resin pays 30,000 to 37,000 Riel per ten kilos.[81] In Snam Prampir, around 20 to 30 villagers used to collect mak prang fruit.[82] According to villagers in Snam Prampir, the NTFP akao, which was used for traditional medicine, can no longer be found in the area near Teuk Chhou.[83] Out of the 78 surveyed bamboo collectors from O'Touch, Thvi Khang Choeung and Moet Peam, who used to collect bamboo at the now flooded area, 15 (19%) collected other NTFPs as well, before the dam's construction. After the dam's construction, only two of them (2.5%) collect other NTFPs.[84] Those collecting other NTFPs used to earn an average 196,500 Riel per year/season before the dam's construction.[85]

1.4. Impacts on the Tourism Sector

Vendors at the TCTS sell food, drinks, fruits, snacks and cakes, and rent out huts and things like towels and tubes for the visitors to play in the water. The popular tourist spot has attracted visitors since before the country's independence. Kampot Department of Tourism estimates that there are around 30 mobile vendors on normal days and up to 50 on weekends and holidays. There are around 40 huts which are rented out to visitors, and an estimated 200 people

[78] FGD Snam Prampir Village 22/8/2012; Snam Prampir Village Chief and Assistant 17/8/2012; Debriefing for Local Communities, Kampot 19/10/2012
[79] Snam Prampir Village Chief and Assistant 17/8/2012
[80] Bamboo-Collecting Family in O'Touch Village 22/8/2012
[81] Debriefing for Local Communities, Kampot 19/10/2012
[82] Snam Prampir Village Chief and Assistant 17/8/2012
[83] FGD Snam Prampir Village 22/8/2012
[84] NTFP Survey 14-18/9/2012
[85] NTFP Survey 14-18/9/2012

work at the TCTS.[86] Approximately 40 to 45 permanent food shops and an estimated 30 stalls for fruit sellers are found at the TCTS. The owners or renters of these shops and stalls pay an annual user-fee to the tourism authority. According to the Department of Tourism the fees are 100,000 Riel for shops and 25,000 Riel for stalls.[87] Confirming the 100,000 Riel fee for shops, local vendors at the TCTS, however, informed that they pay around 60,000 Riel for the stalls. In addition to these annual fees there is a weekly, and apparently unofficial, sanitation fee of 500 Riel which is paid by all, including the mobile vendors.[88]

1.4.1 Decrease in Number of Visitors and Income

The dam's construction damaged the livelihoods of people working at the TCTS. They described how the Kamchay River and its water flow used to be fresh, clear and natural. During construction they experienced a sharp decline in the water quality of the river, due to upstream pollution from the workers and from the construction site. Combined with a great reduction in the amount of water in the river, this scared the visitors away. Now after the dam's construction, the water still appears less natural, and it has some color and smell to it.

According to the survey of 22 vendors at the TCTS, 95% of them reported that there are fewer tourists in the area now than before the dam's construction started.[89] Vendors explained that during the construction, the number of visitors was as low as ten percent of the number that they used to see prior to construction. To make it worse, those who came stayed shorter, because they disliked the lack of water and its poor quality. Thus they also spent less money.[90] Adding to the difficulties of the vendors, a suspension bridge connecting the TCTS to a small river island, which is very popular with the visitors, was destroyed by an unusually large flood during the construction of the dam. While it was never officially established what exactly caused the flood in 2009, which made the suspension bridge collapse, it is clear that the loss of the bridge is far from helpful in the quest of attracting people to the TCTS at a time when vendors are struggling to find income for their families.[91]

Tourism statistics show that the decrease in visitors at the TCTS has indeed been significant, and that the numbers kept decreasing throughout the construction period. In the ESIA, the number of visitors at the TCTS from 2006 to 2010, and

[86] Kampot Provincial Department of Tourism 28/8/2012
[87] Kampot Provincial Department of Tourism 28/8/2012
[88] Female Vendor from Snam Prampir Village 16/8/2012; Female Fruit and Food Vendors at TCTS 20/8/2012
[89] Tourism Survey 14-18/9/2012
[90] Female Shop-Owners at TCTS 1/9/2012
[91] Kampot Provincial Department of Tourism 28/8/2012; Restaurant Co-Owner from Snam Prampir Village 20/8/2012; Female Shop-Owners at TCTS 1/9/2012

the estimated income from tourism, is listed. The most recent statistics of visitors in the first semester of 2012 were not made available by the Kampot Department of Tourism, but numbers for 2011 were shared and are included in Table 3. The table provides an overview of the reduction in visitors during the dam's construction.

Table 3: Number of Visitors at the TCTS and Income Estimation for the years 2006 to 2011

Development in visitor numbers and estimated annual income from tourism			
Year	Total Tourists	Income ($)	% Tourists of 2006
2006	277,977	2,861,425	100%
2007	241,086	2,518,000	86.73%
2008	259,684	2,695,155	93.42%
2009	180,758	1,954,405	65.03%
2010	69,542	761,360	25.02%
2011	65,232[92]	690,155[93]	23,47%

Most vendors at the TCTS estimated that the number of visitors in September 2012 was approximately 40% to 50% of what it was prior to the dam's construction.[94] In addition to the obvious deterioration of the quality of the TCTS during the construction phase, some vendors and government officials considered the increased number of tourist attractions in Kampot as an exacerbating cause of the reduction in visitors.[95]

Decrease in the Income of Vendors

Before the dam's construction, doing business at the TCTS provided enough income for vendors to cover the daily necessities and many were able to save money for celebrations or emergencies. This situation has changed after the dam's construction and most sellers do not earn enough to have the same quality of life that they had before, let alone save for the future or for emergencies. According to the survey, all vendors experience decreased income from their business, and on average, they estimate their current earnings to be 28% of what it was before the dam's construction. The earnings of the tourism-dependent families before and after the dam's construction, respectively, are shown in Figures 6, 7 and 8 below here.[96]

[92] Kampot Provincial Department of Tourism 28/8/2012
[93] Income calculated based on data from 2006 to 2010
[94] Tourism Survey 14-18/9/2012
[95] MoE, Department of National Parks 9/10/2012; Female Shop-Owners at TCTS 1/9/2012; Female Chicken Vendor at TCTS 1/9/2012
[96] Tourism Survey 14-18/9/2012

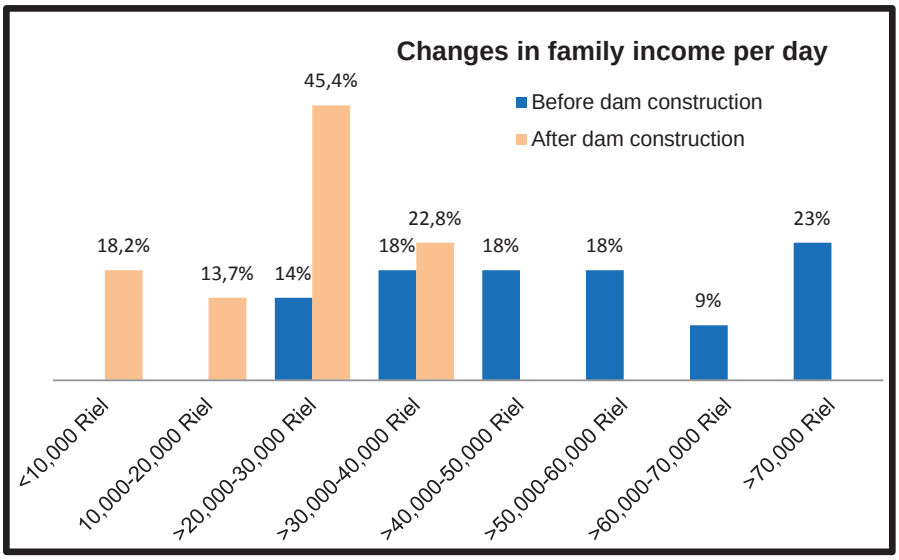
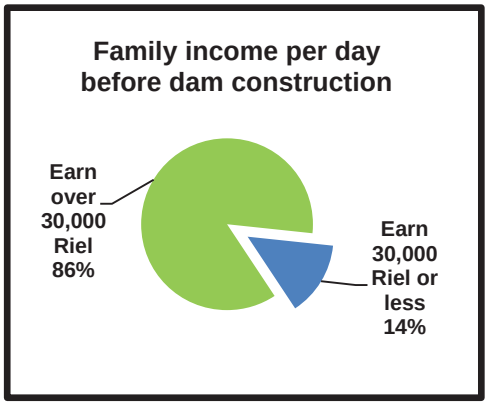


Figure 6: Earnings from selling at the TCTS before and after the dam's construction

Before the dam's construction began, the average earning of a family was 82,300 Riel per day. About 54% of the families earned from 30,000 to 60,000 Riel per day, while 23% of them earned more than 70,000 Riel per day. After construction, the average earning of a family is about 22,700 Riel per day. 82% of the families earn 10,000 to 40,000 Riel per day, while no families earn more than 40,000 Riel per day. 18% now earn less than 10,000 Riel per day.[97] Thus the construction of the dam has had a significant negative impact on the tourism-dependent families, causing decreased livelihoods in the area.



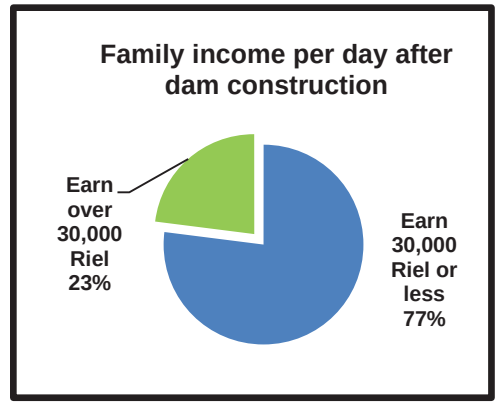


Figure 7 and 8: Daily income of families selling at the TCTS before and after the dam's construction

[97] Tourism Survey 14-18/9/2012

1.4.2. Impacts on Women and the Future of Tourism at Teuk Chhou

Tourism related work is dominated by women and the common perception is that they do this job better than men. The preparation, cooking and related activities are mostly done by women. Men mainly help with transportation of the products to and from the TCTS. Given the high involvement of women in the businesses at Teuk Chhou, the reduction in visitors impacted women more directly than men. In line with this, 91% of the surveyed vendors found that it is now more difficult for women to take care of the family.[98]

Photo: Fruit seller at TCTS

It is clear from the survey, and the in-depth interviews, that the impact on vendors at the TCTS is still significant after the dam's operation started in December 2011. Several concerned government officers, however, believe that tourism will improve and that even more visitors will come in the future.[99] The vendors at the TCTS are less optimistic though, believing that while more visitors are likely to find their way to the area in the coming years, than during the period of construction, they do not expect tourism to return to what it was before. The main reason provided, is the change to the natural flow of the river, as they believe the visitors prefer "natural water", to the water from the dam.[100] Several vendors informed that visitors have started to show interest in seeing and visiting the dam. However, the barb-wired fence around the dam site, and the soldiers guarding the entrance, prohibits such visits.[101] The ESIA stated that the impact on tourism at Teuk Chhou would occur during construction of the dam[102] and it was anticipated that the dam infrastructure would attract more tourists to the area. When describing the impacts during operation of the dam the ESIA did not mention tourism.[103]

[98] Tourism Survey 14-18/9/2012
[99] Kampot Provincial Department of Tourism 28/8/2012; Mak Prang Commune 15/8/2012; Kampong Kreng Commune 16/8/2012
[100] Female Shop-Owners at TCTS 1/9/2012
[101] Visit to the area around the Kamchay Hydropower Dam 18/8/2012
[102] ESIA April 2011, p. 220-221
[103] ESIA April 2011, p. 228-239

The hindering of tourists to visit the dam structure does little to help the tourism sector regain its lost momentum. And given earlier announcements of planned tourism development, this lack of development is rather disappointing. Developing the area into a tourist attraction could help to counter some of the negative effects experienced by the sector. Interviews with relevant stakeholders, however, did not provide for much optimism, as no clear plans for tourism development seem to have been made at this time.[104] Thus, in spite of the hardship of the affected community members working at the TCTS, the issue of boosting the tourism sector, and increasing the number of visitors, does not seem to get much attention from neither the authorities nor the company.

1.5 Temporary Increase in Wood Collection

Inadequate removal of cut trees from the reservoir area has led to a rapid increase in the firewood business during the last couple of years. The premature flooding of the reservoir area resulted in large amounts of cut trees being left in the reservoir. People mostly access this wood by using homemade ferries and bringing along a chainsaw to divide the logs into more manageable pieces before loading it on a ferry. Others float the logs back to the landing site. The wood pieces are then transported down to Snam Prampir where people break and bundle it. According to the law, people are not allowed to cut fresh trees for selling, but only to collect firewood for personal use.[105] However, following the preparation of the reservoir, and given the large number of logs left in the reservoir, villagers have been allowed access to this wood resource.

While some may still collect for household consumption only, the large-scale collection and trading is obvious along the road from Kampot to Teuk Chhou. According to the Snam Prampir Village Chief, an increasing number of villages are selling wood. Whereas 20 to 30 people used to collect wood in the area at Teuk Chhou, now more than 50 families from Snam Prampir collect wood from the reservoir.[106] Wood collection has improved the life of some families, who now typically earn around 30,000 to 35,000 Riel per day. Many wood collectors used to be casual laborers earning less in fruit plantations, thus wood collection is more attractive to them. The benefits from this business, however, will be temporary, as there is only wood left in the reservoir for another one to three

[104] Kampot Provincial Department of Tourism 28/8/2012
[105] MoE, Department of National Parks 9/10/2012; Kampot Department of Environment 18/10/2012; FGD Snam Prampir 22/8/2012
[106] Snam Prampir Village Chief 17/8/2012; Wood Collecting Family from Snam Prampir Village 31/8/2012

years.[107] The temporary advantages from wood collection may, however, result in a social and environmental backlash once all the accessible dead wood in the reservoir has been collected. The people who currently depend on this wood collection and selling for their livelihoods will face a challenge to maintain their income. This may result in their logging of fresh trees and thus increased pressure on the biodiversity and wildlife habitat of the BNP.

Photos: Wood collection at the reservoir and wood work along the road to Teuk Chhou

In principle, the DoE does not allow the use of chainsaws in the BNP. However, for the Kamchay Dam project, they have made an exception and allowed the use of two chainsaws to cut the logs collected in the reservoir. Interviews and field observations, however, indicate a more widespread use of chainsaws in the reservoir area. Several boats with chainsaws on board, as well as the sound of a machine saw coming from the shore, were observed during a field visit at the reservoir. A local community member, who spends his days working in the area, told that there are no less than 20 machine saws in use by wood collectors in the area.[108] The increased dependence on wood collection, combined with the use of chainsaws is a possible threat to the surrounding forest areas. This should cause some concern for the future biodiversity and forest cover in this corner of the BNP. If no better alternatives become available, some collectors will likely seek income from the area in less sustainable ways. Such a situation would require that lowly paid environmental officers and park rangers conduct strict enforcement, and consequently refuse possible cash offers from perpetrators, despite this being against the immediate livelihood interests of both parties.

[107] FGD Snam Prampir 22/8/2012; Wood Collecting Family from Snam Prampir Village 31/8/2012; Kampot Department of Environment 18/10/2012
[108] Visit at the Kamchay Dam Reservoir 20/10/2012

1.6. Changes to Fisheries

The estimated environmental costs to fisheries in the Kamchay River and its tributary Stung Keo River is provided for 2006 to 2010 in the ESIA. The data reveals that the yearly fish catch decreased from 25,433 kilo in 2006 to 15,499 kilo in 2010 (see Figure 9). In 2010 they caught only 61% of the amount they used to catch in 2006 before the dam's construction commenced. The estimated total income from the fisheries also went down to 61% from $63,583 in 2006 to $38,748 in 2010.[109]

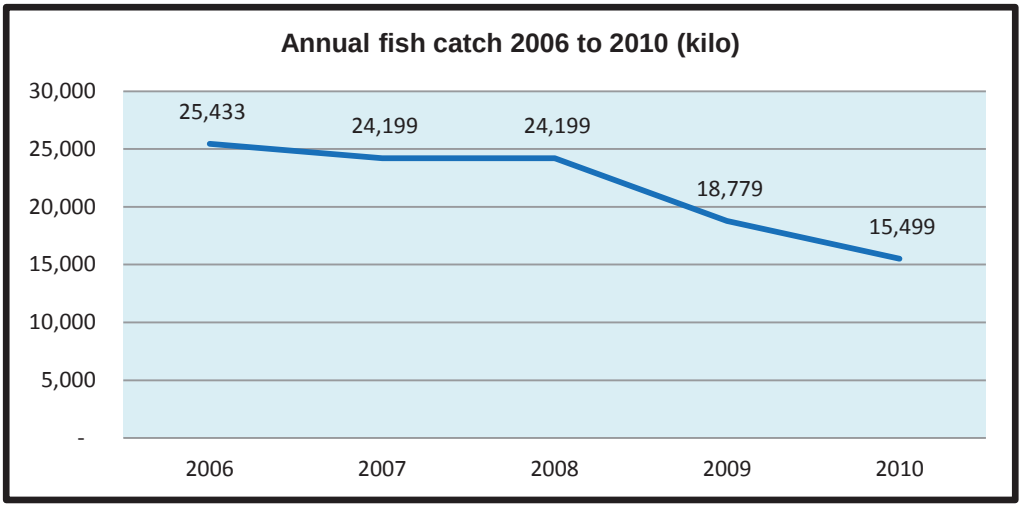


Figure 9: Fish catch in the Kamchay River system from 2006 to 2010
(ESIA April 2011 English Summary)

Before the dam's construction a couple of large August floods caused a large number of the fish species Trey Kros (Osteochilus vittatus) to migrate downstream. This migration led to rich fisheries, where families downstream could catch 50 to 100 kilo of this fish during two to three days, with some families catching even more than 100 kilo. It may have been several hundred families, according to the PFiA, who used to fish with gill-nets during these peak fishing days. Trey Kros migrates downstream to spawn in the lower Kamchay River, where it meets with the Stung Keo and Kampot Rivers.[110]

After the dam's construction the usual flood is now regulated to pass through the turbines, why no fish can migrate anymore. This blocking of the waterway is critical for those species whose biological cycle requires them to migrate.

[109] ESIA April 2011 English Summary, p. 21-22
[110] Kampot Provincial Fisheries Administration 28/8/2012

Consequently, the traditional downstream annual catches of the previously abundant Trey Kros seem to have vanished following the dam's construction, and in general the fish catch below the dam is decreasing. Common species that are still caught upstream after the dam's construction, according to the PFiA, include: Trey Tanil (Hemibagrus filamentus), Trey Kchoeung (Mastacembelus armatus) and Trey Tronum. The Trey Tanil caught up in the reservoir now, does not look healthy, but the PFiA is not sure why. In general the changes to fish and fisheries in the reservoir and upstream are unknown, as no studies have been conducted up there yet.[111]

Prior to the dam's construction people along the Kamchay River used to catch fish with spears during the dry season when the water level was low. The increased water level has put an end to this activity and further, according to one interviewee working near the river, there may no longer be any big fish below the dam.[112] The fishers downstream mostly fished part time for family consumption and supplementary income. Many people reduced or stopped their fishing activities, because they cannot catch as much as before. The most significant change causing this decline, according to the PFiA, is the affected hydrology below the dam.[113]

Photos: Fishers on the reservoir of the Kamchay Dam (left), and fish from the upper part of the reservoir/river sold at Snam Prampir Market (right)

Prior to the dam's construction fishers could catch at least 20 to 30, and even up to 100, fingerlings of the endangered species Trey Neak (Scleropages formosus/Asian Bonytongue), which only lives upstream. These fish, which they

[111] Kampot Provincial Fisheries Administration 28/8/2012
[112] KWS Water Intake 16/8/2012
[113] Kampot Provincial Fisheries Administration 28/8/2012

could catch in the low water during the dry season, are sold as ornamental fish. Now, after the dam's construction, people cannot find the fingerlings because the reservoir is deep. The authorities are uncertain whether this species is declining, or whether it is just harder to find.[114]

The plan to build a reservoir in the river below the dam, near the TCTS, was made after a request from the PFiA in Kampot. The idea is to protect fish species by creating a protected area for Trey Kros to breed and spawn. From there it is expected that the fish can migrate to other areas where it can be caught. At the PFiA they have not received the final ESIA report, and they are not sure if the plan has been accepted or not, as they have not heard any result from the company. The Ministry of Tourism may, however, have worries about the construction of a third dam, required for the planned reservoir, as it is feared that this would harm the tourism sector.[115]

1.7 Missing Compensation

In the project area, people have been compensated for loss of land and fruit trees related to the dam and road constructions. Likewise, people have generally been compensated where the transmission lines have been constructed. On the other hand, people in the affected villages have not been compensated for the loss of income caused by the loss of forest at Teuk Chhou, or for the loss of income from the decrease in visitors at the TCTS. It was described in the ESIA that the dam's construction would affect the livelihoods of people depending on forest products and those doing business at the TCTS. While some of the impacts during construction were identified for both tourism-related businesses and NTFP collectors, there was unfortunately scant attention paid to the long-term impacts that may persist after the dam's operation.[116]

According to the ESIA, $500,000 is allocated to compensate for the loss of income from forest products and $500,000 allocated for the loss of income from tourism. Sinohydro was not able to explain how, or if, this money had in fact been spent. Interviews with a broad range of stakeholders, as well as observations in the field, reveals that neither NTFP collectors, nor families dependent on tourism, were not aware of any attempts made by the company to mitigate the loss of income that these families experience as a result of the dam's

[114] Kampot Provincial Fisheries Administration 28/8/2012
[115] Kampot Provincial Fisheries Administration 28/8/2012
[116] ESIA April 2011

construction.[117] Kampot Department of Tourism noticed that Sinohydro raised plans to compensate the environmental and social areas at a workshop in late 2011. The department had themselves raised the issue of the drop in visitors during construction as a likely impact.[118] In O'Touch, the Village Chief confirmed that no compensation has been paid to the NTFP collectors.[119]

Kept in Waiting

According to Sinohydro, all compensation related to the construction of the transmission lines has already been paid to the affected households.[120] This, however, contrasts with the information obtained in the field, where at least four to six families in Moet Peam and another six families in Andoung Chimoeun, who live near or under the gridline, have not yet received compensation. This is despite the fact that the families have been told by the authorities and the company to move. In several cases, they have waited over nine months since they were told to move, without being informed about the amount of compensation they may, or may not, receive. The families have also not been offered new land or housing.[121] After being told by the authorities that is it not safe to live

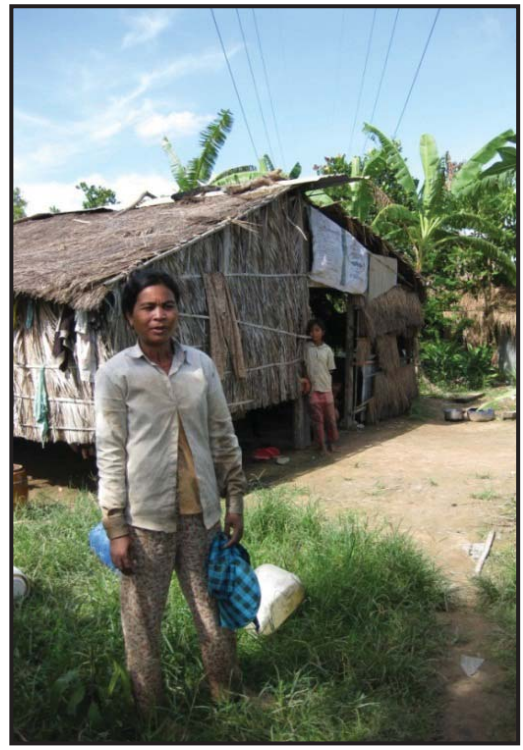


Photo: Family living under the transmission line, Moet Peam Village

[117] Sinohydro 9/10/2012; ADHOC Kampot 23/8/2012; LICADHO Kampot 23/8/2012; MoE, Department of National Parks 9/10/2012; FGD Snam Prampir Village 22/8/2012; Thvi Khang Choeung Vice Village Chief 27/8/2012; Moet Peam Village Chief 18/8/2012

[118] Kampot Provincial Department of Tourism 28/8/2012

[119] O'Touch Village Chief 18/8/2012

[120] Sinohydro Kampot 29/8/2012; Sinohydro 9/10/2012

[121] Mak Prang Commune 15/8/2012; Moet Peam Village Chief 18/8/2012; Lady living under the grid in Andoung Chimoeun Village 21/8/2012; Family living near the grid in Andoung Chimoeun Village 30/8/2012; Family living under the grid in Moet Peam Village 30/8/2012; Families living under the grid in Moet Peam Village 30/8/2012

there, they worry about the possible health risks. But these risks have never been clarified to them by neither the authorities nor the company.[122] The lack of compensation to the families living under the grid is recognized by the local authorities.

The compensation process was found to be complicated by Sinohydro, as the company had little experience with this when they started. The company explained that compensation to the affected villagers goes through the provincial government and the Department of Industry, Mines and Energy (DIME). Sinohydro pays the agreed amounts to the provincial government or DIME, which is then responsible for paying the affected people. If the villagers experience any problems they have to complain to the provincial government, who then negotiate with the company.

From the company's point of view, it is easier to ask the government to take care of negotiations. In an attempt to ensure that compensation is rightfully paid, the company obtains a certificate from the RGC with signatures from the villagers. Although having full details about all the compensation payments, this information remains confidential between the company and the RGC, and thus effectively hidden from the affected communities and concerned local authorities. When interviewed, Sinohydro seemed unaware that there are problems with outstanding compensation of families living under the grid. Though apparently having limited knowledge of the actual situation of the affected families, the company thinks that people should move because it has already paid all compensation.[123] Thus the bottleneck appears to be the provincial government and the DIME who are supposed to take care of the compensation on behalf of Sinohydro. In general, Sinohydro avoids involvement with the affected communities, leaving this to the provincial government. The shortcomings of this procedure are discussed later in the section on information and participation. The company's lack of involvement has left people with no other option than relying on the local authorities who seem, however, unable to interfere with the dispositions of the provincial government.

The affected people living close to the transmission lines have been told by authorities that they would receive compensation, but usually they have not been told the amount they will receive. Some consider contacting the company to obtain clarification on their compensation, but no one knows where the

[122] Lady living under the grid in Andoung Chimoeun Village 21/8/2012; Family living near the grid in Andoung Chimoeun Village 30/8/2012; Family living under the grid in Moet Peam Village 30/8/2012; Families living under the grid in Moet Peam Village 30/8/2012
[123] Sinohydro Kampot 29/8/2012; Sinohydro 9/10/2012

company is, or how to contact them. This situation makes people feel that they lack transparent information from the company, as they do not know what compensation it pays to the authorities.[124] Aggravating the situation of the affected families is a sense of fear to come across the authorities, as it was explained by a man from Andoung Chimoeun: "*In the village people are scared to question or challenge the commune authority. So if they are told to wait they will go home and wait. They do not dare to challenge.*"[125] These circumstances, and the poverty of the families, leave them with few options other than to wait and hope that the authorities and the company will not forget about their cases.[126] The challenges that face affected families, as described above, illustrate the inadequacy of the approach applied by Sinohydro and the RGC. While the system is convenient for the company, it fails to take into account the needs and concerns of the affected villagers.

1.8 Gender

It was found that the most significant impacts experienced by women are changes to their collection pattern (from collectors to non-collectors); a decrease in income and access to money for those women depending on tourists for their income; and an increased burden as temporarily single caretakers of families and homes. At home the women, and in some cases children, face an increased workload preparing baskets, as the men have less time to assist at home. Prior to the loss of forest at Teuk Chhou, the men never slept in the forest.[127] Those men whose wives used to make a good income from selling to tourists at the TCTS now face a more significant pressure to find alternative income. Men from bamboo-collecting families are denied the opportunity to stay with, and take care of, their families, when having to spend their nights in the forest. Further, several bamboo collectors acquired malaria in the forest after having to stay there overnight, an unpleasant risk cited by some interviewees.[128] Unfortunately, the ESIA did not pay attention to gender issues, ignoring the differing roles of men and women and the different impacts experienced by men and women.

[124] Man from Moet Peam Village 30/8/2012
[125] Man from Andoung Chimoeun Village 21/8/2012
[126] Lady living under the grid in Andoung Chimoeun Village 21/8/2012; Family living near the grid in Andoung Chimoeun Village 30/8/2012; Family living under the grid, Moet Peam Village 30/8/2012; Families living under the grid in Moet Peam Village 30/8/2012
[127] Moet Peam Village Chief 18/8/2012
[128] Bamboo Family in O'Touch Village 31/8/2012; O'Touch Village Chief 18/8/2012

2. River Water Use, Agriculture and Climate Change

2.1 River Water Use and Water Quality

Sinohydro and the Department of Water Resources and Meteorology (DoWRaM) informed that the water from the reservoir is used solely for electricity production, and that no infrastructure for irrigation has been constructed. According to the DoWRaM, the water downstream from the dam is not enough for large-scale irrigation, and there seems to be no plans for such infrastructure.[129]

While the majority of the water from the reservoir is released about 2.4 km downstream, after being used to produce electricity at Powerhouse 1, a minimum flow of 4.5m^3/second is maintained right below the main dam.[130] The flow is required to try to preserve some similarity with the previous aquatic habitat. After the water is released from the reservoir, it is used by the visitors at the TCTS, and further downstream the river provides water for the Kampot Water Supply (KWS). The river water is also used by some families along the river to irrigate their fruit trees and by some families for household purposes, including drinking water. Due to saltwater intrusion during the dry season, the use of river water for irrigation and household use mostly takes place upstream from Moet Peam, and mostly around Snam Prampir and Teuk Chhou.

Water Quality

There was a severe reduction in the water quality of the Kamchay River during the construction of the dam. This was caused by a reduction of water in the river, and by the pollution that followed from construction, including liquid and solid waste from the workers. As the quality deteriorated, the KWS needed to provide more treatment to the water, which caused it to smell of chemicals.[131] A person working near the river explained that the river water used to be very clear, but during construction it became very red. Now after construction the water is still a bit reddish. He does not like to go

Photo: The change in water quality has left its sediment traces on trees in the Kamchay River

[129] DoWRaM Kampot 28/8/2012; Sinohydro 9/10/2012
[130] MoE, EIA Department 10/10/2012
[131] Mak Prang Commune 15/8/2012

into the river water anymore, as he is afraid that the water will affect his skin and cause him to be itchy.[132] Several other interviewees shared this concern and still refrain from entering the water after the dam has been completed. Impacts on health however, such as itchy skin, remain anecdotal. According to Kampot Department of Health there was no increase in cases reported in relation to waterborne diseases, or itchy skin, during the period of the dam's construction.[133] The Village Chief in Moet Peam also has not heard of problems to peoples' skin, but he asserted that many people were scared to enter the river water during the construction period, and that some are still worried today.[134]

A visit to the dam revealed that the water in the reservoir near the dam wall was yellowish-brownish in color and that the visibility was not more than two to four meters. There were a number of logs floating in the corners and at the wall of the dam.[135] The MoE has noticed the impact on the water quality, but expects that it will return to normal within a couple of years.[136] A likely lack of oxygen in the reservoir water, and the possibility of decomposing forest and vegetation in the reservoir producing disastrous water insects or plants, was mentioned in the ESIA.[137] Based on a visual inspection, in part of the reservoir, there were no immediately visible signs of excessive growth of water plants or large amounts of insects in or near the water. Likewise, during field interviews there were no indications that such a problem has evolved for the time being. It should be noticed, however, that it was not possible within the limited scope of this study to carry out tests to further examine this issue. The Mak Prang Commune Chief proclaimed that the river water is now of a good quality like before.[138] The DoWRaM generally agreed with this assertion, adding that, despite no measurements of the reservoir water quality being carried out, the quality should be okay for household use.[139]

2.1.1 Agricultural Water Use

Prior to the dam's construction, small floods used to arise several times per year bringing sediment with them to the flooded land. The loss of these small floods has impacted some 30 ha of flood-dependent paddy rice fields in Mak Prang Commune. While it is too early to evaluate the impacts from these lost floods, the farmers may not be able to plant their rice in time, and will have to wait for

[132] KWS Water Intake 16/8/2012
[133] Kampot Department of Health 24/8/2012
[134] Moet Peam Village Chief 18/8/2012
[135] Visit on the Kamchay Hydropower Dam 29/8/2012
[136] MoE, Department of National Parks 9/10/2012
[137] ESIA April 2011, p. 230
[138] Mak Prang Commune 15/8/2012
[139] DoWRaM Kampot 28/8/2012

rain that may, or may not, come.[140] Uncertain is also the question of a possible decrease in the rice production of these fields, following the reduction in naturally added sediment and water. Should the production decrease, farmers may have to add more farm input, such as fertilizer, and will thereby experience increased costs. Despite this possible negative impact on agriculture, there seems to be no monitoring of the changes.

The use of river water for irrigation is generally not necessary in the rainy season. In the dry season, when the water would benefit the farmers, saltwater intrusion in the river has hitherto made its use impossible for most farmers. The border of fresh and salty water used to be about 100 meter downstream from the KWS intake near the TCTS. Since the dam operation commenced, however, it seems to have moved down to around one km from the water intake. Should the freshwater reach two to four km downstream from the water intake, this would allow most farmers living along the river in Mak Prang Commune to use the river water for irrigation. Along the river stretch with recent dry season freshwater, 30 to 40 families have started to test the use of river water on approximately 40 ha of fruit tree plantations. [141]

The agricultural benefit from increased freshwater levels may also reach into Stung Keo River, a tributary to the Kamchay River, which is usually also subject to saltwater intrusion. Some farmers in Moet Peam also follow the development of saltwater levels closely as there are signs that it is becoming fresher. While the farmers here are so far waiting to see whether the water will be fresh, they would appreciate being able to use it during the dry season.[142] In Kampong Kreng Commune, people use reservoirs for irrigation of their durian plantations and rice is only grown in the wet season. So far there is no freshwater in this part of the river there during the dry season.[143]

Water Salinity

A change in the water regime, towards increased freshwater content in the river, was noticed by the Mak Prang Commune Chief. While not specifying the exact location of his observations, he informed that whereas there used to be freshwater in the river from May to November, there is now freshwater from May to February or March.[144] These observations correlate well with the expectations of an increased amount of freshwater being released from the dam during the dry season. The change in the salinity of the Kamchay River represents both opportunities and negative consequences. As seawater, which usually flowed into the river in the dry season, is hindered access due to the additional flow of dry season freshwater, the species composition is changing. The seawater species

[140] Mak Prang Commune 15/8/2012
[141] Mak Prang Commune 15/8/2012; KWS Water Intake 16/8/2012
[142] Moet Peam Village Chief 18/8/2012
[143] Kampong Kreng Commune 16/8/2012
[144] Mak Prang Commune 15/8/2012

usually inhabiting the lower part of the river will disappear, while some non-migratory freshwater species may appear. In addition to these environmental impacts, there are social impacts as well, as fishers, who used to catch shrimps and other seawater species in the river, are no longer able to do so.[145]

On the positive side, if the water becomes fresh throughout the dry season, it would be an asset for farmers living near the river, who could use river water for their fruit plantations. The saltwater level, however, is not being measured.[146] This means that whatever changes in the water's salinity, occurring as a consequence of the hydrological changes to the river, remain un-quantified thus far. Consequently, it is difficult to evaluate, and potentially respond to, these changes in any meaningful way.

2.2 Changes to Agriculture and Irrigation

In addition to electricity generation, a secondary objective of the Kamchay Dam was to serve as a source for irrigation.[147] There is however not much focus on agriculture and irrigation in the ESIA report and it is unclear whether the dam may meet this purpose. As a result of a consultative meeting held in March 2011 in Kampot, it was stated that Sinohydro agreed to build a sub-dam below Teuk Chhou, as a reservoir for fish preserving and increasing the fish stock. Presumably, this reservoir would concurrently serve as a freshwater reservoir that could be used by people for watering their fruit trees.[148] However, considering the already highly-impacted tourism sector, building yet another dam so close to Teuk Chhou may not be feasible.[149] Given the likely increase in dry season freshwater levels, farmers may be able to access freshwater for at least one km downstream from the water intake at Teuk Chhou.[150] This means that unless any extending infrastructure is built, a new reservoir may not make any difference for the farmers in the area.

Interviews with local communities, government authorities and Sinohydro, as well as field observations, showed no signs of any irrigation infrastructure having resulted from the project thus far.[151] In Moet Peam the Village Chief did not notice any immediate changes to irrigation or agricultural production. But he noticed that people are happy that there is no flooding now. The floods, which they used to have three to four times per year, occasionally killed fruit trees and livestock.[152] Local authorities in Kampong Kreng and Andoung Khmer

[145] Male Farmer from Mak Prang Village 16/8/2012
[146] DoWRaM Kampot 28/8/2012
[147] ESIA April 2011 English Summary, p. 4
[148] ESIA April 2011, p. 187
[149] Kampot Department of Environment 18/10/2012; Kampot Provincial Fisheries Administration 28/8/2012
[150] Mak Prang Commune 15/8/2012
[151] Mak Prang Commune 15/8/2012; Snam Prampir Village Chief and Assistant 17/8/2012; Moet Peam Village Chief 18/8/2012; DoWRaM Kampot 28/8/2012; Sinohydro 9/10/2012; NTFP Survey 14-18/9/2012; Tourism Survey 14-18/9/2012
[152] Moet Peam Village Chief 18/8/2012

communes, which are both located further downstream than Mak Prang Commune, explained that people in their villages were unable to use river water for dry season irrigation. Further, they indicated that unlike in Snam Prampir, where some rice fields benefitted from the traditional small floods, rice farmers in their communes were not dependent on such floods. On the contrary, floods had often killed rice crops or fruit trees. According to the O'Touch Village Chief, increased future freshwater levels in the river may not have much impact upon his village, as there are only few fruit trees and little land near the Kamchay River in O'Touch.[153]

Grimsditch described how some farmers, having durian trees close to the river, reportedly experienced branches of their fruit trees dying. Apparently, they believed this could be due to the reduced water quality of the river.[154] This possible impact, however, could not be verified by this study. While several farmers informed that they had experienced a loss of durian trees, none of those interviewed pointed to the quality of the river water as the cause. Rather they attributed the dead trees to either the unusually large 2009 flooding, or to disease.[155]

2.3 Climate Change and the Kamchay Dam

At the ministerial level, the Department of National Parks recognized that the dam will impact on climate change (CC) because of the loss of forest in the area of the reservoir. The magnitude of the impact, however, was found hard to assess, but compared to the economic value, was considered small.[156] The emissions of greenhouse gasses (GHGs) from decomposing plants and trees in the reservoir were not mentioned. The DoE in Kampot stressed the importance of protecting the forest to limit the impact on CC, but believed that the impact from organic material decomposing in the reservoir was insignificant. On the contrary, the positive effect of hydropower as a means to limit CC was highlighted, and in this context, Sinohydro's application for carbon credits via the Clean Development Mechanism (CDM)[157] was mentioned.[158]

Others criticize this application for CDM credits, arguing that the likely adverse effects of the dam on the environment should make such recognition impossible.[159] A key objection is the perceived failure of the project to deliver any additional reduction in GHG emissions, given that the project would have

[153] Kampong Kreng Commune 16/8/2012; Andoung Khmer Commune 20/8/2012; O'Touch Village Chief 18/8/2012
[154] Grimsditch, M. 2012, p. 21
[155] Male Farmer from Mak Prang Village 16/8/2012; Restaurant Co-Owner from Snam Prampir Village 20/8/2012
[156] MoE, Department of National Parks 9/10/2012
[157] The CDM is an arrangement under the Kyoto Protocol that allows industrialized countries with a greenhouse gas reduction commitment to invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own countries.
[158] Kampot Department of Environment 18/10/2012
[159] International Rivers January 2012; International Rivers March 2010; Globalization Monitor 2010

been completed regardless of the possibility of receiving carbon credits.[160] Further, it is argued that the adverse environmental and social impacts of the project go against the sustainable development objective of the CDM, and that the project fails to meet public participation requirements.[161]

Sinohydro's website states that the company is committed to environmental protection including "*Reducing greenhouse gas emission[s]…*"[162] The efforts to reduce GHG emissions in the Kamchay Dam project can be questioned. Inadequate clearing and removal of organic material from the reservoir is likely to result in otherwise avoidable large emissions of methane and other gasses, which will increase the dam's lifetime emissions. A number of reports show that significant amounts of GHGs are produced by reservoirs, especially those in tropical areas.[163] In particular, reservoirs emit methane, a 20 to 25 times stronger GHG than CO^2, per unit.[164] The process leading to GHG emissions from reservoirs is shown in Appendix C.

Photo: The reservoir of the Kamchay Dam, satellite photo 15 May, 2012 (Aruna Technology Ltd.)

[160] An additional project is built only because it receives money from selling carbon credits. When a dam is "non-additional," it is being funded by sales from carbon credits even though it would have been built without revenues from those credits. (CC Glossary, International Rivers)
[161] International Rivers 2012
[162] http://eng.sinohydro.com/en/idems/dev.asp?showtype=2&ClassID=18 - Accessed 23/10/2012
[163] Kummu, M. et al. 2010; Harkonen 2009; IRN 2007; International Rivers November 2008; International Rivers October 2008; Frankel, M. 2012
[164] Frankel, M. 2012; International Rivers November 2008; IRN 2007

The water surface area of the reservoir on May 15, 2012, as seen on the above satellite photo, was approximately 1,422 ha, according to Aruna Technology. This is considerably less than the approximately 2,000 ha reservoir area described in the ESIA. As it shows on the photo, the area surrounding the reservoir is full of green vegetation. Assuming that an additional 500 ha to 600 ha have been flooded after May 15, this indicates that at least 25% of the reservoir may not have been properly cleared of vegetation.

The easily degradable carbon organic material found in recently flooded reservoirs, commonly leads to a higher production of GHG in new reservoirs, compared to older reservoirs. The slow decay of carbon found in tree stems may however cause emission levels to stay high during several decades.[165] To minimize emissions from reservoirs it is essential to carefully remove all organic substances from the areas that are to be inundated, including smaller bushes, peat and compost like materials.[166] Commenting on the magnitude of the GHG emissions, and the additional impact caused by the incomplete clearing of the reservoir, is difficult within the limits of this study. But it is certain, that the likely impacts on CC are of a magnitude that should require attention and further scrutiny, not least in the view of Sinohydro's application for CDM credits.

Photo: Flooded trees in the reservoir of the Kamchay Dam

[165] St. Louis et al. 2000, here in Harkonen 2009, p.16
[166] Kummu, M. et al. 2010

3. Water Supply, Flood Control, Electricity and Infrastructure

3.1 Water Supply

The KWS sources all its water from the Kamchay River through a water intake located just below the TCTS, eight km from Kampot City. The KWS provides public drinking water to parts of Teuk Chhou and Kampot City districts for 1,400 Riel/m^3. This is the same price as before the dam's construction. The water quality is tested thrice: as it comes from the water intake, when it has been through the treatment plant, and as it is distributed. During the construction of the dam, the KWS faced difficulties with the quality of the water sourced from the river, but now these problems have ceased. There have been some rare problems with saltwater reaching the water intake, the latest in 2003, but now with the dam releasing more water during the dry season, this problem is unlikely to happen again.[167] Most villages in the area below the dam are not able to receive water from the KWS, as the distribution network does not reach these more remote areas.

In Snam Prampir, most families obtain their water supply from a private source originating at a nearby mountain. Occasionally, this source runs dry leading some villagers to make use of the river water for their daily household needs.[168] In other villages in the area, open wells and rainwater are the most common water sources. Thvi Khang Choeung, however, has a privately owned water supply, which distributes water from the KWS. The construction of the dam has not led to any improvements in the water supply to the studied villages. An overview of the household water supply in the studied villages is found in Appendix D.

The household survey shows that among the vendors at the TCTS, 41% used the water from the Kamchay River for daily household use before the dam's construction. This decreased to 9% after construction. Among the surveyed bamboo collectors, 9% used the water for "daily household" use before[169], a number increasing to 38% after the dam's construction. This increase is explained by the bamboo collectors having to stay overnight in the forest near the reservoir. The increased time spent at the reservoir is also reflected in their use of the water for drinking. Now, 90% of them drink the water, an increase

[167] KWS 23/8/2012
[168] Restaurant Co-Owner Snam Prampir Village 20/8/2012; Female Vendor from Snam Prampir Village 16/8/2012; Mak Prang Commune 15/8/2012
[169] The surveyed bamboo collectors in O'Touch, Moet Peam and Thvi Khang Choeung villages generally live far from the Kamchay River, and thus they mainly use the river water when they are collecting bamboo at Teuk Chhou, or in the areas around the reservoir.

from 82% before. Downstream from the dam, among the surveyed vendors, the use of the river water for drinking decreased from 36% before the dam's construction, to 14% after. [170]

3.2 Flood Control

The reduction in floods below the dam, including in Kampot City, for the last two years was highlighted by many community members, and most interviewed government officials, as a positive impact from the dam. The Andoung Khmer Commune Chief pointed to the positive effects of the dam blocking floods, Noting that previously they had flooding every year, which could destroy roads and houses, and kill livestock. The floods used to create a lot of problems for local authorities and had severe economic impacts. Now, as the floods seem to have vanished, people have started to plant more fruit trees and improve their houses. He thus sees dual benefits to the local communities, as they avoid the destruction from floods, and may be able to reap future benefits from increased investments in farming and livelihoods.[171]

While a reduction in the number of floods, and their severity, is an expected outcome in the case of the Kamchay Dam, the actual ability of the dam to prevent larger floods is still to be seen. According to the DoWRaM, the local rainwater level in the last two years has not reached a magnitude where Kampot would usually experience floods. Thus it is too early to conclude whether larger floods will be prevented by the dam.[172] Despite the presumed ability of the dam to prevent floods, it was found that there is a fear among community members that the dam can collapse. This fear is, to at least some degree, grounded in lack of knowledge about the dam. It was found that virtually no people in the villages below the dam have been informed about the dam's safety, or its possible environmental and social impacts.[173]

3.3 Changes to Electricity Supply and Price

Out of the three villages in Mak Prang Commune only Snam Prampir has access to electricity supply from the Kampot Electricity Supply (KES). It is, however, only around 100 of the 655 families in the village that have access now, the same

[170] Tourism Survey 14-18/9/2012; NTFP Survey 14-18/9/2012
[171] Andoung Khmer Commune 20/8/2012
[172] DoWRaM Kampot 28/8/2012
[173] Mak Prang Commune 15/8/2012; FGD Thvi Khang Choeung Village 27/8/2012; FGD O'Touch Village 29/8/2012; FGD Snam Prampir Village 22/8/2012; Female Vendor from Snam Prampir Village 16/8/2012; Wood Collecting Family from Snam Prampir Village 31/8/2012; Family living under the grid in Moet Peam Village 30/8/2012

number as prior to the dam's construction.[174] In other words, the increased electricity production in the commune does not yet reach the local communities. More positively, those families connected to the public grid have seen a 16% to 23% and reduction in the price of electricity from a previous 1,100 Riel/kWh in Snam Prampir and 1,200 Riel/kWh in Andoung Khmer Commune prior to the dam's construction, down to 920 Riel/kWh.[175] The public grid is extended by three to four private suppliers to some areas of Moet Peam, where the price is 2,000 Riel/kWh. This expansion took place both before and during dam construction.[176] The continued expansion of the private supply during the dam's construction suggests that these suppliers may not expect the public supply to take over any time soon, as this would otherwise jeopardize their investments. The private supply to Moet Peam started three years ago and around half the village is now connected to this grid. The Village Chief was not aware of any plans to connect the public supply to the village. With a connection fee at $160, and the households having to cover the costs to connect, including the wires, many families find themselves unable to connect to the grid.[177]

In Kampong Kreng the Commune Chief welcomed the increase in cheaper public electricity supply, which replaced private suppliers. They used to charge 2,100 to 2,200 Riel/kWh since they commenced their business in year 2006 or 2007. Now four of the five villages in the commune have access to the grid and the last village, Andoung Chimoeun, is partly connected. The improved public electricity supply in most of the villages in Kampong Kreng Commune took place prior to dam completion and is thus most likely not a direct result of its construction.[178] Andoung Khmer Commune, which is located closer to Kampot City than the two other studied communes, now has public supply in all its five villages.[179] It is however far from all households in the affected communes that are connected to the grid. The survey of bamboo collectors from O'Touch, Thvi Khang Choeung and Moet Peam showed that only 24% of the 78 interviewed households have access to electricity now after the dam's construction. Five years earlier, before the dam's construction, 11.5% had access. Of those who have access, only 53% are satisfied with the price of electricity.[180] Among the surveyed vendors at the TCTS, close to 82% of the households have access to electricity now, compared to 77% five years earlier. Their level of satisfaction with the price, at 37.5%, is

[174] Mak Prang Commune 15/8/2012
[175] Mak Prang Commune 15/8/2012; Andoung Khmer Commune 20/8/2012
[176] Mak Prang Commune 15/8/2012
[177] Moet Peam Village Chief 18/8/2012
[178] Kampong Kreng Commune 16/8/2012
[179] Andoung Khmer Commune 20/8/2012
[180] NTFP Survey 14-18/9/2012

however low. In general, many villagers from Snam Prampir feel that the price should be lower, as the dam is so close to their homes.[181]

In O'Touch Village there was no public electricity prior to 2008 or 2009 where the supply started to reach some households. Till March 2012 the price of the public supply was 1,200 Riel/kWh; afterwards it decreased to the post-Kamchay Dam price of 920 Riel/kWh. While there are now no more private suppliers in the village, the area of O'Touch near Thvi Khang Choeung Village, used to have private 2,000 Riel/kWh supply. It was claimed by the Village Chief that 90% of the O'Touch villagers now have access to the public grid. [182] Field observations, and the survey of bamboo collectors, however, suggest that this percentage may in fact be considerably lower. In neighboring Thvi Khang Choeung, the large majority of villagers now have access to the public grid.[183] The more stable supply, as well as the decrease in price, is believed by the tourism authorities to benefit the tourism sector, as fuel generators are no longer needed to cover for power cuts.[184]

It was not possible to interview the relevant energy authorities in Kampot or in Phnom Penh, and thus acquire exact details regarding the energy distribution. But it was learned that the electricity generated by the Kamchay Dam supplies Phnom Penh, Takeo, Kampot and Sihanouk. Sinohydro delivers the power to a sub-station along National Road 3 from where EDC distributes it. They produce power depending on energy needs, cooperating with EDC to determine how much power to produce at any given time. Currently, most of the power, 40% in the daytime and 80% at nighttime, is delivered to Phnom Penh.[185]

A possible reduction in poverty, due to the decrease in electricity prices, was highlighted by some officials.[186] However, due to the lack of connectivity, the majority of the villagers in Mak Prang Commune see no benefits of the reduced electricity price, but find that the dam mainly benefits people and businesses located far away from the dam. Unlike the local families, they do not face the negative impacts from the dam. Some villagers in the area expressed disappointment with the fact that they remain off-grid, "in the dark", despite major electricity production taking place so close to their villages. Others questioned why the price they have to pay for electricity is higher than the price

[181] Tourism Survey 14-18/9/2012
[182] O'Touch Village Chief 18/8/2012
[183] Thvi Khang Choeung Vice Village Chief 27/8/2012
[184] Kampot Provincial Department of Tourism 28/8/2012
[185] Sinohydro Kampot 29/8/2012; Sinohydro 9/10/2012; Kampot Department of Environment 18/10/2012
[186] Kampot Provincial Department of Tourism 28/8/2012

in areas such as Phnom Penh and Takeo, to which the dam also supplies electricity.[187] While it would be insightful to understand how the price of electricity is determined, and why the price of electricity is lower in Phnom Penh and Takeo, it was not possible to interview those authorities who might be able to answer these questions.[188] Some government officials expect that the electricity price will be reduced further in the future as a measure to reduce poverty, but any such plans have not yet been made publicly available.[189]

3.4 Infrastructure Development

An access road, built between National Road 3 and the dam construction site, constitutes a benefit for villagers in Andoung Chimoeun and Moet Peam, as it crosses through these villages. As a part of this road construction, a bridge was built over Stung Keo River.[190] Easing access to the market, the new road does indeed represent an improvement for the villages in the area. Still, the villagers in Moet Peam are only 60% to 70% satisfied with the road, as it is still a dirt road, which is in poor condition following the heavy transportation during the construction of the dam. The Moet Peam Village Chief used his only chance to talk with the company, at a meeting in July 2011, to suggest to Sinohydro to improve the road. More than a year later, he has still not heard any news from the company regarding his request.[191]

The new road that was built from the TCTS up to the dam is of a good quality. However, as it is shorter than the previous dirt road, which led to the now flooded bamboo and NTFP resources at Teuk Chhou, it does not constitute an overall improvement for the majority of its users. Inquiring whether any more roads to access the major bamboo collection areas are planned, no clear answer was provided by Sinohydro. A company representative did inform, however, that they do not think that there is a need for more roads, as there are already many roads on the mountain.[192] This point of view contrasts with the needs expressed by those community members depending on the forest for their living. According to them, a new road of three to four kilometers length, providing access to the

[187] Restaurant Co-Owner, Snam Prampir Village 20/8/2012
[188] Attempts to interview KES, DIME, EAC and MIME were unsuccessful. KES, DIME and EAC all referred questions to MIME, but the ministry did not resp
ond to requests for an interview.
[189] Kampong Kreng Commune 16/8/2012; Andoung Khmer Commune 20/8/2012; Kampot Department of Environment 18/10/2012
[190] Kampong Kreng Commune 16/8/2012
[191] Moet Peam Village Chief 18/8/2012
[192] Sinohydro Kampot 29/8/2012; Sinohydro 9/10/2012

forest on the left side of the reservoir, will help them to access a network of smaller roads from which they will have improved access to collection areas.[193]

Photos: The new access road connecting the dam site with National Road 3 (left), and the road leading to the reservoir of the Kamchay Dam (right)

In the ESIA, concerns raised by 233 people consulted during the ESIA process (in form of interviews or meetings) were listed. Among the requests to the company was to repair roads and other project infrastructure to be strong and of good quality before handing it over to the RGC. The solution listed in the ESIA, as a reply to this request, was that the company needs to "*have a plan for fixing the infrastructure of the project, and ensure that the infrastructure meets the regulated quality*."[194] The ESIA did not clearly explain if the company would be responsible for fixing the infrastructures of the project, as requested, before handing it over to the RGC. But field observations, nine months after the dam's inauguration, showed that both the access road leading to the dam, from National Road 3, and the smaller roads on the mountainsides near the dam, remained in poor quality.

There are rumors about a possible new road leading from Bokor Mountain to Teuk Chhou.[195] Such a road could represent a welcome boost to tourism, as more people may decide to visit TCTS, if it becomes easier to access. Depending on the route of this road it may, however, contribute further to the loss of the wildlife habitat in the BNP.

In the area near the dam, temporary buildings and other structures used during the construction of the dam have been left partly disassembled. Consequently,

[193] FGD O'Touch Village 29/8/2012
[194] ESIA April 2011, p. 184
[195] Snam Prampir Village Chief 17/8/2012

these spoil the beauty of the area and leave a bad impression for tourists visiting the area.

4. ESIA Mitigation Measures: Promises and Implementation

According to the April 2011 ESIA[196], Sinohydro is responsible for preparing the mitigation measures and the EMP to reduce the negative impacts on the environment. The company and the MoE are responsible for making a plan and forming a working group consisting of members from ministries, the company and local authorities. This working group, which is divided into national and sub-national level, is responsible for the implementation of the EMP and for reporting to the MoE. For a full list of the group members please see Appendix E. The mitigation measures stated in the EMP are to be implemented every three to six months during the dam's construction and operation.[197]

Sinohydro is supposed to work with the MoE to implement the EMP. However, during an interview in October 2012, about ten months after the dam operation commenced, the company expressed uncertainty on how exactly to implement the EMP. From the company's point of view implementation seems to be up to the government: "*Sinohydro will follow the government.*"[198] With the company apparently relying on the RGC to take the lead to implement the EMP, it is imperative that the responsible authorities provide timely guidance to the company. At the same time, the RGC must exercise steady and comprehensive control with the company, to ensure that the required environmental and social safeguards are upheld.

According to the ESIA, the company reserved $17.5 million for environmental protection, comprising of $12 million for the four year construction period, and $5.5 million for implementing an environmental protection plan over 40 years of operation.[199] This allocation makes $137,500 available per year. Some examples of the use of the $12 million reserved for environmental protection during the construction, are the building of a wall to protect against landslides ($1 million); building of a warehouse/reservoir to protect from gasoline/oil running into the river ($500,000); acquisition of land ($3.5 million); cutting and clearing of the forest in the reservoir ($2 million); and the compensation for the loss of forest ($4

[196] The latest available version of the ESIA is dated April 2011. This report has been commonly known to be the latest/final ESIA. However, according to the MoE EIA Department, the ESIA for the Kamchay Hydropower Dam was approved in July 2012. This approved report has not been shared by the MoE and thus it remains unknown to the public whether this report is identical with the report dated April 2011.
[197] ESIA April 2011, p. 328-330
[198] Sinohydro 9/10/2012
[199] ESIA April 2011, p. 330

million).[200] While the cutting and clearing of the reservoir, and construction of walls and a warehouse (to avoid landslides and gasoline running into the river) may be considered as environmental protection, instead of just ordinary construction costs, it is harder to comprehend why land acquisition is included in the costs allocated for environmental protection.

Regarding funding for the EMP implementation Sinohydro "*does not just give them money. They will pay for projects, but does not distribute money.*"[201] This indicates that the company must cooperate closely with the implementing government agencies for the EMP to materialize, a situation that is yet to be seen. Holding the money for EMP implementation, Sinohydro has a great responsibility to ensure timely compliance with the environmental and social safeguards outlined in the ESIA. When inquiring about the amount allocated for the EMP implementation, the company implied that the amount might be allocated depending on the actual need.[202] This raises the question whether the full amounts stated in the ESIA will indeed be used for the intended purposes. The impacts identified in the ESIA, and planned mitigation measures, are presented in the following, where their implementation is also discussed.

4.1 Implementation of the Key Mitigation Measures of the ESIA

4.1.1 Impacts on the Hydrology of the River

It was recognized in the ESIA that the storage of water in the reservoir would impact the natural hydrology and flow of the Kamchay River. The dam would cause changes to the ecological system of the river, and about 2.4 km of the waterway, from the main dam to the first power-house, would lack water. This lack is due to the water being transported via a pipe system from the reservoir to the turbines at the downstream powerhouse. Another projected impact was a possible increase in the level of underground water in the area below the dam. In order to mitigate the impacts on the river's hydrology, the company would implement the following measures[203]:

- Release 4.51 m^3/second of water during both rainy and dry season, as a minimum, to maintain the ecology of the Kamchay River between the main dam and the second re-regulator dam.
- Release between 55 to 160 m^3/second of water from the second dam into the Kamchay River to ensure that the hydrology of the river is maintained.

[200] ESIA April 2011, p. 138-140
[201] Sinohydro 9/10/2012
[202] Sinohydro 9/10/2012
[203] ESIA April 2011, p. 229

- Regularly study and check the level of underground and surface water.
- Build a hydrology station for studying and monitoring the changes to the hydrology of the river.

The locations and methods for conducting regular checks on underground and surface water were not specified. Likewise no details were provided regarding the building of a hydrology station.[204] In relation to the release from the second dam it was, however, and not consistent with the above, also stated that in any case, the minimum release from the second dam will be 0.3 m^3/second during both rainy and dry season.[205] Such little flow could have significant negative impacts downstream for both tourism and the level of saltwater intrusion in the river. Interviews with government agencies indicated that the actual release of water, from the first and from the second dam, is not monitored by any government authorities. In line with the MoE, the DoWRaM was not aware of any current monitoring, but informed that this is controlled by the national level and thus the department is only involved if needed.[206] In addition, Sinohydro has not replied to inquiries regarding the building of the hydrology station mentioned in the ESIA. It has not been possible within the scope of this study to check the actual flow released from the dam, but the absence of government focus on the issue indicates that the monitoring of the flow is neglected.

If adhered to, the release of a minimum flow of 4.5 m^3/second below the large reservoir is likely to help maintain some river-dependent aquatic life and wildlife. Observing the little water in this part of the river though, the change to the natural habitat is obvious, as a large part of the river bed is now dry. While the minimum flow may mitigate some otherwise likely impacts, it is unable to respond to the blocking of fish migration. Further, it does little in terms of ensuring sediment transportation downstream from the dam, as the sediment settles in the reservoir. While the positive and negative effects of the changes in river hydrology are still to be evaluated, it is clear that the hydrology has changed. The DoWRaM highlighted the negative effects of occasionally slowing down or stopping the turbines, as changes in the flow increases the amount of sediment in the water, which is a problem for the tourism at the TCTS.[207]

[204] ESIA April 2011, p. 271
[205] ESIA April 2011, p. 229
[206] DoWRaM Kampot 28/8/2012; MoE, EIA Department 10/10/2012
[207] DoWRaM Kampot 28/8/2012

4.1.2 Loss of Forest and Wildlife Habitat

According to the ESIA, the change of a forested area and wildlife habitat, into a reservoir, would lead to a decrease in both habitat and wildlife. To compensate for this, the company would reserve funds for replanting trees in other areas. The location of this new replanting was not specified. Further, it was stated that the company would install equipment to alert if there is a forest fire. These tasks were to be implemented by Sinohydro in cooperation with the MoE and the BNP.[208]

In October 2012, ten months after the inauguration of the dam, Sinohydro and the involved ministries have not yet implemented the plan to replant forest in another area. According to the MoE, the specific plans and budget for the replanting project have not been assured by the company and the ministry yet. When interviewed, it was however the expectation of the MoE to discuss the replanting of forest with Sinohydro "*a year or more after operation of the dam began.*"[209] However, according to the ESIA the replanting was an activity budgeted for the 4-year construction period. Thus the lack of implementation of this measure represents a delay. According to notes from an inter-ministerial meeting held in April 2012 the replanting of 1,962 ha of forest is to be carried out over the next ten years at an estimated cost of $4 million. It is up to the MoE to discuss with the company how to implement the replanting.[210] Combined with slow progress in discussing and planning the replanting, the suggestion of Sinohydro that the RGC may have difficulties finding a suitable area for reforestation raises concern about the proper implementation of this mitigation measure. Adding to this concern, Sinohydro indicated that they might negotiate the terms of the replanting with the RGC, as it has benefited from the income from the cut trees, while the company did not.[211]

Given the biodiversity found in the reservoir area in previous studies, the loss of habitat is likely to have impacted the wildlife in the area.[212] Further, it is unrealistic that the new forests, which will supposedly be planted in the future, will be able to provide habitat for the wildlife displaced when the reservoir was prepared and filled. While recognizing that it would have been better for the

[208] ESIA April 2011, p. 231-232
[209] MoE, EIA Department 10/10/2012
[210] Kampot Department of Environment 18/10/2012
[211] Sinohydro 9/10/2012
[212] Middleton, C. 2008; NGOF 2007

BNP if the forest had remained, the Department of National Parks appreciated that at least there were no wildlife corridors in the flooded area.[213]

One monitoring activity that seems to be in place, according to the MoE, is patrolling. As part of their patrolling efforts, the rangers of the BNP cooperate with Sinohydro to check for logs or other things in the water of the reservoir every two to three days. The rangers also pay attention to protect the forest around the reservoir, as it protects against landslides. For the whole national park they have 55 rangers who patrol and monitor wildlife and enforces the law. Sinohydro has boats and helps the rangers to patrol the reservoir. However, still illegal activities take place every day in the park, including in the dam area.[214] The DoE in Kampot informed that park rangers, who are now under the management of the DoE, are paid 140,000 Riel per month for full time work. Inconveniently, promised funds from Sinohydro, to support the salaries of five DoE staff, to help the department to protect the forest, has not yet arrived.[215] The presence of pieces of fresh timber on the roads in the area near the reservoir, and rumors of wood-loaded trucks driving out of the area at night suggest that some illegal activities may now be threatening the forest habitat around the reservoir.

Photos: Fresh wood at a road near the Kamchay Dam site (left), and Trucks ready to transport wood and bamboo down from the reservoir site (right)

4.1.3 Impacts on Fisheries

The ESIA recognized that the blocking of the Kamchay River could impact some endangered fish species, hinder fish migration, and be a barrier for fish spawning. In order to mitigate the negative impacts on the fishery resource along the river, Sinohydro should build a reservoir below the dam for fish breeding and spawning, and release fingerlings. It is projected that this will increase the fish

[213] MoE, Department of National Parks 9/10/2012
[214] MoE, Department of National Parks 9/10/2012
[215] Kampot Department of Environment 18/10/2012

stock and help preserve endangered fish.[216] It is unclear exactly how an additional reservoir is believed to be able to prevent the loss of endangered species.

Ten months after operation of the dam commenced, the considerations on the construction of a fish reservoir have not yet materialized. This being said, the MoE confirmed that it is still the plan to implement measures in response to the declining natural fisheries. The following measures are to be implemented:

- Building of a third dam to store water below the dam for fish conservation.
- Release of 100,000 fingerlings per year for ten years.
- Patrolling and managing the fish resources for ten years.

The Fisheries Administration (FiA) and the PFiA should be in charge of the release of fingerlings, while the MoE will play the role as facilitator.[217] All fisheries are under the mandate of the FiA, but it is uncertain who shall monitor fisheries in relation to the EMP. So far, the PFiA has not been involved in any monitoring.[218] Sinohydro confirmed that the construction of a fish reservoir was discussed with the RGC, but the only information they could provide was that it might be done several years later. It seems that there are no clear plans and no decisive decisions have been taken thus far. The release of fingerlings will not be a problem according to the company, if the RGC wishes so: *"It is important to protect the fish, so if the government asks, then the company will do this work."*[219]

4.1.4 Impacts on Water Quality

According to the ESIA, the reservoir would flood an area of 2015.7 ha in order to store more than 718 million m^3 of water to be used to produce 194 MW of electricity.[220] The flooding could affect the water quality, as the flooded forest produce organic and chemical substances. Further, the depth of the reservoir would cause the water to contain little oxygen. These two factors could lead to smelling water of a poorer quality. In order to mitigate the impacts on water quality, Sinohydro should implement the following measures:[221]

- During construction: check and monitor to ensure that the forest and vegetation in the area of the reservoir are cut and cleared before filling the reservoir.
- During operation and maintenance: check and monitor the water quality in the reservoir every three months.

[216] ESIA April 2011, p. 187
[217] MoE, EIA Department 10/10/2012
[218] Kampot Provincial Fisheries Administration 28/8/2012
[219] Sinohydro 9/10/2012
[220] ESIA April 2011, p. 238
[221] ESIA April 2011, p. 230-231

- Install equipment to clean and kill disastrous water insects and water-growing plants in the reservoir.

Contrary to what was required, the reservoir was not properly cut and cleared prior to its filling. There are still lots of logs, flooded trees and vegetation in the reservoir.[222] Community members from the affected villages told how valuable trees were collected and transported out of the area. Other trees and vegetation, including bamboo, were burned using gasoline. Most trees, however, were not completely burned and some bamboo grew up again before it was flooded. When asked what happened to the roots of trees and bushes, one participant at a community debriefing questioned: *"If they cannot even remove the trees, how can they dig and clear the roots?"*[223] Another man informed that workers cleared the area near the dam properly. But further inside the reservoir, they only removed the valuable timber.

Sinohydro was aware that according to the law they had to clear all forest and other vegetation in an area up to 150 meters above sea level (masl).[224] This, however, did not consistently materialize. According to the MoE, an inter-ministerial committee was responsible for clearing and selling trees in the reservoir area. The incomplete clearing of the area for the reservoir was caused by the limited capacity of a company hired by the RGC to do this. Despite the many logs left in the reservoir, its filling was accepted by the RGC when Sinohydro assured that it was safe to close the dam.[225] This deviation from the ESIA represents a significant blow to the environmental safeguards outlined for the project.

As it was correctly predicted in the ESIA, the presence of organic materials in the reservoir has led to reduced water quality in form of colored and smelly water being released from the reservoir.[226] While the extent of the reduced quality is hard to measure, observations at the reservoir showed a very frequent release of captured gasses from the bottom of the reservoir appearing on the surface. In addition to the smell and color of the water, which has kept many locals and visitors from enjoying the water at the TCTS and further downstream, this release of gasses is likely to contribute significantly to CC. This impact, from decomposing organic material in the reservoir, was not mentioned in the ESIA. Monitoring by rangers in the reservoir area is only to protect the forest and they

[222] MoE, Department of National Parks 9/10/2012; Kampot Department of Environment 18/10/2012; Debriefing for Local Communities, Kampot 19/10/2012; Female Fish Seller at Snam Prampir Market 22/8/2012; Wood Collector and Ferry Operator 20/10/2012; Visit at the Kamchay Dam Reservoir 20/10/2012
[223] Debriefing for Local Communities, Kampot 19/10/2012
[224] Sinohydro Kampot 29/8/2012
[225] MoE, Department of National Parks 9/10/2012
[226] Kampot Department of Environment 18/10/2012

are not checking the water quality.[227] According to the MoE, monitoring of the water quality, which should occur every three months during operation, has been done only once by Sinohydro, prior to the dam's operation.[228] The DoWRaM is also not involved in any monitoring and is unaware if any monitoring of underground and surface water is now taking place, or whether it will be monitored in the future.[229] Thus, there has been no monitoring of the water quality during the first ten months of the dam's operation. According to the MoE, the role of its Pollution Control Department is to check and approve the results delivered by Sinohydro.[230] The practice of having the company itself monitor the water quality is questionable since they have a vested interest in reporting good results. Rather an independent body should be considered for this task to ensure neutrality.

Photo: Gas bubbles appear at the reservoir surface, where fuel residues are also seen.

Due to increased boat activity on the reservoir, particularly small ferries with motor, there is increased pollution from fuel spills into the water. Due to the relatively small scale of the traffic, the impact on the water quality may be minimal or insignificant. However, it is an issue that ought to be monitored in the future.

4.1.5 Impacts on Tourism and NTFP Dependent Families

The impacts on bamboo and NTFP collectors, and those families depending on tourism for their livelihoods, were partly included in the ESIA, and some amounts were allocated to compensate these affected groups. $500,000 was allocated for the loss of income from forest products and $500,000 was allocated for the loss of income from tourism. Details, however, of what these amounts would be used for, and how and when compensation measures would be implemented, were absent in the report.[231] Regrettably, up until October 2012 there were no indications that this measure is being implemented.

[227] Kampot Department of Environment 18/10/2012
[228] MoE, EIA Department 10/10/2012
[229] DoWRaM Kampot 28/8/2012
[230] MoE, EIA Department 10/10/2012
[231] ESIA April 2011, p. 147 and p. 338-339

During group discussions at a consultative meeting held in Kampot on March 25, 2011, the issue of socio-economic impacts from the project was discussed. It was found that people who depend on the forest for their livelihoods would lose their occupation of collecting NTFPs. It was recognized that the impacts would be severe during the construction, but the impacts after construction were not mentioned. Participants at the meeting requested for the company to provide training, create jobs for NTFP collectors and to form, and organize, a bamboo and rattan community.[232] As a result of the meeting, Sinohydro agreed to form one or more community groups to plant bamboo and rattan around the Kamchay Mountain.[233] The requested measures do not seem to have been fulfilled. No interviewees informed about training of NTFP collectors or job creation having taken place, and as described earlier, an existing, but inactive, bamboo community in O'Touch has no connection to Sinohydro.

4.2 Status and Future Implementation of EMP and Mitigation Measures

As demonstrated in the previous sections, the implementation of the mitigation measures for the Kamchay Dam project has been inadequate thus far. Table 4 provides an overview of some key mitigation measures and the status of their implementation.

Table 4: Status of EMP Implementation

Selected Mitigation Measures Stated in the EMP[234]	
Mitigation Measure	**Status**
Clear forest and vegetation in the reservoir area	Not properly implemented
Replant trees in other areas to compensate for the loss of forest at the reservoir site	Not yet implemented
Build a reservoir for increasing fish stocks and preserving endangered fish	Not yet implemented
Check the water quality in the reservoir	Not yet implemented
Install equipment in the reservoirs to clean and kill disastrous water insects and plants	Unknown
Build a hydrology station to study and monitor the hydrological changes of the river	Unknown
Install firefighting equipment and systematic equipment alerting if there is a forest fire	Unknown[235]

[232] ESIA April 2011, p. 189
[233] It shall be noted that the Kamchay Mountain is a different mountain than Teuk Chenh mountain near O'Touch and thus the mentioned planting project is unrelated to the existing Bamboo Community in O'Touch village.
[234] ESIA April 2011, p. 331-336
[235] Requests to Sinohydro, for clarification on the building of a hydrology station and installation of equipment in the reservoir to kill insects and plants, as well as installation of firefighting equipment, have been left unanswered.

While the implementation of the EMP has not yet been planned or done,[236] there are plans, according to the DoE, to create a master plan for compensation and replanting. This plan should be developed by MoE, MIME, MAFF and possibly other institutions. It will be up to these ministries to push Sinohydro to implement the plans. Nearly $6 million is reserved to replant, and compensate people for impacts to the natural resources and the associated socio-economic impacts. According to notes from an April 2012 inter-ministerial meeting, the following funds have been reserved:[237]

- Ten years of replanting (around 2,000 ha) = $4 million
- Fisheries: ten years of fingerling release = $450,000
- Construction of a reservoir for conservation of fish resources (a new dam) =$800,000
- Socio-economic fund: For bamboo community and support for fishers = $570,374

In relation to the implementation of the EMP, and other mitigation measures involving the RGC, an apparent lack of a funding mechanism sends a worrying signal regarding the prospects of seeing activities commence. According to the DoE, there is currently no clear guideline for how to provide funds from companies to implement activities for compensating for social and environmental impacts. Consequently, the DoE does not yet have access to the funds described in the reports for the Kamchay Dam project. The DoE would like to see the national level set up guidelines and clarify roles and responsibilities for the sub-national level.[238] At the MoE Department of National Parks, the director was also not aware about what funding mechanism could be used for implementation.[239] The MoE EIA Department, however, was sure that the EMP for the Kamchay Dam would be in place, and implemented, from early 2013.[240]

4.3 Challenges of EMP Implementation

Despite nearly one year having passed since the inauguration of the dam, the implementation of the mitigation measures stated in the ESIA/EMP is thus far inadequate. Most of the listed measures are yet to be implemented, or have been only partially undertaken. Adding to this worrying record is an apparent lack of clear plans for how to address the implementation. Sinohydro and the MoE both point to the other part when confronted with the question of who should take the

[236] Kampot Department of Environment 18/10/2012; MoE, EIA Department 10/10/2012
[237] Kampot Department of Environment 18/10/2012
[238] Kampot Department of Environment 18/10/2012
[239] MoE, Department of National Parks 9/10/2012
[240] MoE, EIA Department 10/10/2012

lead in the process. The MoE appears to see its role as being an auditor of the incoming results from the company's monitoring activities.[241] The uncertainty among the key stakeholders, on how to undertake their duties, undermines the public's interest in limiting the social and environmental impacts of the dam's construction.

Considering the aim of the EIA/ESIA process, to provide sufficient knowledge for enabling well informed decisions to be taken, the extremely late finalization and approval of the ESIA for the Kamchay Dam project is problematic. Having the project assessment approved after commencement, and even finalization, of the dam's construction, effectively reduces the EIA/ESIA process to a near meaningless formality. Without a finalized, approved and published plan for mitigating social and environmental impacts from project construction and operation, implementation of such safeguards easily becomes opaque and coincidental. Lack of clear plans and distribution of responsibilities has jeopardized the chance of transparent and participatory project implementation.

Despite the obvious problem of having the ESIA/EMP approved around five years after the listed mitigation measures were supposed to begin, the MoE used this late approval as an excuse for not yet implementing, or having clear plans made for, the EMP implementation. According to the EIA Department of the MoE, the implementation of the EMP does not have to begin until six months after the approval of the EIA/ESIA, which will be January 2013.[242] From an environmental and local livelihoods' perspective, however, having the dam operate for over a year before commencing the required quarterly or twice-a-year monitoring activities, is far from optimal. Equally important, this late finalization and approval of the ESIA raises the question of which environmental and social precautions were adhered to during the dam's construction.

[241] MoE, EIA Department 10/10/2012; Sinohydro 9/10/2012
[242] MoE, EIA Department 10/10/2012

DISCUSSION

1. Challenges Related to the Kamchay Dam Project

When it comes to the provision of information and inclusion of relevant stakeholders through participation, the record of the Kamchay Dam project is rather bleak. Limited access to information makes it very difficult, if not impossible, for communities, civil society and government departments to monitor the actions taken to mitigate the impacts during and after construction. Further, the secrecy of the project, from the initial discussions and agreements through construction and the first year of operation, makes it virtually impossible for communities and civil society to have a say in the decision-making process, or to even have their voices heard. Consequently, the inclusion of community concerns in project decision-making is effectively hindered and mitigation of adverse effects sporadic.

As often seen in large development projects there are winners and losers, among the local population, when it comes to the benefits and the impacts of projects. In the Kamchay Dam project, the benefits seem to largely bypass the poorer segments of the local communities, who at the same time face most of the negative impacts. In contrast, those with material and financial resources are able to reap the benefits. For example, some well-off families now make a profit from transporting bamboo down from the reservoir by cars, while the poorer bamboo collectors incur increased costs to access, and transport, the bamboo on which they depend. One exemption is the many wood collectors having temporarily improved their income. This positive effect, however, is likely to be short-lived.

1.1 Waiting for Implementation: Expectations to Sinohydro and the RGC

The ESIA presented a budget of $1 million for mitigation measures aimed at community members affected by the loss of access to forest products and by the reduction in visitors at the TCTS. Nevertheless, community members, Sinohydro and government officials are unaware of any initiatives demonstrating the implementation of these promises. However, it is still possible for the RGC and Sinohydro to partly rectify the situation by recognizing that local community members are negatively affected by the dam, and in need of support.

The cooperation between Sinohydro and the RGC seems to mostly confine to the "business-relevant" parts of the government, such as MIME, DIME, EAC and the

provincial government; and less to those related to the environment. At the DoE in Kampot, they feel that the cooperation with the company is not clear. The biggest challenges in their cooperation with the company, so far, relate to coordination between the company and the villagers; protecting the BNP; and improving the communication between the parties.[243] To improve this situation, the DoE finds that it may be beneficial if Sinohydro, the RGC, and the communities could all meet together. Local cooperation is also believed to improve if meetings are arranged between the departments at the provincial level; something that has not yet happened, and for which there is no budget. The consequence of the limited cooperation is that there is currently no clear delegation of responsibilities between agencies.[244] Another key element would be the provision of clear guidelines for fund distribution from the national to the local level. This is exemplified by DoE's plans to create a nursery and support a bamboo community not materializing, because a clear mechanism for funding, delegation of responsibility, and improved coordination is not established.[245]

The Mak Prang Commune Chief wishes to see four families living under the grid in Moet Peam receive compensation from the company and also hopes electricity supply will improve and the price will be cheaper.[246] In Moet Peam, villagers wish that the company would improve the road leading to National Road 3, and that jobs are created.[247] The MoE stressed the importance of Sinohydro proactively protecting the forest in order to preserve the reservoir, on which its business depends. As a part of such protection, the company must consider how to develop the livelihoods of the local people, as this can prevent people from deciding to cut trees in the area.[248] The DoE further called for Sinohydro to fulfill earlier promises of supporting DoE staff to protect the forest. The company apparently agreed with the inter-ministerial committee on the funding, but the DoE in Kampot has yet to see any implementation of the agreement.[249]

It is imperative that the RGC and Sinohydro learn from the shortcomings of the Kamchay Dam project implementation in order to ensure that future hydropower projects include timely consultations and follow legal procedures, especially the application of strong and verifiable safeguards. All relevant stakeholders should be included in the consultation processes to avoid situations where national development projects negatively affect the livelihoods of local community

[243] Kampot Department of Environment 18/10/2012
[244] Kampot Department of Environment 18/10/2012
[245] Kampot Department of Environment 18/10/2012
[246] Mak Prang Commune 15/8/2012
[247] Moet Peam Village Chief 18/8/2012
[248] MoE, Department of National Parks 9/10/2012
[249] Kampot Department of Environment 18/10/2012

members. Solid mechanisms to reduce the impacts on livelihoods from loss of income should be an integrated part of large-scale development projects, such as the $280 million Kamchay Dam.

In order to improve the legacy of this first large-scale hydropower project in Cambodia, and to limit the negative livelihood impacts experienced locally, the RGC needs to make Sinohydro keep its promises. One appropriate action would be for the RGC to facilitate village level consultations in the affected communes, as soon as possible, to understand which mitigation measures will benefit local livelihoods the most. The information and recommendations resulting from this report should comprise a reasonable starting point for such a constructive and long-awaited exercise.

1.2 The Secrecy of the ESIA Process

Throughout this research, gaining insight in the ESIA process proved very difficult and time-consuming. It took seven visits to the EIA Department of the MoE before it became clear that the Final ESIA report for the Kamchay Hydropower Dam, as approved on July 6, 2012, would not be made available for this study. Despite following the demanded process, which is to request the report via a formal letter addressed to the senior minister of environment, it proved impossible to obtain a copy of the ESIA report. During the efforts to obtain access to the report it was learned that the ESIA is considered the "intellectual property" of the company, and thus it is considered a document that the MoE needs to protect. It was made clear by the EIA Department that the ESIA cannot be shared with the general public. This contrasts with Article 1 in the EIA Sub-Decree, which states that one of the main objectives is to: "*Encourage public participation in the implementation of [the] EIA process and take into account of their conceptual input and suggestion for re-consideration prior to the implementation of any project.*"[250]

From consultations with the EIA Department, the overall impression is that the RGC gives higher priority to protecting investors than to attaining a high level of public participation and social and environmental safeguarding. Thus it seems that immediate macroeconomic development is more important to the RGC than social considerations and pro-poor inclusive growth.[251] Though effectively being kept from public scrutiny, the EIA Department claims that the ESIA is widely

[250] Sub-Decree on Environmental Impact Assessment Process 1999, Article 1
[251] MoE, EIA Department 10/10-2012; Consultations with the MoE, EIA Department on 11/10/2012, 22/10/2012, 23/10/2012, 30/10/2012 and 5/11/2012

distributed to ministries and other relevant authorities.[252] However, when interviewed on October 18, 2012, about three and a half months after the ESIA's approval, the DoE in Kampot was not aware of the existence of this final version of the ESIA. The DoE is in possession of the IESIA from 2006 and the ESIA from April 2011, which it considers the final version.[253]

The fact that the dam's construction commenced four to five years prior to the approval of the ESIA was partly defended by the MoE by referring to earlier studies conducted about the dam's potential.[254] Such an excuse for circumventing the legal framework and guidelines for the EIA process is disappointing and gives the impression that the RGC does not take its statutory obligations towards the environment seriously.

1.3 Participation and Information

Participation of Communities and Civil Society

Throughout the project construction, and up to the time of this study, the communities affected by the impacts have received virtually no information about the dam and its impacts. Consequently, local villagers possess a low level of knowledge about the dam and how it works, including its safety. Further, the lack of information and participation has led to a situation where the villagers do not know who to address regarding the concerns and questions they have.

Meetings about the dam's construction have been reserved mainly for government stakeholders, and even the information flow to commune and village authorities has been very limited. Public information meetings, explaining about the dam, its impacts, and the mitigation measures to be applied by the company and the RGC, have been absent in the affected communities.[255] According to the household survey of 100 families in O'Touch, Thvi Khang Choeung, Moet Peam and Snam Prampir, more than 95% of the respondents have never been invited for any meeting about the dam.[256]

The RGC and Sinohydro do not seem to welcome the involvement of local communities and civil society in the ESIA process and in addressing the challenges related to the dam's construction. The local NGO, LICADHO

[252] MoE, EIA Department 10/10-2012
[253] Kampot Department of Environment 18/10-2012
[254] MoE, Department of National Parks 9/10/2012
[255] Mak Prang Commune 15/8/2012; Thvi Khang Choeung Vice Village Chief 27/8/2012; FGD Thvi Khang Choeung Village 27/8/2012; FGD O'Touch Village 29/8/2012; FGD Snam Prampir Village 22/8/2012; Wood Collecting Family from Snam Prampir Village 31/8/2012; Family living under the grid in Moet Peam Village 30/8/2012
[256] 95% of the 22 tourism dependent households surveyed were never invited for any meetings and 97% of the 78 bamboo dependent households were never invited for any meetings.

Kampot, has generally only been involved when it has received complaints from local villagers. When asking the provincial government about contact details for Sinohydro representatives, LICADHO was informed that there was no need to contact the company.[257] In general, the organization finds the level of information about the project to be inadequate: *"it seems that there is no information from the company. Researchers and NGOs seem to have a very difficult time to approach the company to get information."*[258]

During the process of preparing the ESIA the consultancy company SAWAC, who conducted the ESIA for Sinohydro, had meetings and interviews with the participation of 233 persons during 2010. 18 of these were local authorities from Kampot and 215 were "concerned people" living in the area near the dam.[259] 24 family heads of bamboo and rattan depending families in O'Touch, and seven in Thvi Khang Choeung, were interviewed. In Snam Prampir, where the TCTS is located, 32 family heads of tourism-dependent families were interviewed.[260] For all the listed interviews the gender of the interviewees is unspecified and it is therefore uncertain whether the information obtained for the ESIA reflects the viewpoints of both women and men.

Participation of Authorities

While community members received very little information and very few were invited to participate in meetings, give comment, or raise questions related to the dam project, authorities from local to national level had some opportunities to participate or at least become informed. For example, the Mak Prang Commune Chief remembered four to five meetings being held, three of them with participation of SAWAC, and one or two government meetings related to compensation.[261] However, the local authorities in the affected communities did not receive much information regarding the mitigation measures. Whereas there may be an agreement between the RGC and the company, the local authorities were not involved in this discussion, according to the Mak Prang Commune Chief. In Andoung Khmer Commune, the location of the two bamboo-dependent villages O'Touch and Thvi Khang Choeung, the longstanding Commune Chief never received information from or communicated with Sinohydro. Likewise, the Vice Village Chief in Thvi Khang Choeung never heard of any information

[257] LICADHO Kampot 23/8/2012
[258] LICADHO Kampot 23/8/2012
[259] ESIA April 2011, p. 149
[260] ESIA April 2011, p. 149-151
[261] Mak Prang Commune 15/8/2012

meetings held by the company, or the RGC, to explain to people about the dam project. No public meetings were held to inform villagers about the dam.[262]

According to the ESIA, a consultative meeting, led by SAWAC/Sinohydro on March 25, 2011 in Kampot, aimed to provide local authorities, concerned institutions and local communities a chance to voice their concerns. However, out of the 39 participants only two were from civil society organizations (The Rivers Coalition in Cambodia and ADHOC) and none were community members. The large majority of participants were authorities from the provincial and village levels.[263] Such a participant list illustrates the gap between the RGC's and the civil society's perception of the concept of participation. It would serve the RGC well to open up and include affected communities in the participatory processes.

1.4 The Consequence of Lack of Information and Participation

The lack of information and participation causes local community members to feel uncertain about their future livelihood opportunities, and makes them unable to prepare for the changes in time. Worries about a possible collapse of the dam would expectedly be strongly reduced if people were informed about how the dam functions and its safety mechanisms. Several rumors have circulated in the communities and at the TCTS. Many people heard, before the dam's completion, that people in the area would receive free electricity from the dam. Such a persistent false rumor could possibly have been stopped early on if people were able to access information about the project. For some families impacted by the construction of the transmission line, the process of their compensation cases is very slow, and at times not transparent. This situation may, at least partly, result from the lack of information and grievance mechanisms.

Most importantly, when no measures are in place to ensure exchange of communication, the concerns of community members are not easily heard by the company or the RGC. When lacking knowledge of the concerns of the communities, Sinohydro and the RGC are in an unfavorable position to respond to the needs of the affected communities. A female vendor from Snam Prampir, who is generally satisfied with the dam due to the reduction in floods, expressed the significant effect of the communities being left in the dark regarding the dam

[262] Mak Prang Commune 15/8/2012; Andoung Khmer Commune 20/8/2012; Thvi Khang Choeung Vice Village Chief 27/8/2012
[263] ESIA April 2011, Annex 6 List of Participants

and its safety: "*The cheaper price of electricity is good, but it cannot be compared to if the dam breaks, because we could all be killed by the dam.*"[264]

From the interviews it is clear that the local communities, including local authorities, are not aware about how Sinohydro manages the water release from the dam. This creates an uncertainty for villagers regarding whether there will be water to attract the tourists, and whether they can expect that dry season releases from the dam will secure freshwater in the river, further downstream than before.

1.5 The Impacts on Bamboo Collectors

Some government officials paint a distorted positive picture of the impacts from the dam's construction. For example, they describe how the new road makes it easier for people to collect bamboo. However, they do not consider or mention the extra time and efforts required to climb the hillsides or to cross the reservoir. Some even suggested that life is easier now for people because they can float the bamboo in the water in the reservoir. But they fail to mention the extra time needed to float the bamboo or the fact that the collectors still have to transport the bamboo all the way from the reservoir back to their villages.[265] In fact, people used to be able to collect bamboo and other NTFPs much closer to their home before the dam's construction. Further, the transportation time was generally shorter and the work was less arduous. The perception of Sinohydro is that the overall benefit for the country outweighs the "*small impacts*", experienced by for example the NTFP collectors.[266] This overall benefit, however, does not justify the neglect of those communities affected. Assuming, that those claiming that life is now easier for bamboo collectors do not deliberately ignore the challenges of these affected people, but simply lack knowledge of the situation, then increased participation of the local population will do much to inform the RGC and Sinohydro.

[264] Female Vendor, Snam Prampir Village 16/8/2012
[265] Andoung Khmer Commune 20/8/2012; MoE, Department of National Parks 9/10/2012; O'Touch Village Chief 18/8/2012
[266] Sinohydro Kampot 29/8/2012

CONCLUSION AND RECOMMENDATIONS

Conclusion

The benefits of the Kamchay Hydropower Dam and its electricity generation are largely reaped by populations and industries far from the dam site. However, locally the construction of the dam has caused loss of forest and alteration of a natural river habitat in the southeastern corner of the BNP. The most apparent socio-economic impacts relate to the uncompensated loss of income from the decrease in visitors at the TCTS and from the loss of access to rich bamboo resources at the now flooded reservoir site, an area previously utilized by local communities. Other negative impacts include unsettled compensation cases of at least ten families impacted by the construction of power transmission lines, as well as a steep decrease in family-scale fish catch downstream from the dam. Inadequate removal of wood from the reservoir prior to its filling has brought some temporary benefits to a number of families who have taken up wood collection and selling as a new livelihood strategy.

Due to a sharp drop in visitor numbers, those doing business at the TCTS now earn an average 28% of what they did prior to the dam's construction. At the same time, the average bamboo-collecting family has seen its earnings significantly reduced. Prior to the dam's construction, the income of 47% of the bamboo-collecting families was over 20,000 Riel per day, but this number has dropped to 21%. The income of the large majority (79%) is now 10,000 to 20,000 Riel per day. To the detriment of the affected community members, no significant initiatives are implemented by Sinohydro or the RGC to mitigate the negative impacts on their livelihoods. It was found that women in bamboo and NTFP collecting families are significantly impacted on their collection pattern (from collectors to non-collectors), and that women depending on tourism experience a serious reduction in income and access to money. Further, many women face an increased burden as temporarily single caretakers of families and homes, because the men have to stay overnight in the forest in still increasing numbers.

In several local communities, the majority of households remain without electricity supply. But those households already connected to the public grid have seen the price of electricity decrease with 16% to 23%, down to 920

Riel/kWh. Infrastructure built as part of the construction work, especially roads, does not meet the expectations of the local communities, who expect that the company repair the worn out roads. Temporary structures used during the construction of the dam are left partly disassembled in the area near the dam, spoiling the beauty of the area.

Considering the purpose of the EIA findings, to inform the final decision of whether to approve a project, the rushed approval of the Kamchay Dam, prior to the finalization and approval of the full ESIA, was inappropriate and premature. The RGC has failed to establish sufficient safeguard mechanisms to reduce the impacts of the dam's construction, and thus has not met its own legal framework. Inadequate clearing of trees and other organic materials in the reservoir indicates that unnecessarily high GHG emissions may continue for several decades and contribute to climate change. If Sinohydro and the RGC had adhered to the EMP measures this situation would not have arisen. Concurrently, reduced earnings and decreased livelihoods of hundreds of families in the affected communities, including disturbing irregularities or delays in compensation cases, is in conflict with the RGC's purported goal of inclusive pro-poor growth.

A common misperception among authorities, as well as Sinohydro, is that local livelihoods have improved due to the dam's construction. A common view is that bamboo collectors now have better access to the resource they depend on for their livelihoods. This perception, however, is in stark contrast to the experiences of people making a living from bamboo and other NTFPs. They unanimously have stated that they face considerably more difficulties to find and collect bamboo and other NTFPs after the dam's construction. The project does not live up to the social and environmental standards that one would expect from one of the world's leading hydropower developers. Severe shortcomings, namely adverse impacts upon local livelihoods and a pervasive lack of participation, characterize the development of the Kamchay Dam. Communities suffering from these impacts have received little support from local authorities, who seem to be dominated by their superiors, or Sinohydro, who has done little to rectify the situation.

Despite an expressed focus on agriculture in the ESIA, no initiatives to develop irrigation are conducted so far. An expected increase in dry season freshwater availability in the river downstream from the dam may, however, help to increase agricultural production from fruit trees. In addition, an expected reduction in floods and their severity will enable growth of trees in new areas. Less encouraging for agricultural production is the reduced distribution of

nutrients from the sediment that floods used to bring to some rice fields below the dam. The absence of any serious floods in the last couple of years is a commonly hailed benefit from the dam. It is however still too early to write off the possibility of floods, as the amounts of rain in the area in the last two years have been less than those causing the floods in previous years.

If an increased and stable dry season flow is maintained by the dam operator, the overall impression is that there will be some limited benefits to agricultural production following the dam's construction. Required measurements of the hydrological changes, and the water quality, of the river, however seem to be ignored. This situation limits the possibility to take advantage of positive changes to the water regime, and to respond to negative changes that arise.

Deteriorating water quality and lack of water were the main reasons for the sharp drop in the number of visitors to the TCTS during the dam's construction (from 277,977 in 2006 to 65,232 in 2011). Families are still losing income from the decrease in visitors more than nine months after the dam has begun operating. Sinohydro and the RGC could have lessened the negative impacts on local communities by implementing the mitigation measures stated in the ESIA/EMP. They could have rebuilt the suspension bridge at the TCTS, which collapsed in 2009 during the dam's construction, and could have constructed a three to four kilometer road which would improve access to remaining bamboo forest areas. No such measures have been initiated yet.

The lack of execution of the EMP has left the communities in the dark and leaves little hope for the future cooperation between Sinohydro and the RGC to provide sufficient safeguards to avoid adverse effects on the livelihoods of impacted communities. Sinohydro and the RGC have also failed to perform proper monitoring of changes to water quality and hydrology, salinity levels and fisheries. This makes it difficult to apply timely mitigation measures to limit the impacts of these changes. The inadequate implementation of the EMP further reduces the opportunity to acquire valuable best practice lessons from the Kamchay Dam project. Rather the project exemplifies some of the pitfalls that developers and the RGC should heed for future hydropower projects.

The implementation process of the project reveals that there is an imminent need to bridge the gap between the legally required measures and the reality of hydropower project implementation. This situation calls for a review of this type of projects in the country. A first step would be for the RGC to ensure thorough follow up on EMPs and other promised mitigation measures stated in the

EIA/ESIA reports of hydropower projects being planned or implemented. Given the extent of such efforts, the RGC could benefit from publishing assessment reports and inviting academia, civil society and other professionals to help assess the impacts and recommend the best ways to minimize the adverse effects of such projects.

To improve the reputation of the first large-scale hydropower project in Cambodia, and to limit the negative impacts currently experienced by local community members, immediate action needs to be taken. One appropriate action would be for the RGC to facilitate village level consultations in the affected communes, as soon as possible, to understand which mitigation measures will benefit local livelihoods the most.

Sinohydro's limited focus on the implementation of planned mitigation measures indicates that environmental and social safeguards are a low priority for the company. Consequently, the current situation calls for the RGC to intensify its enforcement. This being said, Sinohydro should fulfill its responsibility and ensure that the inadequate implementation of the social and environmental safeguards of the Kamchay Dam project up till now is rectified in the coming months and years.

Given the many large hydropower development projects planned and already under construction in Cambodia, it is important that the RGC raises the bar and commits to actively apply its EIA framework to these projects. Its poor record of low participation and lack of accountability must be improved. Otherwise, affected communities may again be neglected in future projects, and end up worse off, as a result of Cambodia's development.

Recommendations

To avoid repeating other countries' past mistakes, such as basing decisions of hydropower development on insufficient levels of knowledge, existing hydropower projects should be carefully studied and considered before deciding on new projects. When planning and developing hydropower it is strongly recommended to study the recommendations made by the World Commission on Dams (WCD) in year 2000, and to align the projects accordingly. The WCD recommendations are based on comprehensive worldwide studies comprising a thorough review of the positive and negative effects of damming up rivers. In addition to the WCD recommendations, and based on the findings of this study, a number of more specific recommendations are suggested. First, general

recommendations for hydropower development in Cambodia are presented, then specific recommendations for the Kamchay Hydropower Dam project.

❖ Recommendations for Hydropower Development in Cambodia

Recommendations to the Royal Government of Cambodia

Considering the need to strengthen the institutional framework for the handling of the EIA/ESIA process and the implementation of mitigation measures, it is recommended for the RGC to:

- Review all existing, formal and informal, procedures and regulations concerning hydropower dams in Cambodia. The legal framework for EIAs should be strengthened and measures taken to ensure future compliance, by both project developers and the RGC itself.
- Ensure that the current EIA legal framework is revised to allow sufficient time for all stakeholders to review and comment on EIA/ESIA reports prior to the final decision-making.
- Review the current work load and staffing level of the MoE EIA Department and review all processes of work. Thorough reviews and timely feedback on EIA/ESIA reports are required. Strict monitoring and enforcement of project agreements require a certain number of skilled and available staff. It is recommended that the overall institutional capacity is strengthened, something that may need to include increasing the number of staff members at the department.
- Promote a culture of evaluation and self-reflection to optimize continuous learning from hydropower developments. Appropriate procedures must be developed to ensure this.
- Develop a guideline for hydropower projects, based on the recommendations of the WCD. This would be helpful for the RGC when attempting not to repeat the deficiencies described in this study.
- Improve project monitoring both during construction and operation to ensure that companies follow the EIA/ESIA guidelines and the legislation in general.
- Ensure public access to the existing EIA/ESIA reports immediately in order to allow the EIA system to serve its original purpose. Impartial analysis of the potential environmental and social impacts of development projects is in the long-term interest of Cambodia.

- Ensure that environmental and social concerns, including necessary mitigation measures, are put at the forefront in future EIA/ESIA processes; so that no persons are left worse off after the implementation of a development project.
- Prepare legislation that ensures the sharing of benefits with affected communities.
- Local communities should be allowed and encouraged to participate actively in the assessment studies forming the basis for the EIA/ESIA reports. This is necessary to understand local concerns and opinions, and to obtain informed consent from these key stakeholders. This may require more time than currently allocated.
- When assessing hydropower projects, social and environmental aspects should be given the same emphasis as technical, macroeconomic and financial factors.
- Adequate social and environmental measures must be planned, and the responsibilities of the company and each involved government agency must be clearly defined.
- Project approvals must be based on sound and thorough assessments which take into account long-term impacts. This can only happen if competent authorities and other professionals, namely academia and civil society, are allowed early access to and the opportunity to give comments on all project assessments.
- EIAs/ESIAs, including clearly defined and agreed mitigation measures, should be made available to the public in a timely manner and should follow the 1999 EIA Sub-Decree and the 2009 guideline for EIA report writing. The reports should be prepared in both Khmer and English language.
- The completion and approval of the full EIA/ESIA should take place prior to project approval.

In addition to the above EIA/ESIA related recommendations, it is further recommended for the Royal Government of Cambodia to:

- Explore new ways of including local communities in the participatory processes during impact studies. Results of assessments must be presented in ways suitable to the local situation, and take into consideration factors such as illiteracy and low education levels.

- Facilitate the establishing of information centers in affected communities, as a place where people can learn about a given project and it's positive and negative effects, and raise any concerns they have.
- Increase the focus on the impacts from reservoirs on climate change in order to obtain an overview of the magnitude of this negative impact prior to projects' approvals.
- In order to enhance the potential benefit of future hydropower dams on the agricultural sector, agreements between relevant authorities and companies on reservoir water use and management should be made early in the development process. This is a necessary step to ensure the incorporation of agricultural purposes into otherwise energy-focused hydropower projects.

Recommendations to Civil Society Organizations

In a context of rapid development of the hydropower sector in Cambodia, civil society organizations should take the opportunity to act as social and environmental watchdogs. It is recommended that civil society organizations:

- Seek consultations with the MoE and other relevant government institutions in order to improve access to publicly relevant documents such as EIA/ESIA reports. This is needed in order to be able to work constructively on issues related to environmental and social issues.
- Monitor the development of the new EIA law to ensure that it is sufficiently strengthened to improve public participation, and that it helps facilitate increased compliance.
- Request and gather information on hydropower dams in Cambodia and keep reminding the RGC and the private sector of their obligations to facilitate transparent and accountable development projects. The information obtained should be disseminated widely to promote transparency and openness.
- Work with the RGC and project developers to ensure that grievance mechanisms are in place for affected people to seek remedy.
- Act as a watchdog of compliance to agreements and commitments of hydropower dam developers and the RGC.
- Assist aggrieved parties to seek resolutions to outstanding disagreements, in cases where government mechanisms are insufficient. Consider involving Medias in special cases.

❖ Recommendations Regarding the Kamchay Hydropower Dam Project

Recommendations to the Royal Government of Cambodia

The implementation of the EMP and other mitigation measures for the Kamchay Dam project has been constrained by a lack of a clear delegation of responsibilities between Sinohydro and the RGC. This situation needs to be rectified before any significant progress can be expected. It is therefore recommended for the RGC to:

- Arrange a high-level meeting for all responsible ministries and departments. The meeting should clearly define the division of responsibilities between Sinohydro and the RGC, including the roles of the various ministries and departments. It needs to be clearly established who is responsible for the implementation of each of the mitigation measures stated in the ESIA/EMP.
- Publish the finalized division of responsibilities and a clear plan for the implementation of the mitigation measures. This will allow all stakeholders to understand what social and environmental safeguard measures are prepared, and to monitor their implementation.

Very limited information and participation was offered to local communities, local authorities and civil society. This led many local stakeholders to request increased involvement in the development processes, such as compensation cases and other issues related to their livelihoods. The applied method of having the provincial government act as the voice and negotiator of the company was found ineffective and opaque by the affected communities. Thus it is recommended for the RGC to:

- Conduct meetings at village level to update the local communities on the dam, its safety and the expected changes to the water flow and salinity levels of the Kamchay River.
- Provide a forum for settling any issues that affected community members may have. This forum should ensure the participation of both affected villagers and the company, and civil society representatives, if deemed relevant by any of the parties.
- Ensure that Sinohydro implements the promised mitigation measures, including compensation for loss of access to forest products, and from loss of income from the decrease in tourism.
- Inform the communities about the details of the planned measures to mitigate the impacts experienced from loss of access to forest products and

from loss of income from the decrease in tourism, as soon as these plans are finalized.

- Inform the communities about the plans for monitoring the environmental and social impacts of the project in the coming years.
- Monitor the actual flow released from the dam year-round. The responsible authorities should check and ensure that the released water is sufficient to maintain an environmental flow in the river downstream from the dam.
- Invite civil society to follow and monitor the replanting of forest. This would increase the transparency and accountability of the project.

Further, to help improve agricultural production in downstream areas, it is recommended that the company, provincial departments and local authorities initiate a dialogue in order to reach a common understanding on how the release of water from the dam is likely to impact agricultural production downstream from the dam. Once further clarity is established, this could help local farmers to plan for their future.

To understand the actual impacts deriving from the construction of the dam, the whole project should be evaluated regularly, such as every three years. Evaluation of all environmental, social and economic impacts and institutional procedures is crucial to assess the impacts. This knowledge will allow decision-makers to order improvements, and at the same time will provide important input to consider in relation to planned hydropower projects. It will be of key importance to Cambodia that the RGC avoids making the same mistakes as other nations have made in the past.

Recommendations to Sinohydro Corporation Ltd.

As the project developer and operator of the Kamchay Dam, Sinohydro is a key player to ensure sound implementation of the project. This includes implementing proper safeguard mechanisms to limit adverse social and environmental effects. However, the company has transferred the responsibility of dealing directly with the local communities to the provincial government. This practice has proved insufficient to deal with the needs and concerns of the local communities. It is therefore recommended for Sinohydro to:

- Be proactive and request a high-level meeting with the RGC in order to obtain a clear definition of their responsibilities in relation to the execution of the EMP and other mitigation measures. Sinohydro must meet its obligations in a responsible and timely manner.

- Fulfill its responsibility to local communities by engaging directly in dialogues with affected villagers.
- Proactively comply with all relevant regulations and guidelines, and work closely with the RGC to ensure that all Cambodian laws are adhered to.
- Meet internationally recognized standards for hydropower dam development, especially in cases where local legislation may be inferior.
- Take the lead in ensuring that public consultations with affected communities are held.
- Make all information on environmental and social mitigation measures publicly available, and strictly follow all of the measures outlined in the ESIA/EMP.
- Establish a grievance mechanism that allows local communities to raise issues directly with the company.
- Keep inform and provide regular information to communities about the schedule of close and open time of the dam's gate in order to make communities have ability to reduce impacts from water flow.

Caring for its responsibility and reputation, Sinohydro should take an interest in the needs, concerns and livelihoods of those local communities negatively affected by the dam. The company should take immediate steps to understand the situation of the affected villagers and respond to their needs. Specifically it is recommended for the company to:

- Review its collaboration with the RGC in order to ensure that mitigation measures and compensation arrangements provided so far fully cover the needs of the affected communities.
- Specifically examine the unresolved compensation cases of people affected by the construction of transmission lines, and ensure that a solution is found for those villagers left in waiting.
- Inform affected villagers about the amount and timing of the compensation. Payments should be made directly to them.
- Facilitate the building of a new suspension bridge at TCTS.
- Build a road to improve access to bamboo and other NTFP resources.
- Disassemble and remove temporary buildings and other structures used during the construction of the dam. This would enhance the beauty of the landscape surrounding the dam.
- Follow-up on the stated purpose of making the dam a tourist attraction.

Recommendations to Civil Society Organizations

Civil society should monitor the implementation of the EMP and make efforts to ensure that Sinohydro and the RGC implement and enforce the ESIA's safeguard measures. Specifically, it is recommended that civil society organizations:

- Assist local communities in bringing forward their concerns and needs to the RGC and Sinohydro.
- Request Sinohydro and the RGC to implement mitigation measures to compensate for loss of access to forest products and loss from the decrease in tourism at the TCTS. Civil society should help to check that these promises are fulfilled.
- Monitor the implementation of the EMP and other mitigation measures to ensure that Sinohydro and the RGC fulfill their responsibilities.
- Monitor the replanting of forest closely and request transparent implementation of this measure.
- Call for the publishing of the ESIA.

The above recommendations primarily derive from the examination of the Kamchay Hydropower Dam and thus are mainly based on empirical research findings. The more comprehensive WCD recommendations should be reviewed and strongly considered by the RGC and all hydropower developers as a framework that can help ensure sustainable long-term participatory and inclusive hydropower development.

REFERENCES

ESIA April 2011, "*Environmental and Social Impact Assessment (ESIA) Development of Kamchay Hydroelectric Project*", SAWAC Consultants Ltd. Prepared for Sinohydro Corporation Ltd.

ESIA April 2011 English Summary, "*Kamchay Hydroelectric Project, Environmental Impact Assessment (Revised draft, September 2011) Executive Summary.*", English Translation.

Forbes, R. S. et al. 2012, "*Environmental Assessment Law for a Healthy, Secure and Sustainable Canada - A Checklist for Strong Environmental Laws*", February 2012. Authored by: Rachel S. Forbes, Stephen Hazell, Jamie Kneen, Josh Paterson and Dr. John Sinclair.

Frankel, M. 2012, "*Reservoirs May Produce 20 Times More Methane than Normal During Water 'Drawdown'*", Max Frankel, Climate Progress, August 9, 2012.

Globalization Monitor 2010, Letter of Concern over applications for carbon credits for Kamchay and Nam Lik 1 hydropower projects in Cambodia and Laos, Globalization Monitor, Hong Kong, February 16, 2010.

Grimsditch, M. 2012, "*China's Investments in Hydropower in the Mekong Region: The Kamchay Hydropower Dam, Kampot, Cambodia.*", Mark Grimsditch, January 2012.

Harkonen 2009, "*Greenhouse Gas Emissions from Reservoirs: Assessing the Net Emissions.*", Saku Härkönen, Master of Science Thesis, Helsinki University of Technology, Faculty of Engineering and Architecture, Department of Civil and Environmental Engineering, 2009.

Hensengerth, O. 2012, "*Hydropower Planning in Informal Institutional Settings: Chinese Institutions and the Failure of Environmental and Social Regulation in Cambodia.*", August 17, 2012. "Forthcoming in: Waltina Scheumann and Oliver Hensengerth (eds.) (2013), Evolution of Dam Policies: Evidence from the Big Hydropower States (Berlin and Heidelberg: Springer)."

International Rivers January 2008, International Rivers, The Rivers Coalition in Cambodia and The NGO Forum on Cambodia 2008, "*New Report Urges Better*

Energy Planning in Cambodia before Hydropower Dams are Developed.", Press Release - January 28, 2008.

International Rivers February 2008, "*The World Commission on Dams Framework - A Brief Introduction*", February 29, 2008, http://www.internationalrivers.org/resources/the-world-commission-on-dams-framework-a-brief-introduction-2654 - Accessed on December 4, 2012.

International Rivers November 2008, "*Dirty Hydro: Dams and Greenhouse Gas Emissions"*, International Rivers, November 2008.

International Rivers March 2010, Letter of Concern to SGS (Thailand) Limited: "*Re: Submission for carbon credits of the Kamchay Hydroelectric BOT Project*", International Rivers, March 11, 2010.

International Rivers October 2011, "*Wrong Climate for Big Dams - Destroying Rivers will Worsen Climate Crisis*", International Rivers Fact sheet, October 2011.

International Rivers 2011, "*Advancements in the Field of Reservoir Emissions - A Briefing on Recent Research and Guidelines*", Prepared by Dr. Payal Parekh for International Rivers December 2, 2011.

International Rivers January 2012, "*Comments to CF Carbon Fund II Limited Regarding the Kamchay Hydropower Project (Cambodia)"*, International Rivers, January 20, 2012.

International Rivers, "*Climate Change Glossary*", International Rivers, - http://www.internationalrivers.org/resources/climate change-glossary-3588 - Accessed on November 5, 2012

IPS 2008, "*DEVELOPMENT-CAMBODIA: Bowing to Regional Hydropower Demands*", Inter Press Service News Agency, Andrew Nette, Phnom Penh, March 20, 2008.

IRN 2007, "*Frequently Asked Questions: Greenhouse Gas Emissions from Dams*", International Rivers Network (IRN), May 2007.

Kummu, M. et al. 2010, "*Greenhouse gas emissions from reservoirs – case Cambodia*", Matti Kummu, Olli Varis and Timo Räsänen, Water & Development Research Group, Aalto University, Finland, March 31, 2010, Draft.

Middleton, C. 2008, "*Cambodia's Hydropower Development and China's Involvement*", Middleton, C. 2008, International Rivers and The Rivers Coalition in Cambodia.

MIME 2012, National Stakeholder Consultation Workshop, "*ADB TA7764-REG: Ensuring Sustainability of the GMS Regional Power Development*", Ministry of Industry, Mines and Energy, Sunway Hotel, October 2, 2012, Phnom Penh.

MIME July 2009, "*National Power and Hydropower Development Plans in Cambodia*.", Presentation by CHEA Piseth, Hydro-Electricity Department, General Department of Energy, July 16-17, 2009, Phnom Penh, Cambodia.

NGOF/Kavenagh, M. et al. 2012, "*Free, Prior and Informed Consent in the Development Process in Indigenous People Communities of Mondulkiri and Ratanakiri province*", January 2012, Researched by: Dr. Mark Kavenagh, Dom Renfrey & Erin Flynn, Published by: The NGO Forum on Cambodia, Land and Livelihoods Programme, Indigenous Peoples Land Rights Project.

NGOF 2012, "*Mekong River-Dependent Livelihoods - The Sambor Baseline Survey*", April 2012, The NGO Forum on Cambodia.

NGOF 2009, "*Lower Sesan 2 Hydro Project EIA Review*", The NGO Forum on Cambodia, Phnom Penh, Cambodia, August 2009.

NGOF 2007, "*Kamchay Baseline Study - Mak Prang Commune, Kampot District, Kampot Province*", December 2007, The NGO Forum on Cambodia.

Phnom Penh Post, November 29, 2012, Article on the Lower Sesan 2 Hydropower Dam.

Phnom Penh Post, November 4-18, 2005, "*China revives dreams of Kampot mega-dam*".

Royal Government of Cambodia, "*Proclamation on General Guideline for Writing a Preliminary and Final Report on Environmental Impact Assessment.*" 2009.

Royal Government of Cambodia, "*Sub-decree on Environmental Impact Assessment Process 1999*", The Royal Government of Cambodia, No: 72 ANRK.BK, Phnom Penh, August 11, 1999.

Sinohydro 2007, "*Kamchay Hydroelectric BOT Project, Progress Report*", Sinohydro Kamchay Hydroelectric Project Co. Ltd., August 2007.

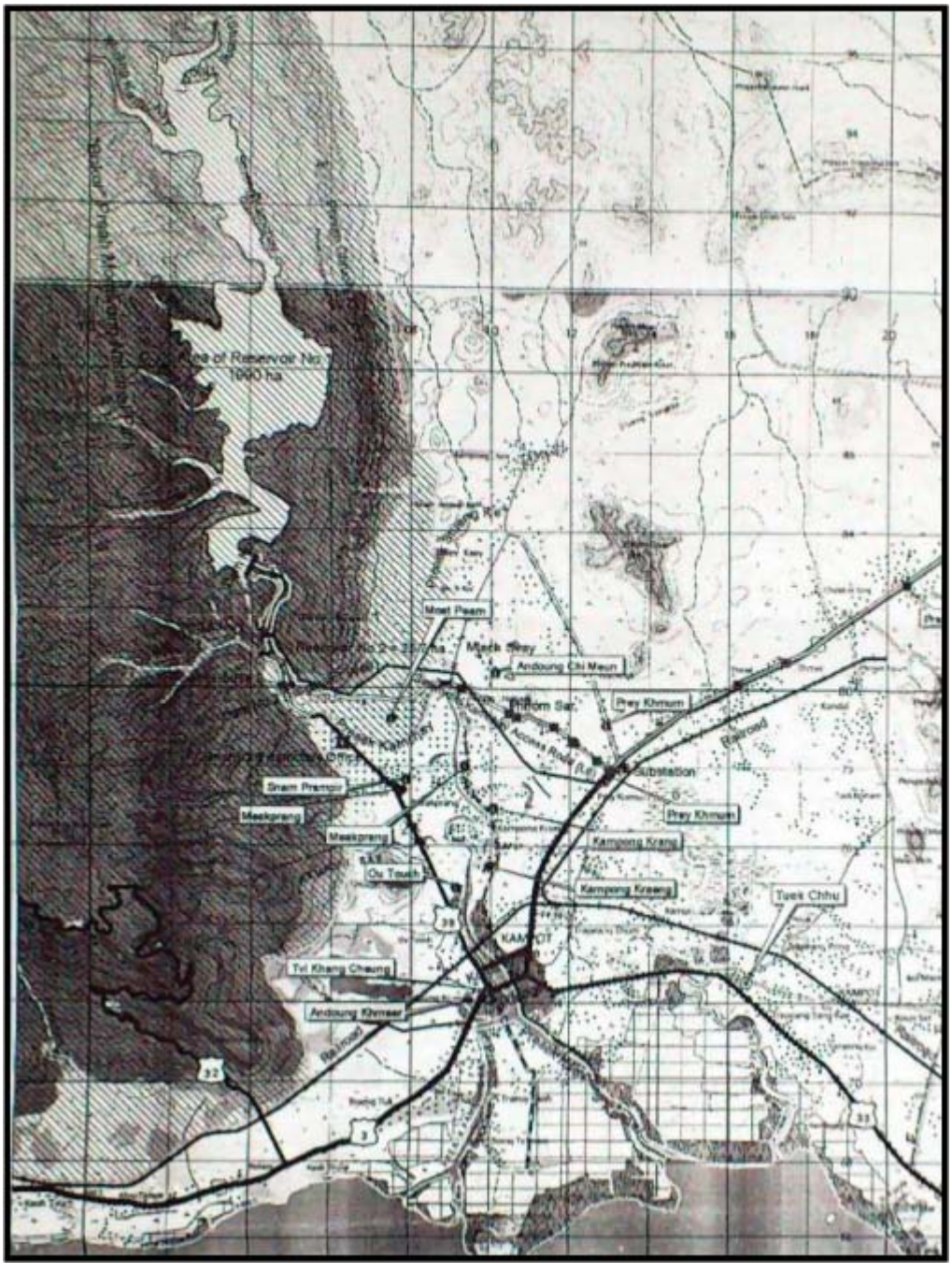
The Cambodia Daily 23/11/2012, "*1 in 20 Firms Carry Out Environment Assessments*", The Cambodia Daily, Volume 53 Issue 50, November 23, 2012.

The Cambodia Daily 24-25/11/2012, "*Hydropower Is the Future, yet Villagers in the Dark*", The Cambodia Daily, Volume 53 Issue 51, November 24-25, 2012.

WCD 2000, "*Dams and Development - A New Framework for Decision-Making*", The Report of the World Commission on Dams, World Commission on Dams, Earthscan Publications, November 2000.

Appendix A: Map of the Reservoir and the Downstream Villages

The reservoir of the Kamchay Dam and its location in relation to Kampot City (ESIA April 2011)



Appendix B: Interviews and Field Visits Conducted

Sinohydro and Ministries:

29/08/2012 Sinohydro Kampot

09/10/2012 Sinohydro Phnom Penh

09/10/2012 MoE Department of National Parks

10/10/2012 MoE Department of EIA

Kampot Authorities and NGOs:

16/08/2012 Kampot Water Supply Intake

23/08/2012 Kampot Water Supply

24/08/2012 Kampot Department of Health

28/08/2012 Kampot Provincial Department of Tourism

28/08/2012 Kampot Provincial Fisheries Administration

28/08/2012 Kampot DoWRaM

18/10/2012 Kampot Department of Environment

23/08/2012 ADHOC Kampot

23/08/2012 LICADHO Kampot

Local Authorities:

15/08/2012 Mak Prang Commune Chief

16/08/2012 Kampong Kreng Commune Chief

17/08/2012 Snam Prampir Village Chief

18/08/2012 O'Touch Village Chief

18/08/2012 Moet Peam Village Chief

20/08/2012 Andoung Khmer Commune Chief

27/08/2012 Thvi Khang Choeung Vice Village Chief

Community Stakeholders:

16/08/2012 Interview with a female mobile vendor in Snam Prampir Village

16/08/2012 Talk with a male drink shop owner in Snam Prampir Village.

16/08/2012 Talk with a group of wood collectors from Phum Krang

16/08/2012 Interview with a durian farmer from Phum Komnob, which is part of Mak Prang Village in Kampong Kreng Commune

20/08/2012 Visit and talks with people at Snam Prampir Market.

20/08/2012 Interview with a fisher at Snam Prampir Village

20/08/2012 Interview with vendors at Teuk Chhou Tourist Site

20/08/2012 Interview with a teacher and co-owner of a restaurant near the river at Teuk Chhou

20/08/2012 Interview with a male bamboo collector in O'Touch Village

21/08/2012 Visit to Mak Prang Commune, Moet Peam Village and interviews, including with families Living under the grid

22/08/2012 Interview with a female fish seller at Snam Prampir Market

22/08/2012 Interview with a bamboo-collecting family in O'Touch Village

22/08/2012 Interview with the chief of the Bamboo Community in O'Touch Village

27/08/2012 Interview with a community representative in O'Touch Village

30/08/2012 Interview with a family living near the grid in Andoung Chimoeun Village

30/08/2012 Interview with a family making bamboo baskets for steaming fish in Moet Peam Village

30/08/2012 Interview with a family living under the grid in Moet Peam Village

30/08/2012 Observation and talks with families living under grid in Moet Peam Village

31/08/2012 Talk with a man from Snam Prampir Village

31/08/2012 Interview with a wood collecting family in Snam Prampir Village

31/08/2012 Interview with a bamboo-collecting family in O'Touch Village (2nd interview)

01/09/2012 Interview with a female mobile vendor selling fried chicken at Teuk Chhou Tourist Site

20/10/2012 Interview with a male bamboo collector near the dam

Focus Group Discussions:

22/08/2012 Focus Group Discussion in Snam Prampir Village about Wild Fruits and Wood

27/08/2012 Focus Group Discussion in Thvi Khang Choeung Village about Bamboo

29/08/2012 Focus Group Discussion in O'Touch Village about NTFP/Bamboo

01/09/2012 Small Focus Group Discussion/interview with shop owners at Teuk Chhou

Other Site Visits in Kampot:

18/08/2012 Visit to the area around the Kamchay Dam

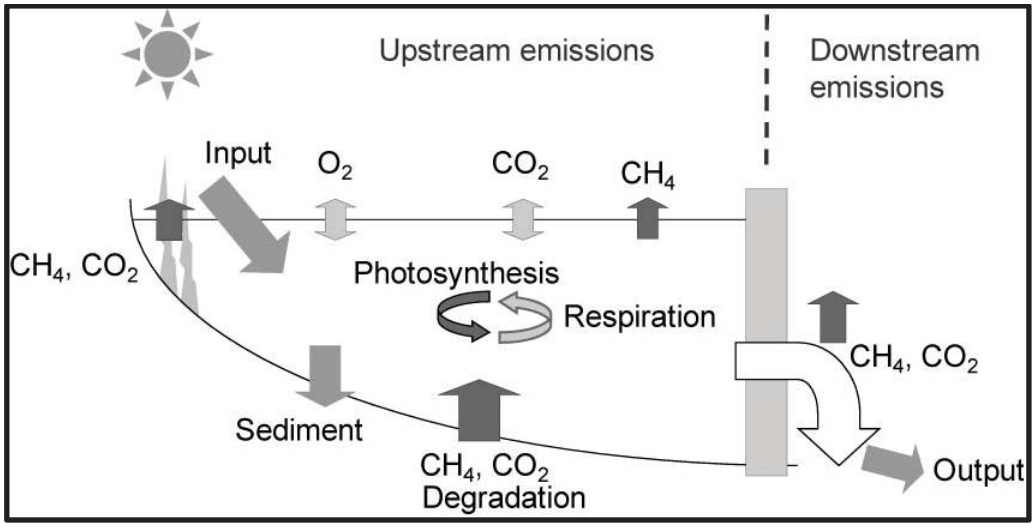
29/08/2012 Visit on the Kamchay Dam

30/08/2012 Visit at Andoung Chimoeun Village

20/10/2012 Visit at the Kamchay Dam reservoir. Talk with wood collectors and a boat man

Appendix C: The process leading to GHG emissions from reservoirs

Carbon and greenhouse gas fluxes in a reservoir



(Figure from Varis et al. in press, here in Harkonen 2009, p. 6)

Appendix D: Sources of Water Supply in the Studied Villages

Village	Main source of water supply	Other water sources	Comments
Snam Prampir	Piped water sourced from a mountain nearby (1,000 Riel/m^3). Others have access to water from the KWS (1,400 Riel/m^3).	Water from the Kamchay River and open wells/reservoirs.	River water was used for drinking by some prior to construction of the dam. But during construction, and now, nearly no one drinks the water. There has been no change in the water supply.
Moet Peam	Open wells/reservoirs and rainwater are commonly used.		There is no piped water supply in the village.
O'Touch	Open wells and rainwater are commonly used. Some people living near the road to Teuk Chhou have access to water from the KWS.	Some people buy water for drinking from households with access to water from the KWS.	There has been no change in the water supply.
Thvi Khang Choeung	Nearly all have access to privately owned water supply that originates from the KWS (2,500 Riel/m^3).	A few households have direct access to water from the KWS. Some may be using deep wells to access groundwater.	
Andoung Chimoeun	Open wells/reservoirs are commonly used.		There is no public supply in the village.

Sources: Thvi Khang Choeung Vice Village Chief 27/8/2012; O'Touch Village Chief 18/8/2012; Andoung Khmer Commune 20/8/2012; Kampong Kreng Commune 16/8/2012; Moet Peam Village Chief 18/8/2012; Mak Prang Commune 15/8/2012

Appendix E: Institutions Overseeing the Implementation of the EMP

The institutions included in the working groups overseeing the implementation of the EMP at national and sub-national level:

National Level	Sub-national Level
▪ Ministry of Environment ▪ Ministry of Industry, Mines and Energy ▪ Ministry of Water Resources and Meteorology ▪ Ministry of Economy and Finance ▪ Ministry of Agriculture, Forestry and Fisheries ▪ Ministry of Land Management, Urban Planning and Construction ▪ Ministry of Tourism ▪ Ministry of Public Work and Transport ▪ Fishery Administration ▪ Forestry Administration ▪ The Company	▪ Department of Environment ▪ Department of Industry, Mines and Energy ▪ Department of Water Resources and Meteorology ▪ Department of Economy and Finance ▪ Department of Agriculture ▪ Department of Land Management, Urban Planning and Construction ▪ Department of Tourism ▪ Department of Public work and Transport ▪ Kampot Fishery Administration ▪ Kampot Forestry Administration ▪ Company ▪ Local Authorities: Village, Commune, District and Provincial officers

The NGO Forum on Cambodia

Address: #9-11 Street 476 Sangkat Toul Tompoung 1,
Khan Chamkar Morn, Phnom Penh City, Cambodia.
P.O Box: 2295 Phnom Penh-3
Tel: (855-23) 214 429
Fax: (855-23) 994 063
E-mail: ngoforum@ngoforum.org.kh
Website: www.ngoforum.org.kh