ការអភិវឌ្ឍថាមពលទាឺអគ្គិសនីនៅកម្ពុជា និងការពាក់ព័ន្ធរបស់ប្រទេសចិន

Cambodia's Hydropower Development and China's Involvement

(សេចក្តីសង្ខេបជាភាសាខ្មែរ)

ខែមករា ឆ្នាំ២០០៨

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Rivers Coalition in Cambodia

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សម្ព័ន្ធរវាងអង្គការសង្គមស៊ីវិលនានាដែលធ្វើការដើម្បីការពារ និងស្តារ ឡើងវិញនូវប្រព័ន្ធអេកូឡូស៊ីទន្លេ និងជីវភាពដែលពឹងផ្អែកទៅលើទន្លេ នៅក្នុងប្រទេសកម្ពុជា

Rivers Coalition in Cambodia

An Alliance of Civil Society Organizations Working to Protect and Restore River Ecosystems and River-based Livelihoods in Cambodia

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Executive Summary

Securing access to reliable, cheap electricity to supply Cambodia's expanding economy is a key challenge faced by the Cambodian Government. Around only 20% of the population presently has access to reliable electricity – mainly in urban centers - and prices are amongst the highest in the world. The comparatively flat topography of Cambodia means that domestic hydropower potential is relatively limited, although the Government is keen to develop the sites that are available. Experience in neighboring countries and globally, however, has demonstrated that large hydropower projects can incur significant environmental and social costs that risk undermining sustainable development. Any decision to move forward with a large hydropower project therefore warrants due consideration from decision-makers, affected communities and the wider public.

Cambodia's political and economic ties with China have grown in recent years and are reflected in China's strong support for Cambodia's hydropower development program. In April 2006, China announced a US$600 million aid package to Cambodia, almost half of which financed the Kamchay Dam that will be Cambodia's first large domestic hydropower project. The dam will be constructed and operated by Sinohydro Corporation, China's largest hydropower firm. A second major hydropower project was approved in 2007 and a further six large dams are known to be presently undergoing feasibility studies, mostly by Chinese companies.

Recognizing the significant changes underway, this research was undertaken to better understand the current policy and plans of the Cambodian government for the electricity sector; map the decision-making process; develop a greater understanding of the key actors involved; outline the extent of Chinese investment in Cambodia's hydropower sector; and determine any social and environmental implications. A fieldtrip to the Kamchay Dam was undertaken to better understand the project's impact at this early stage of development.

The key ministry responsible for setting and administrating government policies, strategies and planning in the power sector is the Ministry of Industry, Mines and Energy (MIME). Current government policy states that domestic hydropower will play an important role in meeting future electricity demand, together with the construction of a national transmission grid linking urban centers and enabling electricity imports from neighboring countries. MIME acts as the primary point of contact for hydropower developers interested in investing in the sector. The Ministry of Water Resources and Meteorology is charged with managing Cambodia's water resources and is responsible for issuing hydropower project licenses, and the Ministry of Environment is responsible for evaluating Environmental Impact Assessments (EIA) for major projects and monitoring implementation. The Electricity Authority of Cambodia functions as an independent regulator and issues licenses to independent power producers.

Whilst Cambodia on paper has a number of strong laws that should safeguard the environment and ensure adequate protection for affected communities, in practice their effectiveness is limited due to inadequate resources and, on occasion, institutional disincentive. The endorsement by senior Cambodian politicians of extensive hydropower development plans has signaled to the government's bureaucracy that these projects should be pushed through.

According to a plan prepared by MIME in 2003 with support from the Mekong River Commission, the total hydropower potential in Cambodia is approximately 10,000 MW, of which 50% is on the Mekong River mainstream. To date, two major hydropower projects – the Kamchay Dam and Stung Atay Dam - have been approved for construction, both by Chinese developers. A further six projects are known to be under study, four by Chinese developers and two by Vietnamese developers (on the Sesan River). A number of these projects have significant environmental and social impacts,threatening some of Cambodia's most important protected areas:

- The Kamchay Dam is located within Bokor National Park and will flood two thousand hectares of protected forest. This area is also an important source of Non-Timber Forest Products to local residents, for many of whom it is an important source of income.
- Although limited public information is available on the Stung Atay Dam, it appears that the dam's reservoir will flood a substantial area of the Central Cardamom Protected Forest.
- The proposed Stung Tatay Dam is located close to the Central Cardamom Protected Forest and its reservoir would likely extend into the protected area. The project would also impact a number of settlements up and downstream of the dam.
- The proposed Stung Cheay Areng Dam is located in a densely populated area close to the Central Cardamom Protected Forest. Its reservoir would flood nine villages with a combined population of 1,500 mainly indigenous people and would extend into the Central Cardamom Protected Forest area, inundating the habitat for 31 endangered fauna species, including the world's most important breeding site for the endangered Siamese Crocodile. Downstream impacts will include loss of riverside and coastal rice paddy, and destruction of productive swamp forest fishery.
- The Sambor Dam would be located on the Mekong River mainstream. Environmental consequences would be severe, including blocking commercially important large fish migrations and destruction of deep pool habitats, which would seriously affect the well-being of those that depend on these resources. The dam also threatens a number of endangered species, including the Irrawaddy dolphin.
- Eight out of ten further dams currently under detailed study by consultants for the Japanese International Cooperation Agency (JICA) for a Cambodia hydropower masterplan are also located within protected areas.

In its decision to support these hydropower projects, the Cambodian government has argued the need to balance conservation objectives with the need for economic development.

China's strong support for Cambodia's domestic hydropower development over the past couple of years is a complex interplay of entrepreneurial initiative on the part of Chinese State Owned Enterprises (SOEs), backing by Chinese financiers including China Exim Bank, and high-level political support.

The Chinese SOEs that are promoting hydropower in Cambodia are of diverse character, ranging from Sinohydro Corporation, China's largest hydropower company, to comparatively small investment-brokering SOEs, such as the China Yunnan Corporation for International Techo-Economic Cooperation, which specializes in brokering contracts for infrastructure projects and then sub-contracting the construction work. Sinohydro Corporation has been reprimanded by the Chinese Government in 2004, 2005 and 2006

over its weak safety and environmental record in China on domestic dam projects. Sinohydro Corporation's agreement to construct the Kamchay Dam despite its location within a national park raises questions over the company's commitment to maintain international environmental and social standards in its international operations. The other Chinese companies active in Cambodia have an unknown or unproven dam development track record.

There is almost no information in the public domain on the financing arrangements for Cambodia's hydropower projects. The China Export-Import Bank, one of China's three policy banks, has been linked to the Kamchay Dam project. The China Development Bank, another of China's policy banks, may be involved in backing the Stung Atay dam. These Policy Banks essentially constitute the official overseas lending arm of the Chinese government. In the case of Kamchay Dam, the US$280 million required to build the dam was provided as part of a US$600 million Chinese aid package to Cambodia in April 2006. Of concern, both institutions have environmental policies that are substantially weaker that the already less-than-admirable standards of Western bilateral donors and Export Credit Agencies that typically sponsor major infrastructure projects. It is likely that the support of Chinese commercial banks has also been sought, which in general have weak or non-existent safeguard standards.

Political support for large hydropower dams has been highly visible at a number of international meetings. For example, an important agreement on Kamchay Dam signed at the second Greater Mekong Subregion summit held in Kunming, Yunnan Province, China, was witnessed by Chinese Premier Wen Jiabao and Cambodia's Prime Minister Hun Sen in July 2005. At the same time, contracts for the projects have been signed behind closed doors and little information is available in the public domain. To date, hydropower development in Cambodia has proceeded in the absence of meaningful public consultation and an overall lack of transparency in the decision-making process.

To meet Cambodia's escalating power demand, the government seems intent on moving forward with a centralized grid system fueled by hydropower. Yet, Cambodia's free-flowing rivers and abundant natural resources are invaluable assets, the health of which are vital to the well-being of Cambodia's rural population. Poorly conceived hydropower development could irreparably damage these resources and undermine Cambodia's sustainable development.

The over-arching recommendation of this report is that Cambodian decision-makers should establish a multi-stakeholder process to examine the recommendations of the World Commission on Dams (WCD) report and to discuss how these recommendations could be adopted in Cambodian law. Derived from the principles of the WCD, other key recommendations include:

- Before proceeding further along the road of extensive hydropower development, MIME should implement a participatory, integrated planning process conducted according to international standards. The assessment would evaluate Cambodia's energy needs and the best options for meeting these needs.
- Options for meeting rural and urban energy needs through decentralized energy solutions and renewable energy resources should be explored by the Cambodian government and fully integrated into Cambodia's national energy plan.
- Where a hydropower project is determined, though a public consultation process, to be the best solution to meet energy and water needs, the Cambodian government and hydropower project developers should commit to ensuring the informed and full

participation of all concerned stakeholders throughout the project's full development cycle.

- Planning to mitigate environmental and social impacts should be treated as a priority by both the project developer and the government. Before a project moves ahead key documents including an Environmental Impact Assessment, Social Impact Assessment, Environmental Management Plan, Resettlement Action Plan and Livelihood Restoration Plan should be prepared and disclosed, and stakeholders should have the opportunity to provide input on its contents. Before a project moves forward there should be mutual agreement amongst stakeholders.
- Chinese companies and their financiers should publicly commit to adopting and implementing international standards relevant to infrastructure development.

សេចក្តីប្រតិបត្តិ

ការធានាឱ្យមានការផ្គត់ផ្គង់ថាមពលអគ្គិសនីថោកដែលអាចជឿជាក់ ដើម្បីទ្រទ្រង់សេដ្ឋកិច្ចកម្ពុជាដែលកំពុងមានកំនើន គឺជាបញ្ហាគន្លឹះ ប្រឈមដោយរដ្ឋាភិបាលប្រទេសកម្ពុជា។ នៅពេលបច្ចុប្បន្ន មានប្រជាជនកម្ពុជាត្រឹម ២០% ប៉ុណ្ណោះ ដែលមានថាមពលពលអគ្គិសនីប្រើប្រាស់ដែលភាគច្រើននៃប្រជាជនទាំងនេះរស់ក្នុងតំបន់ទីប្រជុំជន ហើយអគ្គិសនីស្ថិតក្នុងតំលៃខ្ពស់បំផុតមួយក្នុងពិភពលោក។ ដោយសារទីតាំងភូមិសាស្ត្ររាបស្មើរបស់ប្រទេសកម្ពុជា សក្តានុពលថាមពលវារីអគ្គិសនីនៅក្នុងប្រទេសមានកម្រិត ទោះបីជារដ្ឋាភិបាលមានបំណងក្នុងការអភិវឌ្ឍតំបន់វារីអគ្គិសនីដែលមានស្រាប់ក៏ដោយ។ ទោះជាយ៉ាងនេះ បទពិសោធន៍ពីប្រទេសជិតខាង និងពីពិភពលោកបានបញ្ជាក់ថា គម្រោងថាមពលវារីអគ្គិសនីធំៗ អាចនាំឱ្យមានផលប៉ះពាល់យ៉ាងច្រើនលើបរិស្ថាន និងសង្គម ដែលជាកត្តានាំឱ្យមានផលប៉ះពាល់ដល់ការអភិវឌ្ឍប្រកបដោយនិរន្តរភាព។ ដូច្នេះ រាល់ការសម្រេចចិត្តណាមួយដើម្បីអភិវឌ្ឍគម្រោងថាមពលវារីអគ្គិសនីធំៗ ត្រូវតែមានការពិចារណាយ៉ាងយកចិត្តទុកដាក់ពីអ្នកធ្វើការសម្រេចចិត្ត សហគមន៍ និងសាធារណៈជនទូទៅ ដែលទទួលរងផលប៉ះពាល់ពីថាមពលវារីអគ្គិសនី។

ចំណងសេដ្ឋកិច្ច និងនយោបាយរបស់ប្រទេសកម្ពុជាជាមួយនឹងប្រទេសចិន ត្រូវបានពង្រឹងគួរជាទីកត់សម្គាល់ក្នុងរយៈពេលប៉ុន្មានឆ្នាំថ្មីៗនេះ ហើយជាក់ស្តែងប្រទេសចិនបានជួយគាំទ្រយ៉ាងខ្លាំងក្លាក្នុងកម្មវិធីការអភិវឌ្ឍថាមពលវារីអគ្គិសនីនៅកម្ពុជា។ នៅខែមេសា ឆ្នាំ២០០៦ ប្រទេសចិនបានប្រកាសផ្តល់ជំនួយជាកញ្ចប់ក្នុងទឹកប្រាក់ ៦០០ លានដុល្លាអាមេរិកដល់ប្រទេសកម្ពុជា ហើយទឹកប្រាក់ស្មើរពាក់កណ្តាលត្រូវប្រើប្រាស់សម្រាប់គម្រោងថាមពលវារីអគ្គិសនីទំនប់កំចាយ ដែលនឹងក្លាយជាគម្រោងថាមពលវារីអគ្គិសនីធំជាងគេបង្អស់របស់កម្ពុជា។ ក្រុមហ៊ុន Sinohydro ដែលជាក្រុមហ៊ុនថាមពលវារីអគ្គិសនីរបស់ចិននឹងធ្វើការសាងសង់និងប្រតិបត្តិការទំនប់នេះ។ គម្រោងថាមពលវារីអគ្គិសនីធំទី២ បានទទួលការឯកភាពនៅឆ្នាំ២០០៧ និងគម្រោងធំៗ ៦ ទៀតកំពុងស្ថិតក្នុងដំណាក់កាលនៃការសិក្សាពីលទ្ធភាពសាងសង់វារីអគ្គិសនី ហើយគម្រោងទាំងអស់នេះភាគច្រើនធ្វើឡើងដោយប្រទេសចិន។

ដោយមានការទទួលស្គាល់ពីការប្រែប្រួលសំខាន់ៗ ដែលកំពុងកើតមានឡើងពីការអភិវឌ្ឍថាមពលវារីអគ្គិសនី ការសិក្សាស្រាវជ្រាវនេះបានធ្វើឡើងក្នុងគោលបំណងដើម្បី : ស្វែងយល់ឱ្យកាន់តែប្រសើរឡើងពីផែនការ និងគោលនយោបាយនាពេលបច្ចុប្បន្នរបស់រដ្ឋាភិបាលកម្ពុជាទាក់ទងនឹងវិស័យអគ្គិសនី ពិនិត្យពីដំណើរការនៃការធ្វើសេចក្តីសម្រេច បង្កើនឪកាសយល់ដឹងឱ្យកាន់តែច្រើនពីអ្នកពាក់ព័ន្ធសំខាន់ៗ ឆ្លុះបញ្ចាំងពីវិសាលភាពនៃការវិនិយោគទុនរបស់ប្រទេសចិនក្នុងវិស័យថាមពលវារីអគ្គិសនីរបស់ប្រទេសកម្ពុជា និងធ្វើការកំណត់ពីផលប៉ះពាល់បរិស្ថាន និងសង្គម។ ការចុះសិក្សាដល់ទីកន្លែងនៅទំនប់កំចាយបានធ្វើឱ្យមានការយល់ដឹងកាន់តែប្រសើរឡើងពីផលប៉ះពាល់នៅនឹងកន្លែងនៅដំណាក់កាលដំបូងនៃការអភិវឌ្ឍ។

ក្រសួងសំខាន់ៗដែលទទួលបន្ទុកលើការបង្កើត និងការរៀបចំគោលនយោបាយ យុទ្ធសាស្ត្រ និងរៀបចំផែនការរបស់រដ្ឋាភិបាលលើវិស័យថាមពល គឺក្រសួងឧស្សាហកម្ម រ៉ែ និងថាមពល (MIME)។ គោលនយោបាយរបស់រដ្ឋាភិបាលនៅពេលថ្មីៗនេះបញ្ជាក់ថា ការអភិវឌ្ឍសក្តានុពលថាមពលវារីអគ្គិសនីនៅក្នុងស្រុករបស់កម្ពុជានឹងដើរតួយ៉ាងសំខាន់ក្នុងការឆ្លើយតបទៅនឹងតម្រូវការអគ្គិសនីនៅពេលអនាគត គួបផ្សំជាមួយនឹងការកសាងបណ្តាញបង្គោលអគ្គិសនីតភ្ជាប់ទូទាំងប្រទេសដោយភ្ជាប់ពីទីប្រជុំជន និងជំរុញការនាំចូលអគ្គិសនីពីប្រទេសជិតខាង។ ក្រសួងឧស្សាហកម្ម រ៉ែ និងថាមពល ដើរតួជាអ្នកផ្តើមក្នុងការទាក់ទងអ្នកផលិត

ថាមពលវារីអគ្គិសនីដែលមានចំណាប់អារម្មណ៍ក្នុងការសិក្សាពីលទ្ធភាពនៃសក្តានុពលភាពរបស់គម្រោង និងការសាងសង់ដោយមានការយល់ព្រមពីរដ្ឋាភិបាល។ ក្រៅពីនេះ ក្រសួងធនធានទឹក និងឧតុនិយមទទួលបន្ទុកក្នុងការគ្រប់គ្រងធនធានទឹកនៅកម្ពុជាមានតួនាទីក្នុងការចេញលិខិតអនុញ្ញាតគម្រោងថាមពលអគ្គិសនី ហើយក្រសួងបរិស្ថានមានតួនាទីវាយតម្លៃផលប៉ះពាល់បរិស្ថាន (EIA) លើគម្រោងធំៗ និងត្រួតពិនិត្យការអនុវត្ត។ អាជ្ញាធរអគ្គិសនីកម្ពុជា មានតួនាទីជាអ្នកបង្កើតច្បាប់ឯករាជ្យ និងចេញលិខិតអនុញ្ញាតដល់អ្នកផលិតថាមពលដោយឯករាជ្យ។

ទោះបីប្រទេសកម្ពុជាមានច្បាប់ដ៏រឹងមាំនៅលើក្រដាសក្នុងការការពារបរិស្ថាន និងធានាឱ្យមានការការពារគ្រប់គ្រាន់ដល់សហគមន៍ដែលទទួលរងផលប៉ះពាល់ក៏ដោយ តែការអនុវត្តជាក់ស្តែងវិញនៅមានកម្រិត ដោយសារកង្វះខាតធនធាន និងពេលខ្លះកង្វះខាតការលើកទឹកចិត្តពីស្ថាប័ន។ ការទទួលការយល់ព្រមពីអ្នកនយោបាយជាន់ខ្ពស់របស់កម្ពុជាស្តីពីផែនការអភិវឌ្ឍថាមពលវារីអគ្គិសនី ឱ្យទូលំទូលាយ ត្រូវមានទាក់ទងជាមួយការិយាល័យនិយមរបស់រដ្ឋាភិបាលដែលគម្រោងនេះគួរឆ្លងកាត់។

យោងតាមផែនការរៀបចំឡើងដោយក្រសួងឧស្សាហកម្ម រ៉ែ និងថាមពល នៅឆ្នាំ២០០៣ ដោយមានការគាំទ្រពីគណៈកម្មកាទន្លេមេគង្គ សក្តានុពលថាមពលវារីអគ្គិសនីសរុបរបស់កម្ពុជា មានប្រមាណ ១០.០០០ មេហ្គាវ៉ាត់ ដែល៥% ទាញយកចេញពីខ្សែទឹកទន្លេមេគង្គ។ គិតមកដល់បច្ចុប្បន្ន គម្រោងថាមពលវារីអគ្គិសនីធំៗពីរ ទំនប់កំចាយ និងទំនប់ស្ទឹងអាតៃទទួលបានការឯកភាពយល់ព្រមឱ្យសាងសង់ ដែលសាងសង់ដោយអ្នកអភិវឌ្ឍថាមពលជនជាតិចិន។ គម្រោង ៦ទៀតកំពុងស្ថិតក្នុងដំណាក់កាលសិក្សាដែលគម្រោងចំនួន៤ អនុវត្តដោយអ្នកផលិតថាមពលប្រទេសចិន និង២ទៀតដោយប្រទេសវៀតណាម (១ នៅទន្លេសេសាន)។ គម្រោងខាងលើទាំងអស់នេះ មានផលប៉ះពាល់ដល់បរិស្ថាន និងសង្គមដូចជា :

- ទំនប់កំចាយ មានទីតាំងនៅឧទ្យានជាតិបូកគោ ហើយអាចបណ្តាលឱ្យព្រៃការពារចំនួន២000ហិកតាលិចលង់។ តំបន់ទំនប់កំចាយក៏ជាតំបន់មានអនុផលព្រៃឈើដ៏សំខាន់សម្រាប់ប្រជាជនរស់នៅតំបន់នោះ ដែលភាគច្រើននៃប្រជាជនទាំងនេះចាត់ទុកធនធានទាំងនោះជាប្រភពចំណូលដ៏សំខាន់របស់គេ។
- ទោះជាព័តិមានជាសាធារណៈពីទំនប់ស្ទឹងតាតៃមិនមានច្រើនក៏ដោយ ក៏មានការលេចឮថាអាងផ្ទុកទឹករបស់ទំនប់អាតៃនេះនឹងបង្កឱ្យលិចលង់នៅតំបន់ការពារព្រៃឈើភ្នំក្រវ៉ាញភាគកណ្តាល។
- គម្រោងទំនប់ស្ទឹងតាតៃ មានទីតាំងស្ថិតជាប់នឹងតំបន់ការពារព្រៃឈើភ្នំក្រវ៉ាញភាគកណ្តាល ហើយអាងស្តុកទឹកនៅទំនប់តាតៃទំនងនឹងអាចលាតត្រដាងដល់តំបន់ការពារថែមទៀត។ គម្រោងទំនប់ស្ទឹងតាតៃ នឹងបង្កឱ្យមានផលប៉ះពាល់ដល់អ្នកតាំងទីលំនៅមួយចំនួននៅផ្នែកខាងលើ និងផ្នែកខាងក្រោមរបស់ស្ទឹង។
- គម្រោងទំនប់ស្ទឹងឆាយអារ៉ែង មានទីតាំងនៅតំបន់ដែលមានដងស៊ុតេប្រជាជនខ្ពស់ ស្ថិតនៅក្បែរតំបន់ការពារព្រៃឈើភ្នំក្រវ៉ាញភាគកណ្តាល។ អាងផ្ទុកទឹករបស់ទំនប់នេះ នឹងធ្វើឱ្យលិចលង់ដល់ភូមិចំនួន៩ ដែលមានប្រជាជនសរុប១៥00នាក់ ដែលភាគច្រើនជាជនជាតិដើមភាគតិច និងផ្លៃទឹកអាចរីកចូលដល់តំបន់ការពារព្រៃឈើភ្នំក្រវ៉ាញភាគកណ្តាល និងធ្វើឱ្យលិចជម្រកសត្វ៣១ប្រភេទដែលជាប្រភេទសត្វព្រៃជិតផុតពូជ រួមទាំងតំបន់បង្កាត់ពូជសំខាន់ៗបំផុតនៅលើសកលលោករបស់ពពួកក្រពើភ្នំដែលជិតផុតពូជទៀតផង។ ផលប៉ះពាល់នៅផ្នែខាងក្រោមទំនប់រួមមាន ការបាត់បង់ដីស្រែនៅតាមមាត់ស្ទឹង និងមាត់សមុទ្រ ការបំផ្លាញនូវធនធានមច្ឆជាតិ និងព្រៃលិចទឹកដ៏សម្បូរណ៌។

- គម្រោងទំនប់សំបួរ នឹងត្រូវសាងសង់នៅលើដងទន្លេមេគង្គ។ ផលប៉ះពាល់ធ្ងន់ធ្ងរដល់បរិស្ថាន រួមមានការរារាំងការហែលចុះឡើងរបស់ត្រីមានតម្លៃពាណិជ្ជកម្មសំខាន់ធំៗ និងការបំផ្លាញទីជម្រកនៅអាងជ្រៅៗ ដែលអាចជះឥទ្ធិពលយ៉ាងធ្ងន់ធ្ងរដល់សុខមាលភាពនៃមច្ឆជាតិដែលរស់នៅពឹងផ្អែកលើធនធានក្នុងទឹកនៅតំបន់នោះ។ ទំនប់សំបួរ ក៏អាចបង្កនូវការគំរាមកំហែងដល់ប្រភេទសត្វដែលជិតផុតពូជមួយចំនួនផងដែរ។
- នាពេលថ្មីៗនេះ ទំនប់ចំនួន៨ក្នុងចំណោម១០ ផ្សេងទៀត ស្ថិតនៅក្រោមការសិក្សាយ៉ាងល្អិតល្អន់ដោយទីប្រឹក្សាមកពីទីភ្នាក់ងារជប៉ុនសម្រាប់ការអភិវឌ្ឍអន្តរជាតិ (JICA) សម្រាប់បួងមេនៃថាមពលវារីអគ្គិសនីមានទីតាំងនៅតំបន់ការពារ។

ក្នុងការសម្រេចគាំទ្រគម្រោងថាមពលវារីអគ្គិសនីទាំងអស់ខាងលើ រដ្ឋាភិបាលកម្ពុជាបានលើកឡើងពីតម្រូវការឱ្យមានតុល្យភាពនៃគោលដៅអភិរក្ស និងតម្រូវការអភិវឌ្ឍសេដ្ឋកិច្ច។ ការគាំទ្រដ៏ខ្លាំងក្លាពីសំណាក់ប្រទេសចិនសម្រាប់ការបង្កើតថាមពលវារីអគ្គិសនីក្នុងស្រុករបស់កម្ពុជាប៉ុន្មានឆ្នាំកន្លងមកនេះ គឺជាការផ្តល់ផលប្រយោជន៍គ្នាទៅវិញទៅមកនៃគំនិតផ្តួចផ្តើមបង្កើតសហគ្រាសដែលជាផ្នែកមួយនៃសហគ្រាសរដ្ឋរបស់ចិន (SOEs) ដែលមានការជួយគាំទ្រពីអ្នកជំនាញហិរញ្ញវត្ថុរបស់ចិន រួមមានធនាគារអាហារណ៍និហារណ៍របស់ចិន និងមានការគាំទ្រខាងនយោបាយពីថ្នាក់ដឹកនាំកំពូលៗទៀតផង។

សហគ្រាសរដ្ឋរបស់ចិន (SOEs) ដែលកំពុងជួយលើកកម្ពស់ថាមពលវារីអគ្គិសនីនៅប្រទេសកម្ពុជា គឺមានលក្ខណៈសម្បត្តិចំរុះដោយរាប់តាំងពីក្រុមហ៊ុនថាមពលវារីអគ្គិសនីចិន (Sinohydro Corporation) ដែលជាក្រុមហ៊ុនថាមពលវារីអគ្គិសនីធំបំផុតរបស់ចិន រហូតដល់សហគ្រាសរដ្ឋរបស់ចិនដែលមានការបណ្តាក់ទុនវិនិយោគតូចៗដូចជា ក្រុមហ៊ុនយូណានឆាយណាសម្រាប់កិច្ចសហប្រតិបត្តិការបច្ចេកវិទ្យាសេដ្ឋកិច្ចអន្តរជាតិ ដែលមានជំនាញខាងការរៀបចំកិច្ចសន្យាសម្រាប់សាងសង់គម្រោងហេដ្ឋារចនាសម្ព័ន្ធ និងធ្វើកិច្ចសន្យាបន្តលើការងារសាងសង់។ ក្រុមហ៊ុនថាមពលវារីអគ្គិសនីចិន Sinohydro Corporation ធ្លាប់ត្រូវបានស្តីបន្ទោសដោយរដ្ឋាភិបាលចិនកាលពីឆ្នាំ ២០០៤ ២០០៥ និង ២០០៦ អំពីការមិនគោរពតាមគោលការណ៍សុវត្ថិភាពនិងការការពារបរិស្ថានសំរាប់គម្រោងទំនប់វារីអគ្គិសនីនៅក្នុងប្រទេស។ បើទោះក្រុមហ៊ុន (Sinohydro Corporation) មានកិច្ចសន្យាសាងសង់ទំនប់កំចាយក៏ពិតមែន ប៉ុន្តែទីតាំងនៃការសាងសង់របស់ក្រុមហ៊ុនដែលស្ថិតនៅក្នុងឧទ្យានជាតិ។ ដូច្នោះមានការលើកឡើងនូវសំណួរផ្សេងៗទាក់ទងទៅនឹងការប្តេជ្ញាចិត្តរបស់ក្រុមហ៊ុនក្នុងការរក្សា និងគោរពតាមបទដ្ឋានបរិស្ថាននិងសង្គមជាលក្ខណៈអន្តរជាតិ ។ ក្រុមហ៊ុនវិនិយោគចិនមួយចំនួនផ្សេងទៀតដែលកំពុងមានសកម្មភាពនៅក្នុងប្រទេសកម្ពុជាពុំមានឯកសារពាក់ព័ន្ធណា បញ្ជាក់អំពីការវិនិយោគលើវារីអគ្គិសនីឡើយ ។

ព័តិមានសម្រាប់សាធារណៈទាក់ទងនឹងការរៀបចំផ្តល់ហិរញ្ញវត្ថុសម្រាប់គម្រោងថាមពលវារីអគ្គិសនីរបស់កម្ពុជា ស្ទើរតែមិនមានឡើយ។ ធនាគារអាហរ៍ណ-នីហរ៍ណចិន ដែលជាធនាគារមួយក្នុងចំណោមធនាគារគោលនយោបាយចិនទាំង ៣ មានទំនាក់ទំនងទៅនឹងគម្រោងទំនប់កំចាយ។ ធនាគារអភិវឌ្ឍន៍ចិន ដែលជាធនាគារគោលនយោបាយចិនមួយផ្សេងទៀត ក៏អាចមានទំនាក់ទំនងក្នុងការផ្តល់ថវិកាដល់ទំនប់ស្ទឹងអាតែ។ ធនាគារគោលនយោបាយទាំងពីរនេះ ជាផ្នែកមួយដ៏ចាំបាច់បំផុតលើការផ្តល់ប្រាក់កម្ចីជាផ្លូវការដល់បរទេសរបស់រដ្ឋាភិបាលកណ្តាលរបស់ចិន។ ចំពោះករណីទំនប់កំចាយ ទឹកប្រាក់ដែលត្រូវសាងសង់ចំនួន ២៨0 លានដុល្លាអាមេរិក នឹងយកចេញទឹកប្រាក់ជំនួយជាកញ្ចប់របស់ចិនចំនួន ៦00លានដុល្លា ផ្តល់ដល់កម្ពុជានៅខែមេសា ឆ្នាំ ២00៦។

ការព្រួយបារម្ភគឺថា ស្ថាប័នធនាគារទាំងពីរនេះ មានគោលនយោបាយបរិស្ថានដែលមានលក្ខណៈទន់ខ្សោយយ៉ាងខ្លាំង បើប្រៀបធៀបជាមួយនឹងបទដ្ឋាននានាដែលមានលក្ខណៈទាបរបស់ម្ចាស់ជំនួយទ្វេភាគីរបស់បស្ចិមប្រទេស និងទីភ្នាក់ងារគណនេយ្យនាំចេញ ដែលជាអ្នកផ្តល់ជំនួយលើគម្រោងហេដ្ឋារចនាសម្ព័ន្ធដ៏សំខាន់នៃជំនួយជាកញ្ចប់ពីបស្ចិមប្រទេស។ ការគាំទ្រពីធនាគារពាណិជ្ជចិននេះមើលជាទូទៅដូចជាមានភាពខ្សោយ ឬគ្មានបទដ្ឋានសុវត្ថិភាពឡើយ។

ការគាំទ្រខាងផ្នែកនយោបាយលើទំនប់ថាមពលវារីអគ្គិសនីធំៗ ត្រូវឃើញមានបានបង្ហាញនៅក្នុងកិច្ចប្រជុំអន្តរជាតិផ្សេងៗជាច្រើនផងដែរ។ ឧទាហរណ៍ កិច្ចព្រមព្រៀងលើទំនប់កំចាយត្រូវបានចុះហត្ថលេខាក្នុងកិច្ចប្រជុំមហាអនុតំបន់ទន្លេមេគង្គលើកទី២ នៅគុនមិញ ខេត្តយូណាន ប្រទេសចិន នៅចំពោះមុខលោកនាយករដ្ឋមន្ត្រីចិន Wen Jiabao និងលោកនាយករដ្ឋមន្ត្រីកម្ពុជា ហ៊ុន សែន ក្នុងខែកក្កដា ឆ្នាំ២០០៥។ ក្នុងខណៈនោះដែរ កិច្ចសន្យាលើគម្រោងទាំងអស់នោះ ត្រូវបានចុះហត្ថលេខាក្នុងបន្ទប់បិទទ្វារ ហើយ មានព័ត៌មានដល់សារធារណៈតិចតួចណាស់។ រហូតមកដល់បច្ចុប្បន្ននេះ ការអភិវឌ្ឍថាមពលវារីអគ្គិសនីនៅប្រទេសកម្ពុជាបានធ្វើឡើងដោយមិនមានការប្រឹក្សាយោបល់ជាសាធារណៈពេញលេញឡើយ និងជារួមមានការខ្វះខាតនូវតម្លាភាពក្នុងដំណើរការនៃការសម្រេចចិត្ត។

ដើម្បីបំពេញនឹងតម្រូវការថាមពលរបស់កម្ពុជាដែលមានកំណើន រដ្ឋាភិបាលទំនងដូចជាចង់ឱ្យមានប្រព័ន្ធបណ្តាញថាមពលដែលផ្គត់ផ្គង់ដោយវារីអគ្គិសនីថ្មាក់ជាតិវិញ។ ប៉ុន្តែទន្លេដែលមានទឹកហូរធម្មជាតិ និងធនធានធម្មជាតិដ៏សម្បូររបស់កម្ពុជាជាច្រើន និង តម្លៃជាអាយុជីវិតសម្រាប់សុខុមាលភាពរបស់ប្រជាជននៅតំបន់ជនបទរបស់កម្ពុជា បែរជាក្លាយជាទ្រព្យសម្បត្តិដែលមិនមានតម្លៃ ។ ការអភិវឌ្ឍថាមពលវារីអគ្គិសនីដែលមានការយកចិត្តទុកដាក់តិចតួចនោះ អាចនឹងបំផ្លាញធនធានធម្មជាតិដោយមិនអាចស្តារឡើងវិញបាន និងធ្វើអោយមានផលប៉ះពាល់ដល់ការអភិវឌ្ឍប្រកបដោយចីរភាពរបស់កម្ពុជា។

អនុសាសន៍ដែលអាចអនុវត្តបានលើកឡើងក្នុងរបាយការណ៍នេះ គឺថា អ្នកធ្វើសេចក្តីសម្រេចចិត្តកម្ពុជា គួរតែបង្កើតនូវដំណើរការដែលមានភាគីពាក់ព័ន្ធចម្រុះ ដើម្បីសិក្សាអនុសាសន៍នៃរបាយការណ៍របស់គណៈកម្មការពិភពលោកស្តីពីទំនប់ (WCD) និងដើម្បីពិភាក្សារកវិធីដើម្បីអនុម័តដាក់បញ្ចូលអនុសាសន៍ទាំងនោះទៅក្នុងច្បាប់របស់ប្រទេសកម្ពុជា។ អនុសាសន៍សំខាន់ៗដែលទទួលពីគោលការណ៍របស់ WCD រួមមាន :

- មុនពេលបន្តដំណើរការយូរអង្វែងនៃការពង្រីកការអភិវឌ្ឍថាមពលវារីអគ្គិសនី ក្រសួងឧស្សាហកម្ម រ៉ែ និង ថាមពលគួរបង្កើតឱ្យមានដំណើរការនៃការធ្វើផែនការ ដោយមានការចូលរួមពីផ្នែកចម្រុះ ឱ្យស្របទៅតាមបទដ្ឋានអន្តរជាតិ។ រាល់ការសិក្សាវាយតម្លៃ នឹងត្រូវវាយតម្លៃលើតម្រូវការថាមពលរបស់កម្ពុជា និងវាយតម្លៃលើជម្រើសដ៏ប្រសើរបំផុតផ្សេងទៀតសម្រាប់ឆ្លើយតបនឹងតម្រូវការនោះ។
- ជម្រើសសម្រាប់ឆ្លើយតបនឹងតម្រូវការថាមពលនៅទីប្រជុំជន និងជនបទតាមរយៈដំណោះស្រាយថាមពលវិមជ្ឈកា និងធនធានថាមពលដែលប្រើប្រាស់ឡើងវិញបាន គួរតែស្ថិតក្រោមការស្វែងរករបស់រដ្ឋាភិបាលកម្ពុជា និងបញ្ចូលជម្រើសទាំងនោះទៅក្នុងផែនការថាមពលជាតិរបស់កម្ពុជា។
- នៅពេលគម្រោងថាមពលវារីអគ្គិសនីត្រូវបានសម្រេចតាមរយៈការប្រឹក្សាជាសាធារណៈថា ជាដំណោះស្រាយដ៏ប្រសើរបំផុតដើម្បីឆ្លើយតបនឹងតម្រូវការទីក និងថាមពលហើយនោះ រដ្ឋាភិបាលកម្ពុជា និងអ្នកអភិវឌ្ឍន៍គម្រោងថាមពលវារី

អគ្គិសនី គួរតែប្តេជ្ញាចិត្តខ្ពស់ក្នុងការធានាឱ្យមានការចូលរួម និងទទួលបានព័ត៌មានពេញលេញពីសំណាក់ភាគីពាក់ព័ន្ធ តាមរយៈវេទិកាពេញលេញនៃការអភិវឌ្ឍន៍គម្រោង។

- ការរៀបចំផែនការ ដើម្បីបន្ថយផលប៉ះពាល់ដល់សង្គម និងបរិស្ថាន គួរតែត្រូវពិចារណាជាអាទិភាពទាំងអ្នកអភិវឌ្ឍន៍គម្រោង និងរដ្ឋាភិបាល។ មុនពេលគម្រោងដំណើរការឆ្ពោះទៅមុខ ឯកសារសំខាន់ៗរួមមាន ការវាយតម្លៃហេតុប៉ះពាល់បរិស្ថាន ការវាយតម្លៃផលប៉ះពាល់សង្គម ផែនការគ្រប់គ្រងបរិស្ថាន ផែនការសកម្មភាពការតាំងទីលំនៅ និងផែនការស្តារជីវភាពរស់នៅឡើងវិញ គួរតែត្រូវបានរៀបចំឡើង និងមានការឯកភាពទៅវិញទៅមកក្នុងចំណោមភាគីជាប់ពាក់ព័ន្ធ។
- ក្រុមហ៊ុនចិន និងអ្នកផ្តល់ថវិកា គួរធ្វើការប្តេជ្ញាជាសាធារណៈដើម្បីអនុវត្តទៅតាមបទដ្ឋានអន្តរជាតិស្តីពីការអភិវឌ្ឍហេដ្ឋារចនាសម្ព័ន្ធទំបន់វារីអគ្គិសនី។

Contents

Abbreviations

ADB	Asian Development Bank
BOT	Build-Operate-Transfer
CDC	Council for the Development of Cambodia
CETIC	China Electric Power Technology Import & Export Corporation
CIDA	Canadian International Development Agency
CYC	China Yunnan Corporation for International Techno-Economic Cooperation
EAC	Electricity Authority of Cambodia
ECA	Export Credit Agency
EdC	Electricité du Cambodge
EIA	Environmental Impact Assessment
GMS	Greater Mekong Subregion
Ha	Hectares
HPP	Hydropower Project
IPP	Independent Power Producer
KWh	Kilowatt Hours
MIME	Ministry of Industry, Mines and Energy
MoE	Ministry of Environment
MoU	Memorandum of Understanding
MOWRAM	Ministry of Water Resources and Meteorology
MRC	Mekong River Commission
PDP	Power Development Plan
SOE	State Owned Enterprise
TEPSCO	Tokyo Electric Power Services Co. Ltd
YSE	Yunnan Southeast-Asia Economy and Technology Investment Industrial Co Ltd

1. Introduction

Cambodia is on the threshold of committing to an extensive domestic hydropower development program, financed with the support of the Chinese government and facilitated through the technical expertise of Chinese construction companies. The Cambodian government has prioritized access to cheap and reliable electricity to sustain its economic development, yet as a result of decades of fighting and instability, Cambodia's electricity infrastructure remains rudimentary and the cost of electricity amongst the highest in the world. In response, the Cambodian government plans to prioritize the exploitation of Cambodia's hydropower resources together with the construction of a network of high-voltage transmission lines that would connect remote hydropower stations to urban centers and also facilitate power imports from Thailand and Vietnam.

Until recently, the Cambodian government has struggled to attract investment to its planned major hydropower projects. The main development agencies active in Cambodia, namely the Asian Development Bank (ADB), the World Bank and bilateral donors from Western countries, have been reluctant to assist the development of large hydropower schemes in Cambodia for a variety of reasons. These have included concerns over environmental and social impacts - many of the potential project sites are located within or close to protected areas - and questions over economic feasibility. Over the past couple of years, however, as China's political and economic ties with Cambodia have strengthened, the Chinese government has indicated its willingness to support the Cambodian government's ambitious yet contentious hydropower development strategy. Nowadays, the Cambodian government no longer seeks the support from the multilateral development banks for its hydropower plans.

In April 2006, China's Premier Wen Jiabao announced a package of $600 million in loans and grant aid to Cambodia during high-level talks with Cambodia's Prime Minister Hun Sen in Phnom Penh[1]. Signaling the countries' strengthening relationship, Wen Jiabao pronounced that bilateral relations had entered a new development stage and both sides should seize the opportunities. In response, Hun Sen said that to develop bilateral cooperative relations is an unswerving policy of the Cambodian government[2]. Hun Sen thanked Wen Jiabao for the "no strings attached" loan, commending China for not interfering in the internal affairs of Cambodia - thus implicitly chiding the conditionalities often attached to Western aid packages[3]. The Chinese aid, which was finalized behind closed doors and will be disbursed over a three to four year period, is marginally less than that pledged to Cambodia by all Western donors for 2006[4].

Almost half of the aid package has financed the Kamchay hydropower project in Kampot Province, Southwest Cambodia, now under development by the Chinese hydropower developer Sinohydro Corporation[5]. The project's reservoir will flood 2000 hectares (Ha) of forest in Bokor National Park. A decade earlier, the Canadian

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[1] Premier Wen Jiabao Holds Talks with His Cambodian Counterpart Hun Sen, *Ministry of Foreign Affairs of the Peoples' Republic of China* 2006/04/09, http://www1.fmprc.gov.cn/eng/zxxx/t245549.htm#

[2] ibid

[3] China emerges as major player in Asian aid, *The New York Times* 17 September, 2006 http://www.iht.com/articles/2006/09/17/news/aid.php

[4] China gives Cambodia $600m in aid, by Sopheng Cheang (*AP*) www.jucee.org/china/china-gives-cambodia-600m-in-aid.html

[5] China boosts Cambodian relations with $600m pledge, *Financial Times* 10 April, 2006

International Development Agency (CIDA) had considered the project, but withdrew its support apparently at least in part because of the project's environmental and social costs. Leaders of the Cambodian government have warmly welcomed the Chinese investment, arguing that the project's benefits far outweigh the social and environmental costs. Yet, details of the deal remain undisclosed – even to Cambodia's lawmakers who were asked to endorse an investment guarantee for Sinohydro's investment without having seen the contractual arrangement[6].

The revival of the Kamchay hydropower project reveals a worrisome trend. With the strong support of the Cambodian government, Chinese companies backed by Chinese financial institutions are racing to exploit Cambodia's hydropower resources whilst paying little regard to international best development practices. Two major hydropower projects already approved for construction - Kamchay and Stung Atay - were both developed with limited public consultation and an overall lack of transparency in the decision-making process which, according to international standards, should be expected for such high-risk projects.

This report documents Cambodia's rapidly-changing domestic hydropower sector, examines the relevant Cambodian laws and policies, identifies the key actors involved, and outlines the investment decision-making process. In consideration of the environmental and social implications, the report explores better development processes for reaching decisions over hydropower development in Cambodia, bearing in mind the poverty alleviation objectives of the Cambodian government

The findings of this report are based on extensive desk-based research, meetings with Cambodian government officials, and a field visit to the Kamchay Dam project in April 2007. The study team was formed of Dr. Carl Middleton (International Rivers) and Mr. Sam Chanthy (NGO Forum on Cambodia). Sources for desk-based research include reports on Cambodia's energy sector prepared by the Cambodian government and development agencies, relevant Cambodian laws and policies, and a through review of recent Cambodian, Chinese, and international newspaper articles. From 2nd to 11th April 2007, meetings were held in Phnom Penh with relevant government departments within the Ministry of Water Resources and Meteorology, and the Ministry of Environment. Our requests to meet representatives from the Ministry of Industry, Mines and Energy, and the Chinese Chamber of Commerce were declined. We also met with a number of non-government organizations working on energy, water and conservation issues. During a three day field-trip to the Kamchay Dam site to gather information on the project, we meet with relevant provincial government agencies, a representative from Sinohydro Corporation, provincial non-government organizations, commune-level officials, and villagers living along the Kamchay River.

This report is presented in five sections. Section one outlines the current policy and regulatory framework for domestic hydropower development in Cambodia. It also covers Cambodia's investment process for major development projects and the role of the relevant Cambodian government agencies. Section two covers Cambodia's power sector policy in more detail and the status of domestic hydropower projects under construction or at an advanced stage of planning, accompanied by discussion on the potential environmental and social implications. Section three outlines the recent heightened interest by China in Cambodia's domestic hydropower sector, and provides background

[6] 'NA Votes to Guarantee Chinese Dam Investment', *Cambodia Daily* July 27, 2006.

on the Chinese companies planning to develop hydropower projects in Cambodia and their financiers. Section four presents a case study on the Kamchay Dam in Kampot Province, Cambodia under construction by the Chinese hydropower developer Sinohydro Corporation. Section five offers conclusions and recommendations based on the reports findings.

2. Cambodia's domestic hydropower policy and legal framework, key actors, and the investment process

2.1 Cambodia's 'Rectangular' strategy

The over-arching development strategy of the Cambodian government is articulated in the "Rectangular Strategy for Growth, Employment, Equity and Efficiency," which covers the period 2003 to 2008. Emphasizing the need for low-cost electricity to sustain Cambodia's economic growth, the development of the energy sector and electricity network constitutes one side of the second "Growth Rectangle" of the strategy. According to the strategy, the Cambodian government will promote private sector participation in electricity production and distribution, and support power transmission grids that facilitate electricity imports from Cambodia's neighboring countries.

The Rectangular Strategy also outlines the Cambodian government's support for constructing hydropower projects at Kamchay, Stung Battambang, Stung Atay and Stung Russey Chrum. The strategy states "In developing hydro power resources, the Royal Government will carefully analyze all aspects involved, especially its economic benefits and environmental and social impacts."

Another side of the second Growth Rectangle addresses Water Resources and Irrigation System Management. It commits the government to "protect, manage and assure sustainable exploitation of both fresh water and marine resources while enhancing bio-diversity and sustainability for equitable benefit to the public."

2.2 Cambodian authorities responsible for hydropower development and relevant laws

The main government ministries mandated to manage development of Cambodia's hydropower resources are the Ministry of Industry, Mines and Energy (MIME) and the Ministry of Water Resources and Meteorology (MOWRAM). Other ministries, such as the Ministry of Environment and Electricity du Cambodge, are involved to a lesser extent in specific aspects of the development and management process. Guided by the Rectangular Strategy, the Ministries develop their own policies and action plans, implemented under the relevant laws that they are charged with enforcing.

It is generally recognized amongst ministries that, in principle, they should coordinate in developing hydropower projects, although there is not a specific policy that stipulates this. In reality, whilst an inter-ministerial steering committee may be set up, only one Ministry, MIME, leads and does most of the work. In a recent detailed study of Cambodia's legal framework relevant to hydropower development, Chamreoun[7] observes, "The institutional structure and arrangements in Cambodia are highly compartmentalized and they lack mechanisms for coordination and feedback among key agencies dealing with numerous water resources management activities. In addition, there is no clear definition of the regulatory and development functions." Furthermore, private sector companies often do not actively seek deep cooperation with the Ministries, unless they require information, due to slow bureaucratic pace of the Ministries, ultimately costing the companies money.

[7] Chamreoun, S. (2006), 'Scoping Study of Existing Frameworks Related to the World Commission on Dams Strategic Framework – Cambodia' in 'Mekong Region Water Resources Decision-making, National Policy and Legal Frameworks *vis-a-vis* World Commission on Dams Strategic Priorities' published by IUCN. (Available in Khmer and English)

There is no direct law on hydropower development in Cambodia, although other laws related to energy, the environment, and agriculture contain relevant articles. Yet, whilst the foundation of a reasonable legal framework has been established in Cambodia, much remains to be done as many existing laws are constrained by weak compliance and limited enforcement capability, sometimes arising from a questionable willingness on the part of the responsible authorities[8].

2.2.1 Ministry of Industry, Mines, and Energy (MIME) and the Electricity Law

The Electricity Law, promulgated in 2001, states that "The Ministry of Industry, Mines and Energy shall be responsible for setting and administrating the government policies, strategies and planning in the power sector" (Article 3). The mandate of MIME related to hydropower includes: conducting research on the hydropower distribution networks; estimating hydropower potential in order to develop hydropower projects; and monitoring and evaluation of existing hydropower projects[9].

MIME has recently signed a number of Memorandum of Understandings (MoU) with Chinese companies that will conduct hydropower project feasibility studies (see section 3). In the case of the Kamchay Dam, MIME hosted the bidding process in 2004, awarding the contract to Sinohydro, and has subsequently worked with the company to facilitate the project on behalf of the Cambodian government.

The main department within MIME responsible for hydropower development is the Department of Hydropower, located within the General Department of Energy. Its responsibilities include[10]:

- Preparing and implementing national power policies related to hydropower;
- Collecting, analyzing, and utilizing all data in studying the development of hydropower;
- Selecting locations and priority projects;
- Formulating and implementing hydropower development plans throughout the country; and
- Studying, formulating, implementing, and controlling the construction of hydropower generation projects.

No specific policies related to hydropower have been formulated by MIME to date. MIME has, however, prepared a number of power development plans and strategies, with the support of various donors and that envision a significant future role for domestic hydropower projects.

2.2.2 Ministry of Water Resources and Meteorology and the Water Resources Management Law

The Ministry of Water Resources and Meteorology (MOWRAM) is responsible for the overall management of Cambodia's surface and ground water resources. The Water

[8] ibid

[9] The Sub-decree on the Organization and Functioning of the Ministry of Industry, Mines and Energy (No. 35ANK/26 April 1999)

[10] Chamreoun, S. (2006), 'Scoping Study of Existing Frameworks Related to the World Commission on Dams Strategic Framework – Cambodia' in 'Mekong Region Water Resources Decision-making, National Policy and Legal Frameworks *vis-a-vis* World Commission on Dams Strategic Priorities' published by IUCN. (Available in Khmer and English)

Resources Law details the roles, responsibilities and jurisdiction of MOWRAM and was promulgated by the National Assembly on 22nd May 2007, after almost seven years of delay. Lawmakers were initially resistant to the law on the basis it would confer too much authority to MOWRAM as both license regulator and water use controller[11]. The prolonged absence of the Water Resources Law had left MOWRAM's role ill-defined and limited the ministry's ability to effectively exercise its general mandate to manage Cambodia's water resources.

Recognizing the overlapping mandates of MIME and MOWRAM on developing and managing hydropower and multipurpose dams[12], in 2000 an agreement was reached between the two ministries under which MIME would be lead agency for the development of hydropower dams and MOWRAM would be lead agency for multipurpose dams[13]. Whilst plans for the development of hydropower in Cambodia are advanced and receive high-level political support, planning for multipurpose schemes remains essentially undeveloped[14].

Within MOWRAM, the Department of Water Resources Management and Conservation is the main department responsible for legislation development, river basin management, and hydropower. Its most important function relevant to hydropower development is to issue and monitor compliance of licenses for water use and water works construction, and imposing water user fees. The use of water would be planned and managed by MOWRAM according to the principles of 'Integrated Water Resources Management', which for example recognizes the need for a minimum flow in rivers to conserve ecosystems.

To date, MOWRAM has issued two water use permits for the Kirirom 1 and Kamchay hydropower project - although due to the absence of the Water Resources Law at the time, neither permit presently charges for water use.

One other department within MOWRAM especially relevant to the development of hydropower projects is the Department of Hydrology and River Works. It is responsible for data collection on hydrology, flood management and general water quality monitoring, and is occasionally requested to provide information to hydropower companies exploring the feasibility of their projects.

2.2.3 The Ministry of Environment (MoE), and Environmental Impact Assessment in Cambodia

The Ministry of Environment is broadly responsible for issues related to environmental protection and natural resources management, as stipulated in the Law on Environmental Protection and Natural Resources Management (1996) and associated sub-decrees[15]. The law's provisions include articles on: Environmental Impact Assessment (EIA); Natural Resource Management; Environmental Protection; and Public Participation. Whilst this law has been in force for over a decade, in reality it is

[11] Meeting with Mr. Theng Tara, Director, Department of Water Resources Management and Conservation, MOWRAM, 9.4.07
[12] Multipurpose dams both generate electricity and store water for irrigated agriculture
[13] Meeting with Mr. Theng Tara, Director, Department of Water Resources Management and Conservation, MOWRAM, 9.4.07
[14] Meeting with Mr. Mao Mok, Director, Department of Hydrology and River Works, MOWRAM, 9.4.07
[15] The Subdecree on the EIA process (11 August 1999); The Sub-decree on Water Pollution Control (6 April 1999); The Sub-decree on Solid Waste Management (27 April 1999); and the Sub-decree on Air and Noise Pollution Control (10 July 2000).

difficult for the MoE to implement and enforce in part because several sub-decrees are still pending that leave aspects of the law ill-defined, for example the "Sub-decree on Public Participation and Access to Information"[16]. Furthermore, a second law on Protect Areas Management that is necessary for the MoE to enforce its mandate to prevent illegal activities within protected areas has awaited approval for almost a decade.

An important function of the MoE relevant to hydropower development is the evaluation of Environmental Impact Assessments (EIA), which is the responsibility of the Department of Environmental Impact Assessment Review. The Sub-decree on EIA Process (1999) states "An environmental impact assessment shall be carried out on all projects and activities, either private or public, and shall be examined and evaluated by the Ministry of Environment before being submitted to the government for a decision. This assessment shall also be applicable to those existing activities and those that are under process, and for which their environmental impacts have not yet been assessed (Article 6)." According to the sub-decree, hydropower projects that have the capacity to generate more than one megawatt (MW) of power must prepare an Initial EIA (IEIA). If the project is deemed by MoE to have a "serious impact on natural resources, ecosystem, health or public welfare" it may then be required to submit a full EIA. At present, however, there is no clear guidance on the criteria by which a full EIA is deemed necessary. In practice, therefore, due to staff and laboratory facility limitations, most projects are only required to submit an IEIA[17]. According to the Department of EIA Review, a "step by step" approach has been adopted, whereby if issues arise with a project in its implementation then the developer should complete a full EIA.

Regarding public participation, Article 1 of the Sub-decree on EIA Process states that a main objective of the sub-decree is to "Encourage public participation in the implementation of EIA process and take into account of their conceptual input and suggestion for re-consideration prior to the implementation of any project." Unfortunately, as Chamreoun's[18] analysis notes, the nature of public participation is not specified, for example: when should public participation occur in the EIA process; how should that participation be reported on; and how will public inputs be incorporated in the final project document? Compounding these factors, in Cambodia there is not a culture of public participation in the decision-making process, leading to reluctance on the part of both bureaucrats and local communities to meaningfully engage.

According to the Department of EIA Review, to assess an EIA a working group is usually formed, which could include technical staff from other MoE departments and where necessary other Ministries. At the final draft stage of the MoE's report on the

[16] Chamreoun, S. (2006), 'Scoping Study of Existing Frameworks Related to the World Commission on Dams Strategic Framework – Cambodia' in 'Mekong Region Water Resources Decision-making, National Policy and Legal Frameworks *vis-a-vis* World Commission on Dams Strategic Priorities' published by IUCN. (Available in Khmer and English)

[17] The MoE must process a project's EIA within 30 working days of receipt (Article 17), placing a strain on the Department of EIA's resources and capacity. If the MoE is unable to submit its comments within this period, the project owner can assume that the EIA has been accepted (Article 18).

[18] Chamreoun, S. (2006), 'Scoping Study of Existing Frameworks Related to the World Commission on Dams Strategic Framework – Cambodia' in 'Mekong Region Water Resources Decision-making, National Policy and Legal Frameworks *vis-a-vis* World Commission on Dams Strategic Priorities' published by IUCN. (Available in Khmer and English)

EIA, a consultative meeting should be held with other government and public stakeholders, before the report is finalized and approved[19].

There are numerous, well-recognized constraints to the preparation of EIAs in Cambodia. The need and importance of an EIA is not widely recognized amongst all Ministries, limiting the authority of MoE to enforce an EIA's requirements. There is also limited capacity within Cambodia to prepare EIAs and hiring international consultants to conduct this work can be prohibitively expensive for the investing company. In addition, the Department of EIA Review is constrained both by its staff capacity and size to manage the review of large EIAs within the 30-day period stipulated in the sub-decree. Finally, some decision-makers view the need for a project's compliance with the EIA process to be secondary to the need for rapid economic development in Cambodia.

2.2.4 Electricity du Cambodge

Electricité du Cambodge (EdC) was established as a wholly state-owned limited liability company in March 1996. It is responsible for the generation, transmission and distribution of electric power throughout Cambodia and operates as a commercial business[20]. By 2005, EdC was selling electricity to customers in Phnom Penh, 11 provincial centers, and several district centers.

Major Independent Power Producers (IPPs), such as Sinohydro Corporation in the case of the Kamchay Dam, will typically sell their power directly to EdC for transmission and distribution[21]. Smaller IPPs that serve remoter regions of Cambodia sell their power directly to the consumer[22].

2.2.5 Electricity Authority of Cambodia

The Electricity Authority of Cambodia (EAC) was established as an independent regulatory authority of Cambodia's power sector under the Electricity Law (2001). EAC's responsibilities include: to issue regulations; to issue licenses to electric power service providers; to review cost and approve tariff rates; to resolve disputes; and to regulate and impose penalties. As an independent regulator, EAC is tasked to ensure that the sale of electricity to consumers by electricity suppliers is conducted in a fair and transparent manner[23]. It is worth noting that Cambodia is the only lower Mekong country to have in place an independent power regulator.

2.3 An overview of the investment process for large hydropower projects in Cambodia

For major investment projects, such as large hydropower schemes, there appears to be no clearly defined route to secure project approval. Private companies must seek agreement with the Council for the Development of Cambodia, the relevant Ministries, and possibly even representatives of the Council of Ministers. Furthermore, for high-profile projects, senior politicians can also be influential in the decision-making process.

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[19] Interview with Ms. Chou Sophany, Head of Department, Department of EIA, Ministry of Environment, 3.4.07

[20] Electricite du Cambodge. 2005 Annual Report. www.edc.com.kh

21 'Kampot poised to enter world of hydroelectric power', Phnom Penh Post, January 12-25, 2007.

22 According to Sokha, 2006 (www.newsmekong.org/cambodia_from_across_the_border_cheaper_power), in 2003, between 600 and 1,000 small IPPs were supplying electricity to about 120,000 households for an average of four hours per day

[23] EAC 2004 Annual Report. www.eac.gov.kh

- *The Council for the Development of Cambodia (CDC)* is the highest decision-making level of the Cambodian government for private and public sector investment. The CDC is intended as a "one-stop service" for investment review and decision-making in Cambodia and was established in 1994 under the Law on Foreign Investment in the Kingdom of Cambodia. The CDC is chaired by the Prime Minister and composed of senior ministers from relevant government agencies. It has two boards: One for private sector investment (The Cambodian Investment Board[24]); and one for public sector investment (The Cambodian Rehabilitation and Development Board[25])
- *The Cambodian Investment Board (CIB)* is the operational arm of the CDC for private sector investment. The CIB reviews investment applications and is able to offer investment incentives such as tax and customs exemptions, and other privileges for qualifying projects that include physical infrastructure and energy projects[26].
- *The Cambodian Rehabilitation and Development Board (CRDB)* hosts the annual "Consultative Group" (CG) meeting between the Cambodian government and its donors at which development issues and challenges are discussed. The CG meeting facilitates donor coordination and discussion on financing needs for development programs. Linked to the CG meeting, 17 "Technical Working Groups" focus on specific development sectors, such as Agriculture and Water, and meet on a quarterly basis throughout the year bringing together relevant government and donor agencies to coordinate their activities.
- *The Council of Ministers:* Major investments may require the implicit endorsement from representatives of the Council of Ministers. In addition, if specific legislation is required for the approval of a project, as has been the case for the Kamchay Dam (see section 5), then the consent of the National Assembly is also required.

Chinese investors, as with all investors, also depend on the support of their embassy and the Chinese Chamber of Commerce in Cambodia, which is well-established and highly active. The Ministry of Foreign Affairs in Cambodia and the investor's country's counterpart agency may also play a role in facilitating potential investors coming to Cambodia.

For the first time, in 2007 Chinese embassy officials participated in the annual CG meetings, which marks a significant step forward in communication between China, Western donors, and the Cambodian government. However, Chinese representatives still remain absent from the associated Technical Working Groups and only limited information is available to the public on the terms and conditions of China's ODA to Cambodia.

When developing a hydropower project, a potential company must first seek an MoU with MIME to prepare a feasibility study. The company's technical staff will then prepare the feasibility study, with MIME arranging access to relevant government staff, data and the necessary approval permits. The company typically self-finances the study, which becomes the joint property of the company and MIME once completed. The feasibility study typically takes between one and two years to complete. On satisfactory completion of the feasibility study, the company is then entitled to enter into discussion with MIME

[24] www.cambodiainvestment.gov.kh/
[25] www.cdc-crdb.gov.kh/
[26] Article 12 of Law on Investment of the Kingdom of Cambodia (1994)

on the possibility of developing the hydropower project. If MIME selects a different company to implement the project, the feasibility study costs must be reimbursed to the first company by the selected company.

Senior political figures of the Cambodian government have strongly and publicly expressed their support for the development of large hydropower schemes. For example, in November 2006, Prime Minister Hun Sen requested the Chinese Ambassador to "attract her country's companies to invest in hydroelectric power generation in Cambodia."[27] In an earlier visit to China in late October, Chinese officials had promised Hun Sen that they would build four hydroelectric dams in Pursat Province[28].

Chinese companies have also received high-level political support from their political leaders to invest in Cambodia. For example, in April 2007, the Governor of Yunnan Province, Mr. Qin Guangrong, led a senior delegation of government officials and business persons to visit Cambodia in order to promote industry from Yunnan Province, as well as to promote investment in Yunnan by companies operating in Cambodia[29]. At a "China (Yunnan) - Cambodia Investment and Trade Fair" in Phnom Penh, Mr. Qin told the 400 senior Cambodian and Chinese government official and private sector representatives that Yunnan plans to intensify its cooperation with Cambodian partners in the fields of agriculture, transport, hydropower, investment, trade, forestry, tourism and mining[30]. Symbolizing the mutual-commitment of Chinese companies and the Cambodian government to develop Cambodia's domestic hydropower sector, the foundation stone of the recently-approved Stung Atay dam was jointly-unveiled by Cambodian Deputy Prime Minister, H.E. Sok An, and Mr. Guangrongn at the trade fair. The "China Yunnan Corporation for International Techo-Economic Cooperation" was selected by the Cambodian Council of Ministers to develop the Stung Atay project in February 2007.

The very visible support given by high-level Cambodian politicians to develop large domestic hydropower projects could subsequently be interpreted by government bureaucrats as instruction on how decisions should be taken within the relevant ministries. Whilst according to the law there are certain evaluation mechanisms that must be followed to judge the relative merits and costs of a project prior to approval, if a project enjoys high-level political support the steps become only a formal process that a project developer must complete in order to implement the project.

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[27] Cheang Sokha (2006). Cambodia: From across the Border Cheaper Power. www.newsmekong.org/cambodia_from_across_the_border_cheaper_power

[28] ibid

[29] The Asian Development Bank's Greater Mekong Subregion (GMS) Economic Cooperation programme is an important framework facilitating trade between Yunnan Province, China and mainland Southeast Asia.

[30] www.news.xinhuanet.com/english/2007-04/07/content_5947257.htm

3. Cambodia's power sector policy and the status of domestic hydropower projects

3.1 Introduction

At present, only 20% of households have access to electricity in Cambodia, the majority of which are in Phnom Penh where around 85% of residents have access to reliable power[31, 32]. The demand for electricity is surging throughout Cambodia - by 2020 it is estimated that Cambodia's peak electricity demand will increase almost five-fold from 212 MW in 2002 to 991 MW [33]. Cambodia's existing electricity generation, transmission and distribution system is incapable of meeting this demand and a major expansion program is planned.

Electricity is also very expensive in Cambodia because most electricity is generated using diesel-fuel.[34] In Phnom Penh electricity can cost up to $0.18 per kilowatt-hour (KWh), whilst in the provincial centers electricity costs average around $0.30 per KWh[35]. In remote locations that are served by small-scale IPPs, prices can be far higher – for example, in some districts outside Battambang Town the cost is reportedly $0.75 to $1.25 per KWh.

Cambodia's most recently approved Power Development Plan (PDP) dates 1999-2016[36], although a new PDP is under development, supported by the World Bank and complimented by studies by various other donors[37]. There are, in addition, several other plans for rural electrification and renewable energy development[38]. The main directions of Cambodia's power sector strategy are:

- Working towards reduced reliance on costly diesel-fueled electricity generation
- Importation of low-cost electricity from Thailand[39], Vietnam[40], and Laos[41], that will enable supply to meet rising demand and at the same time allow the expansion of Cambodia's electricity market that would then make feasible large-scale power plants to be developed in Cambodia itself.
- Construct of high-voltage transmission lines connecting the main towns of the southern region (Phnom Penh, Kandal, Kampong Speu, Takeo, Kampot and Sihnaoukville provinces) and the western region (Banteay Meanchey, Battambang and Siem Reap provinces) of Cambodia. The transmission infrastructure will initially facilitate power imports from neighboring countries, and in the longer term enable transmission of electricity generated within Cambodia.

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[31] Electricity Still a Luxury Beyond Phnom Penh, *Cambodia Daily*, 9 January 2007
[32] Cheang Sokha (2006). Cambodia: From across the Border Cheaper Power. www.newsmekong.org/cambodia_from_across_the_border_cheaper_power
[33] World Bank, (2004). Draft Cambodia Energy Sector Strategy (August 2004)
[34] EAC estimate that 92% of electricity used in Cambodia is from diesel
[35] Electricity Still a Luxury Beyond Phnom Penh, *Cambodia Daily*, 9 January 2007
[36] MIME (1999). Cambodia Power Sector Strategy 1999-2016, *Published by MIME*
[37] A draft of the "Cambodia Energy Sector Strategy" was prepared with World Bank support in 2004, and apparently, to date, remains to be finalized. Other projects under preparation include a 'Power Sector Development Plan 2005-2024' supported by the World Bank, a 'Electricity Network Master Plan' supported by the Electricity Generating Authority of Thailand, and a hydropower master plan supported by the Japan Bank for International Cooperation
[38] e.g. See http://www.recambodia.org/index.html
[39] MoU signed 3 February 2000, and a power purchase agreement signed in 2002.
[40] Power cooperation agreement signed 10 June 1999.
[41] Power cooperation agreement signed 21 October 1999.

- Extensive development of Cambodia's domestic hydropower generation capacity, together with a thermal generation plant (coal or gas) to be located in Sihanoukville

The Cambodian government has promoted the involvement of the private sector to invest in Cambodia's power sector since 1996[42]. H.E. Ith Praing, secretary of state at MIME, told a *Phnom Penh Post* reporter recently that private sector participation to produce and supply power will be necessary in order to achieve the government's target of 70% of households electrified by 2030[43].

3.2 Transmission networks and regional integration

Since 1994, the ADB has been promoting the regional integration of power under its Mekong Power Grid plan. The ADB envisions a regional power grid and electricity trading system through which power from some of the most controversial hydropower projects planned for Laos, China, and Burma would be transmitted to the increasingly energy-hungry cities of Thailand and Vietnam[44]. Whilst Cambodia doesn't figure centrally in the plan (due to its comparatively low hydropower potential and electricity consumption) the plan envisions that initially Cambodia will be a net electricity importer and then in the future, once Cambodia's hydropower potential is developed, a net energy exporter.

The following major regional interconnection transmission lines are presently under construction[45, 46]:

- A 115 kV connection from Thailand to Banteay Meanchey, Battambang and Siem Reap province, planned to be completed by 2007 and developed by the Electricity Generating Company (EGCO), a Thai private company. The project will deliver 85 MW of power, cost US$20 million, and is built under a 25 year BOT contract.
- The World Bank and the ADB have funded a 230 kV transmission line linking Vietnam to Phnom Penh via Takeo province that will initially supply 80 MW, rising to up to 200 MW in the future. However, the project is presently stalled because, at the time of writing, the Cambodian government is still trying to select qualified construction companies[47, 48].
- In June 2007, the World Bank provided a US$18.5 million grant to Cambodia for two further 115 kV transmission lines connecting Laos to Stung Treng town and Vietnam to Kampong Cham province.

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[42] EAC 2004 Annual Report. www.eac.gov.kh

[43] Cheang Sokha (2006). Cambodia: From across the Border Cheaper Power. www.newsmekong.org/cambodia_from_across_the_border_cheaper_power

[44] The ADB's Mekong Power Grid plan will inevitably result in serious and wide-ranging environmental impacts in the Mekong basin and on the 60 million people dependent on its rich natural resources. For a critical analysis of the Mekong Power Grid plan visit http://www.internationalrivers.org/en/southeast-asia/mekong-regional-initiatives/mekong-power-grid

[45] Megawatts predicted to more than quadruple, by Ky Soklim,*Cambodia Weekly*, 4 February, 2007

[46] Cheang Sokha (2006). Cambodia: From across the Border Cheaper Power. www.newsmekong.org/cambodia_from_across_the_border_cheaper_power

[47] ibid

[48] The Vietnam stretch of the transmission line to the Cambodian border was completed in February 2006. However, the ADB and World Bank have refused to release the Cambodian part of the loan until recently. It is planned that construction will commence in 2008.

Several major domestic transmission lines are also underway that will facilitate the distribution of imported energy to key regions of Cambodia[49]:

- The Yunnan Southeast-Asia Economy and Technology Investment Industrial Co Ltd, a Chinese company, was awarded a contract in February 2007 to develop a transmission line that will run from Phnom Penh to Kampong Chhnang, Pursat and Battambang provinces. The transmission line is planned to be commission in 2012 and will also connect to the Stung Atay dam (see below)[50].
- An ADB-financed transmission line running from Kampot to Sihanoukville was approved in October 2006 and should be completed by 2010.
- A transmission line running from Takeo to Kampot is under construction by the German funding agency KFW and will be operational by 2009.

In addition, a number of shorter lower voltage 22 kV connections import electricity to several of Cambodia's border regions from Vietnam and Thailand[51].

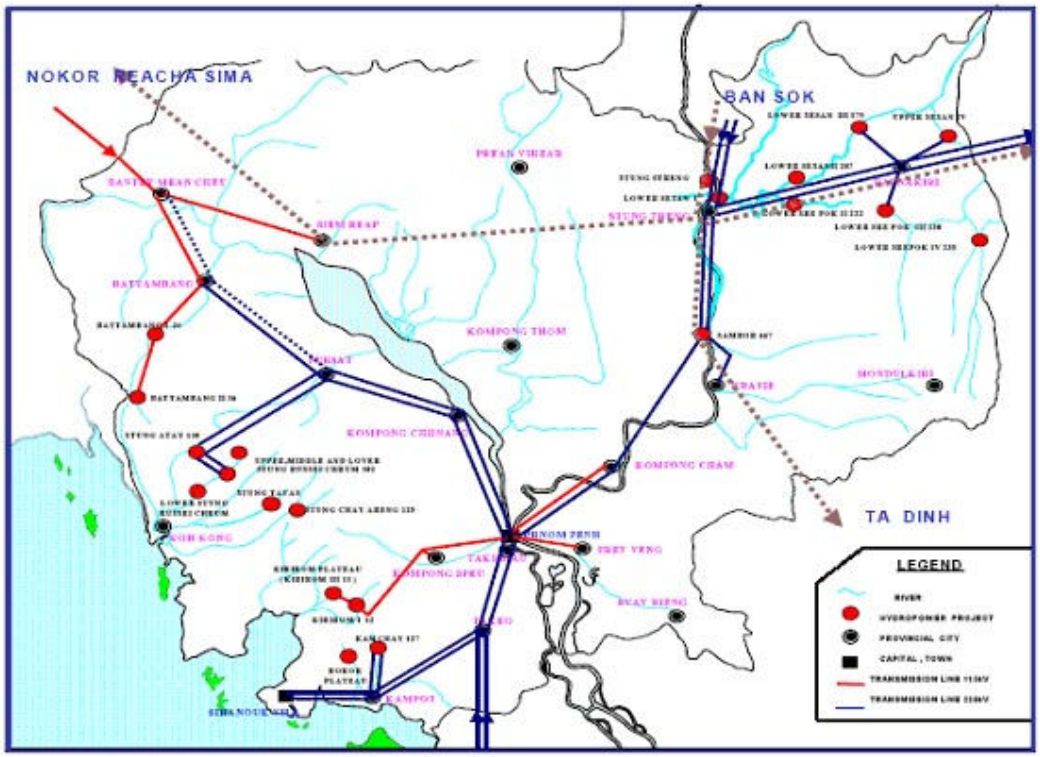

Figure 1: Planned high-voltage transmission network in Cambodia[52]

3.3 Hydropower development plans in Cambodia

The development of Cambodia's domestic hydropower resources figure centrally in the government's plans to meet escalating power demands. A National Sector Review of Hydropower prepared in 2003 by MIME determined the total hydropower potential in

[49] Megawatts predicted to more than quadruple, by Ky Soklim, *Cambodia Weekly*, 4 February, 2007
[50] Chinese Firms Win 2 Major Contracts for Energy Supply, *Cambodia Daily,* February 12, 2007
[51] Krek and Mekot districts in Kampong Cham province, and Kampong Ror and Kampong Trach in Kampot province have imported electricity from Vietnam since 2002. Koh Kong and Poipet have imported electricity from Thailand since 2000.
[52] JBIC (2006) Project Formulation Document for Hydropower Masterplan Study.

Cambodia to be around 10,000 MW, of which 50% is on the Mekong mainstream[53]. The study identified fourteen priority projects (table 1). Other major potential projects identified in the review were Stung Pursat I and II (92MW), Lower Srepok III (330 MW), Lower Sesan III (375 MW), and Stung Piphot (25MW)[54].

Table 1: Priority hydropower projects in Cambodia

No	HPP's Name	Installed Capacity (MW)	Annual Energy Production (GWh/yr.)	Expected years of commission	Status
1	Kirirom III	13	70	2006	FS
2	Battambang III	13	76	2008	Unknown
3	Kamchay	180	558	2010	Const.
4	Battambang II	36	187	2010	Unknown
5	Battambang I	24	120	2010	Unknown
6	Stung Tatay	80	426	2010	FS
7	Stung Atay	110	588	2012	Const
8	Middle Stung Russey Chrum	120	668	2015	Unknown
9	Lower Stung Russey Chrum	125	656	2015	FS
10	Upper Stung Russey Chrum	32	211	2015	Unknown
11	Stung Chay Areng	260	1,358	2015	FS
12	Sambor	467 or 3,300	2,800 or 14,870	2016	FS
13	Lower Sre Pok II	222	1,174	2018	PrS
14	Lower Se San II	207	1,065	2018	PrS

PrS = Prefeasibility Study; FS = Feasibility Study; Const = Under construction

To date, two small hydropower projects have been constructed in Cambodia: Kirirom I (12 MW) and O Chum II (1 MW). The Cambodian government has recently approved the construction of two major new hydropower projects by Chinese companies, Kamchay and Stung Atay. Feasibility studies are underway on a further four projects, also by Chinese companies.

The following section details the status of hydropower projects constructed, under construction and under feasibility study in Cambodia. In many cases, very little detail is publicly available regarding the projects themselves, the agreements reached between the Cambodian government and the project developer, and the potential social and environmental impacts. A summary of the projects key characteristics is provided in table 2.

[53] MIME (2003) National Sector Review 2003: Hydropower. Prepared by MIME in association with the Cambodia National Mekong Committee.

[54] The Stung Piphot project was studied in 1995 and rejected because of the extensive resettlement required.

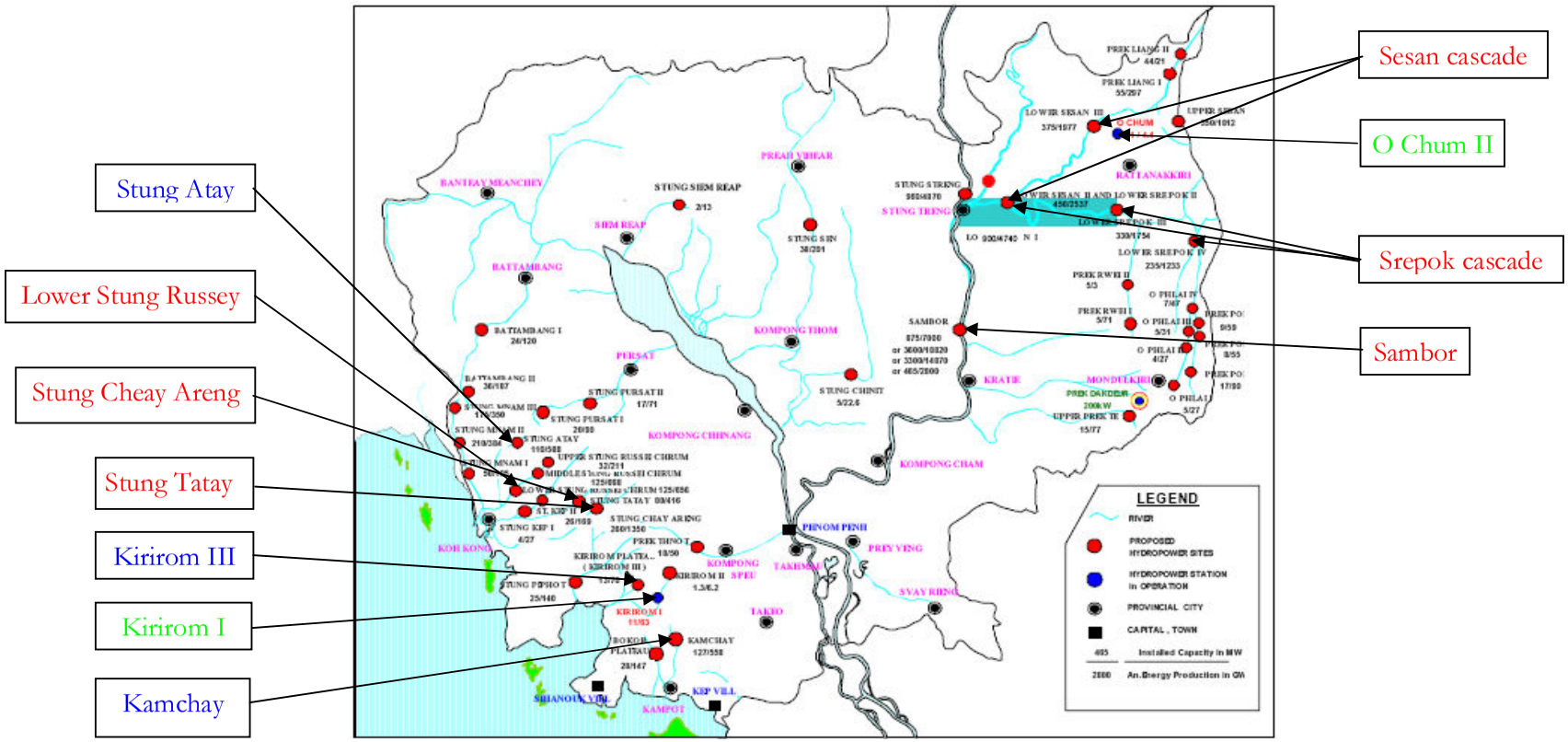

Figure 2: Map of potential and developed hydropower sites in Cambodia: Projects completed and planned are indicated [55]

Key: Green = In operation; Blue = Approved for/ under construction; Red = Feasibility study underway

[55] Reproduced from JBIC (2006) Project Formulation Document for Hydropower Masterplan Study. Original prepared by Dr. Bun Narith, MIME (see TEPSCO (2006), Lower Stung Russey Chrum Hydropower Project, Draft Final Report. August 2006 for accompanying project statistics)

Table 2: Summary of hydropower projects under development by Chinese companies in Cambodia			
Project	*Location*	*Company*	*Characteristics*
Kamchay (193MW)	Kamchay River (Prek Touk Chhu), Kampot district, Kampot province	Sinohydro Corporation	• Approved for construction in April 2005 and expected to be completed by 2010 • Estimated cost is US$280 million financed through a 2006 aid package from the Chinese government, probably through the China Exim Bank. In July 2006, Cambodia's National Assembly voted to guarantee Sinohydro Corporation financial recompense if the project faced difficulties. • Project is located within Bokor National Park, Kampot Province, southwest Cambodia. Its reservoir will flood approximately 2000 Ha of the national park. Despite this, the project has enjoyed strong political support from senior Cambodian politicians citing that the development benefits of the project outweigh the conservation costs • The project will deny access to Non-Timber Forest Products to local residents, for many of whom it is an important source of income, and potentially also impact a local tourist resort downstream of the dam.
Stung Atay (120 MW)	Atay River, Veal Veaeng District, Pursat province	Yunnan Corporation for International Techno-Economic Cooperation (CYC)	• Approved for construction in February 2007 and is expected to be completed by 2012 • Estimated cost US$255 million • Deal linked to a high voltage transmission line linking Phnom Penh, Kompong Chhnang, Pursat, and Battambang provinces by Yunnan Southeast-Asia Economy and Technology Investment Industrial Co Ltd (YSE) • According to an EIA report for a downstream project, it appears that the dam will flood a substantial area of the Central Cardamom Protected Forest. • According to CYC, there is no resettlement and limited environmental impact. • No national level public consultation was organized
Lower Stung Russey (235 MW)	Stung Russey Chrum river, Mondol Seima district, Koh Kong province	CYC and Yunnan Southeast-Asia Economy and Technology Investment Industrial Co Ltd	• MoU signed in April 2007 for CYC and YSE to co-develop project. • According to a draft EIA prepared by Tokyo Electric Power Services Co. Ltd in August 2006, the project would cost US$290 million. Whilst no resettlement is required, the report acknowledges that there may be impacts on downstream communities and ecosystems from poor water quality, sedimentation/erosion, and impacts on fisheries. River level fluctuations of 1-2 meters within the space of 10 minutes may possibly occur as a result of dam operation.
Stung Cheay Areng (260 MW)	Thmor Bang District, Koh Kong Province	China Southern Power Grid Company Limited	• MoU signed in October 2006 for feasibility study. • The dam's reservoir would inundate nine villages with a combined population of 1,500 mainly indigenous people. The reservoir would extend into the Central Cardamom Protected Forest area and flood the habitat of 31 endangered fauna species, including the world's most important breeding site for the endangered Siamese Crocodile. • Downstream impacts will include loss of riverside and coastal rice paddy, and destruction of productive swamp forest fishery

Table 2: Summary of hydropower projects under development by Chinese companies in Cambodia (continued)			
Project	*Location*	*Company*	*Characteristics*
Stung Tatay (80 MW)	Thmor Bang District, Koh Kong Province	China National Heavy Machinery Corporation	• MoU signed in January 2007 for feasibility study. • Estimated cost US$215 million • Located close to the boundary of the Central Cardamom Protected Forest, its reservoir will likely extend into the protected area, • A number of settlements up and downstream will be impacted by the project.
Sambor (465 MW or 3300 MW)	Sambor district, Kratie Province	China Southern Power Grid Company	• MoU signed in October 2006 for feasibility study • Project is located on the Mekong River mainstream. • Environmental consequences would be severe, including blocking commercially important large fish migrations, destruction of deep pool habitats and impacts on endangered species, such as the Irrawaddy dolphin.

3.3.1 O Chum II (completed 1993)

O Chum II, commissioned in 1993, is a 1 MW mini-hydropower plant located in the north-east of Ratanakiri province. It is owned and operated by the Cambodian government and has an estimated annual generation output of between 2.2-2.5 GWh[56].

3.3.2 Kirirom I (completed 1965; partially destroyed 1975; re-commissioned 2002)

The 12 MW Kirirom 1 hydropower scheme, located in Kampong Speu province was built in 1968 with support from Yugoslavia. In 1975, under the Khmer Rouge regime, the power plant fell into disrepair and electricity production stopped. In 1999, a Chinese State Owned Enterprise, China Electric Power Technology Import & Export Corporation (CETIC), was contracted to re-build the project at a cost of US$24 million under a 30 year build-operate-transfer (BOT) agreement[57]. The Council for Development of Cambodia approved the project on 29th December 2000 and in May 2002 the project re-commenced operation, providing electricity to Kampong Speu province and Phnom Penh[58, 59]. The project is managed by Electricity du Cambodge and is linked to Phnom Penh by a 120 km long, 115kV transmission line.

The China Export-Import Bank agreed to provide credit of up to US$15.5 million to CETIC in December 2000. For China, the deal was a landmark event as it was the first overseas BOT project for the Chinese power industry[60]. CETIC estimate that their investment will be paid back within ten to twelve years from the date of commission[61].

Kirirom I reservoir, Kampong Cham Province, Cambodia (Credit: EAC)

[56] Williamson, A. (2004). Sustainable Energy in Cambodia: Status and Assessment of the Potential for CDM Projects", published by the Ministry of Environment.
[57] http://www.findarticles.com/p/articles/mi_m0WDP/is_2002_June_3/ai_86623620
[58] Sam Rith, Imaging Mekong 'China Revives Dreams of Megadam in Cambodia (16.3.06)
[59] http://www.winne.com/asia/cambodia/2004/to04.php
[60] Loan Given to Build Hydropower Dam Abroad, *China Daily*, December 11, 2000.
http://www.probeinternational.org/PI/index.cfm?DSP=content&ContentID=1892
[61] http://www.winne.com/asia/cambodia/2004/to04.php

3.3.3 Kirirom III (construction reportedly approved)

Kirirom III is planned to be an 18 MW project located in Kampong Speu province and is expected to be commissioned in 2008[62]. A Chinese company started a feasibility study in November 2004 and has reportedly been approved for construction, although no further details are available[63].

3.3.4 Stung Atay Hydropower Project (construction approved)

The China Yunnan Corporation for International Techno-Economic Cooperation (CYC) was selected by the Council of Ministers to develop the 120 MW Stung Atay hydropower on 9th February 2007 [64, 65]. The project is located on the Atay River in Ou Saom commune, Veal Veaeng District, Pursat province within the Central Cardamom Protected Forest area.

According to a 2007 company press release, CYC received the initial go-ahead to investigate the Atay dam in June 2004 and then in July 2005, at the Greater Mekong Subregion (GMS) meeting in Kunming, Yunnan Province of China, signed an MoU to prepare a feasibility study for the project, which by February 2007 was reportedly almost complete[66]. The project is planned to be completed by 2012, will cost US$255 million, and is developed under a 34 year BOT agreement (including a 4 year construction period) [67,68]. The project is reportedly seeking finance from the China Development Bank.

A study by Tokyo Electric Power Services Co. Ltd prepared in 2006 suggested the optimum design for the Stung Atay HPP would consist of a two-dam cascade, 10 km apart, with the upper dam possessing a large reservoir with a dam height of 38 meters and an installed capacity of 40 MW, and the lower dam being a run-of-river type with a 9 meter high dam and an installed capacity of between 99 MW and 112 MW[69]. Whether this is the design CYC has adopted is unknown.

According to the CYC's press release, at least 478 million KWh per year will be purchased by EDC over the 30-year period, although the terms of the Power Purchase Agreement has not been made public. The *Koh Sontapheap* newspaper reports that the project will produce electricity at 5.8 US cents per KWh, and will provide electricity along National Road number 5 with the intention of accelerating economic development. However, in CYC's press release, the stated selling price of the electricity is 7.14 US cents per KWh, for which it claims an agreement had already been signed with the Ministry of Finance.

A second contract to construct a high-voltage 230 kV transmission line from the dam to Phnom Penh, Kompong Chhnang, Pursat, and Battambang provinces was awarded to Yunnan Southeast-Asia Economy and Technology Investment Industrial Co Ltd (YSE)

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[62] Megawatts predicted to more than quadruple, *Cambodia Weekly*, 4 February, 2007
[63] TEPSCO (2006), Lower Stung Russey Chrum Hydropower Project, Draft Final Report. August 2006.
[64] Chinese Firms Win 2 Major Contracts for Energy Supply, *Cambodia Daily,* February 12, 2007
[65] China transforms Cambodia's electricity, *Phnom Penh Post*, Issue 16 / 05, March 9 - 22, 2007
[66] CYC Press Release for the China (Yunnan) - Cambodia Investment and Trade Fair, 7 April 2007, Intercontinental Hotel, Phnom Penh, Cambodia (translated from Chinese).
[67] Cambodia needs more energy in order to attract more investment for development, *Koh Sontapheap Daily*, 9th April, 2007.
[68] CYC Press Release for the China (Yunnan) - Cambodia Investment and Trade Fair, 7 April 2007, Intercontinental Hotel, Phnom Penh, Cambodia (translated from Chinese).
[69] TEPSCO (2006), Lower Stung Russey Chrum Hydropower Project, Draft Final Report. August 2006.

[70, 71]. The transmission line will cost US$113 million and is developed under a 25-year BOT agreement, including 2 years for construction[72]. A power sub-station costing US$55.33 million will also be built in Ou Saom commune[73]. *Koh Sontapheap* newspaper reports that the project's financing comes from China, although the lending institution is not identified[74]. In a company press release, YSE announced it will charge US$19.6 million per year to transmit electricity along the transmission lines (the electric transmission agreement has not been made public).

An MoU was signed between YSE and the Cambodian government to develop the transmission line at the Nanjing GMS Expo on 1st November 2006[75]. Cambodian Law prevents ownership of both a generating project and the associated transmission line, because this could stifle competition between IPPs[76]. In a joint press release by CYC and YSE it is stated "through the extensive efforts of the Cambodian government and CYC, two companies were formed to develop the [dam and transmission] projects." The precise nature of the relationship between CYC and YSE, however, remains unclear.

Controversy erupted in May 2007, when opposition lawmakers discovered that a draft law was proposed that would provide a governmental guarantee to CYC and YSE against losses on their investments if they encountered any problems[77]. A similar guarantee had earlier been approved by the National Assembly to Sinohydro in July 2006 (see section 5). Whilst lawmakers supporting the law claimed that it was necessary to secure investment in critical infrastructure in Cambodia, critics questioned the law's legality and said it indicated investors did not trust the justice system in Cambodia.

Globally, however, it has been a common practice for governments to provide risk guarantees to infrastructure projects developed under BOT agreements. In allowing the private sector to develop critical infrastructure projects, it has been a generally misplaced belief that host countries are relieved of project risks associated with financing, construction and operation. In reality BOT contracts continue to transfer many of the project risks onto host governments[78]. Limited or non-recourse financing arrangements, take or pay power purchase agreements, and partial risk guarantees, known as "Contingent Liabilities", all transfer risk from the project developer to the host government, such that private investors face relatively certain revenue flows whilst host governments bear a high proportion of the project risk.

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[70] Chinese Firms Win 2 Major Contracts for Energy Supply, *Cambodia Daily,* February 12, 2007
[71] China transforms Cambodia's electricity, *Phnom Penh Post*, Issue 16 / 05, March 9 - 22, 2007
[72] CYC Press Release for the China (Yunnan) - Cambodia Investment and Trade Fair, 7 April 2007, Intercontinental Hotel, Phnom Penh, Cambodia (translated from Chinese).
[73] Cambodia needs more energy in order to attract more investment for development, *Koh Sontapheap Daily*, 9th April, 2007.
[74] ibid
[75] CYC Press Release for the China (Yunnan) - Cambodia Investment and Trade Fair, 7 April 2007, Intercontinental Hotel, Phnom Penh, Cambodia (translated from Chinese).
[76] If a transmission line company also operates an associated generating project, the transmission company could be tempted to give unfavorable rates to competitors to use the transmission line, thereby making their own electricity more competitive
[77] Mondol Keo, Radio Free Asia "Opposition criticizes the law to guarantee Chinese companies investments", 15 May 2007 (unofficial translation from Khmer by Heng Soy)
[78] e.g. see Wyatt, A. "BOT, Governance and the ADB" in "Good Governance or Bad Management: An overview of the ADB's decision making processes" (2002) published by Focus on the Global South. http://www.focusweb.org/publications/Books/good-governance.pdf

According to the company an initial EIA has been prepared and they are now planning to conduct a detailed EIA. There has, however, been no record of public consultation on this project to date. Reportedly, CYC has claimed there will be no resettlement associated with this project as the dam site is very remote. The company also claims that because the Stung Atay is a seasonal river and is empty of water in the dry season, there will be little impact on fisheries.

CYC also states that the project is not located within the nearby National Park, although acknowledge it is located quite close to it. However, a report prepared by the Tokyo Electric Power Services Co. Ltd (TEPSCO) on the feasibility of the Stung Russey Chrum hydropower project, which is located downstream of the Stung Atay project, indicates that the upper Stung Atay Dam infrastructure and its associated reservoir is located almost wholly within the Central Cardamom Protected Forest area and will flood a substantial amount of the protected area (Figure 3). Flooding of the protected forest by the Stung Atay project could have serious environmental implications (Box 1).

The TEPSCO study identifies a number of social and environmental impacts from the Lower Stung Russey Chrum project (see section 3.3.5). Presumably, therefore, similar impacts could be expected to result from the Stung Atay Hydropower Project.

Box 1: Hydropower Dams in the Cardamom mountains

Many of the hydropower projects currently undergoing feasibility study are located in the central Cardamom Mountains range, known as the monsoon catcher of the Indo-Burma region (Figure 3). Located in the Southeast of Cambodia, the Cardamom Mountains range is the largest continuous and almost pristine rainforest in mainland Southeast Asia. The Cardamom Mountains are globally recognized for their exceptional biodiversity of mammals, birds, reptiles and amphibians, which includes many globally threatened species such as Indochinese tiger, Asian elephant, Malayan Sunbear, and Siamese crocodile. The torrential seasonal rainfall, which can reach up to six meters per year in some areas, sustains the forests and feeds five of Cambodia's major rivers, some of which are now proving attractive to hydropower dam developers. The impact that hydropower development would have on the Cardamom Mountains remains unevaluated.

Three contiguous protected areas cover the Cardamom Mountain range, from West to East, comprising the Phnom Samkos wildlife sanctuary, the Central Cardamom Mountains protected forest, and the Phnom Aural wildlife sanctuary. The total combined area of the protected areas amounts to almost 1,000,000 hectares. The Ministry of Environment, with support from the NGO Flora and Fauna International, works to protect the two wildlife sanctuaries, whilst the Forestry Administration, with support from the NGO Conservation International, safeguards the protected forest area.

Several international conservation organizations have recently suggested that the region would qualify as a UNESCO World Heritage Site, although there appears to be a reluctance by some senior decision-makers to submit the area for consideration. They argue that the development potential of the area, including its hydropower potential, should be evaluated before committing to designating the area as a World Heritage Site.

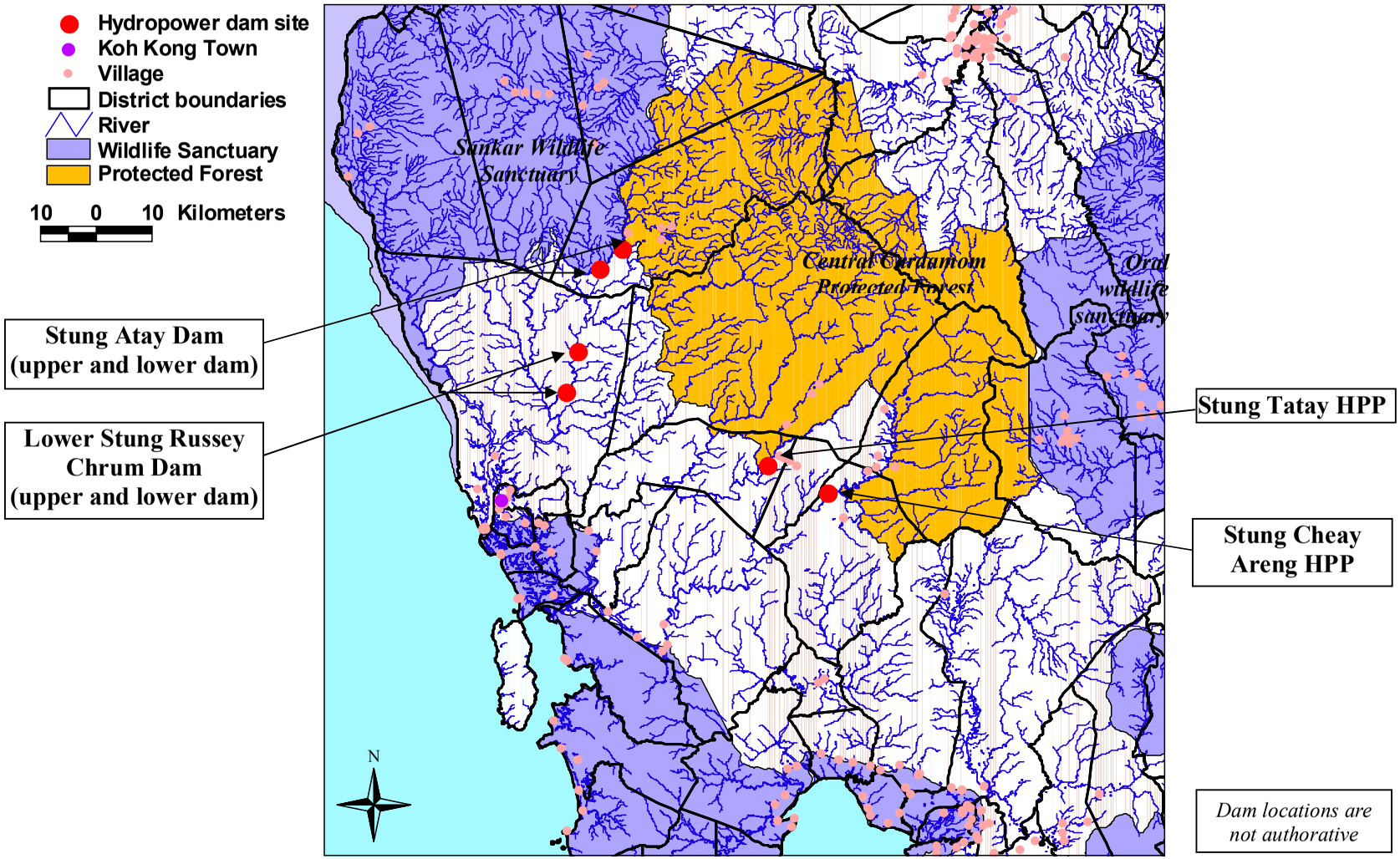

Figure 3: Approximate location of hydropower schemes located in Cambodia's the Cardamon Mountain range: with the exception of Lower Stung Russey Chrum Dam, all project's reservoirs will likely inundate areas of the protected areas.

3.3.5 Lower Stung Russey Hydropower Project (Feasibility study stage)

At the Yunnan - Cambodia Investment and Trade Fair in Phnom Penh in April 2007, CYC and YSE signed an MoU to co-develop the Lower Stung Russey Hydropower Plant in Koh Kong province. The signing ceremony was presided over by Cambodia's Deputy Prime Minister, H.E. Sok An[79, 80]. Until very recently, this project was under study by Tokyo Electric Power Services Co. Ltd (TEPSCO), which produced a draft feasibility report dated August 2006 and had investigated the project since March 2002[81]. The project is located 20 km north of the provincial capital of Koh Kong in Mondol Seima district, Koh Kong province, in the Stung Russey Chrum river basin.

According to the TEPSCO draft feasibility study, the optimum configuration for the hydropower scheme consists of an upper dam 89 meters high installed with 128 MW of generating capacity, and a lower dam 50 meters high installed with a generating capacity of 107 MW. According to the TEPSCO design, the scheme is estimated to cost US$290 million and would be capable of providing a stable supply of electricity throughout the dry season.

According to the TEPSCO report, the reservoir will inundate around 920 ha of tropical/ semi-tropical rain forest ecosystem. It states, however, "No permanent communities are located in and around the impoundment area and relocation of residents will not occur. There is no farmland, pastureland, lumber logging and fishery either… No cultural heritages, such as archeological and historic sites, exist in and around the project area. Ecological impact would not be extensive… since the impounded area by this Project is not so large."

The TEPSCO report does, however, acknowledge that the project will result in negative changes in water quality from nutrient trapping in the reservoir and oxygen depletion. Surprisingly, the report does not call for clearance of vegetation in the reservoir (beyond selective logging) to minimize impacts on water quality from rotting vegetation. Significant changes to sediment transport along the river are also expected, resulting in the loss of downstream sandbars and erosion of the river banks. The report also notes that the hydropower station will be operated in accordance with changes in daily demand for power and therefore downstream water levels could fluctuate between 1 and 2 meters, possibly within the space of only ten minutes. The report concludes a re-regulating dam is not necessary although the justification for this is not explained. Instead the report recommends an alarm system be put in place, although the effectiveness of this measure is not explored.

The report states that the Russey Chrum River is rich in freshwater fish and lowland species of amphibians and reptiles, but suggests that fish presently in the river will be adaptable to the new conditions resulting in the long-term in "a diminished but stable population of fish". No scientific evidence is presented to support this assumption, however, which appears to be only the speculation of the consultants. It is well known, however, that water quality problems, changes in sediment load, and changes in water flow seriously impact fisheries. The consultants also claim that there are no major fishing activities in the river.

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[79] http://news.xinhuanet.com/english/2007-04/07/content_5947257.htm

[80] Cambodia needs more energy in order to attract more investment for development, *Koh Sontapheap Daily*, 9th April, 2007.

[81] TEPSCO (2006), Lower Stung Russey Chrum Hydropower Project, Draft Final Report. August 2006.

Overall, the report concludes that construction of the Lower Stung Russey Chrum hydropower project will lead to physical and ecological changes in the river, possibly down to the estuary environment. Whilst no permanent communities are located immediately downstream of the project, the report states that permanent settlements 20 km downstream and beyond could be affected and the possible social impacts require further study. The report is unclear on how non-permanent populations utilize the river and its resources. The consultants also caution that there is an overall lack of ecological and sociological data by which to determine potential impacts from the project and that further detailed investigation is required.

3.3.6 Stung Cheay Areng Hydropower Project (Feasibility study stage)

At the GMS expo in Nan Ning in October 2006 the China Southern Power Grid Company Limited signed an MoU with MIME to conduct a feasibility study for the Stung Cheay Areng hydropower project and an associated high-voltage transmission line, in Koh Kong province[82]. An undated MIME report 'Hydropower Developments in Cambodia', identifies that the project would have a 110 km^2 reservoir, a dam height of 55 meters and an installed capacity of 260 MW[83].

The project's current design will inundate nine villages located in the proposed reservoir area that are comprised mostly of indigenous communities with a combined population of over 1,500 people[84] (Figure 3). The reservoir will flood between 1,500 and 2,000 ha of indigenous land belonging to these villages, including 500 ha of sacred forest. The Upper Areng Valley is also the known habitat of some of Cambodia's rarest wildlife, including 31 species of mammals, birds, reptiles, fish and amphibians that are globally threatened with extinction, counting amongst them the Siamese Crocodile, one of the world's rarest crocodile species whose global population is less than 200 individuals and for whom the Upper Areng Valley is the most important of only six known breeding sites.

Downstream of the proposed dam location, the river's flow regime presently seasonally inundates 600 ha of rice paddy belonging to 500 families in Trapeang Rung village, and flushes out saline water entering the river in the dry season thus ensuring the viability of approximately 1,500 ha of rice paddy in the coastal zone upon which at least 1,800 people depend. Dam construction threatens both areas of rice production. Changing the rivers hydrology also threatens the wider ecology of the river in the Lower Areng Valley, including wet-season fish production in 1000 ha of seasonally inundated swamp forests. These wild-capture fisheries are an important source of protein for the area's population, as well as a source of income.

3.3.7 Stung Tatay Hydropower Project (Feasibility study stage)

On 18 January, 2007, MIME signed an MoU with the China National Heavy Machinery Corporation to develop a feasibility study for the 80 MW Stung Tatay hydropower project in Koh Kong province[85]. The project is located in Thmor Bang District, Koh Kong Province, and is estimated to cost US$215 million. According to an undated MIME report, the project would have a 33 km^2 reservoir and a dam height of 55 meters.

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[82] http://www.csg.net.cn/news/compnewscon.aspx?id=8725&ItemCode=009001000000

[83] Undated MIME report summarized on page 2-8 of TEPSCO (2006), Lower Stung Russey Chrum Hydropower Project, Draft Final Report. August 2006.

[84] Field report by Conservation International

[85] Chinese will invest in one of the biggest hydropower projects in Koh Kong, *Rasamei Kampuchea, 19 January 2007*

Whilst limited details are currently available regarding this project, it appears to be located on the boundary of the Central Cardamom Protected Forest and its reservoir would extend into the protected area (Figure 3). Initial field research has indicated that there are a number of villages upstream and downstream of the project that could suffer impacts from the project, as well as a diversity of flora and fauna[86]. The field investigation, conducted in June 2007, found there was very little awareness about the project and its possible impacts amongst nearby communities, and none had been consulted about the project by the project developers.

3.3.8 Sambor Hydropower Project (Feasibility study stage)

The proposed Sambor Hydropower Project would be located on the Mekong mainstream in Sambor District, Kratie Province, Cambodia approximately 35 km north of Kratie Town and just south of a 40 km-long river island on which 5 villages are located. The Cambodian government has been eager to build the project for decades, but political circumstances, difficulty raising the funds and the project's considerable environmental and social impacts have prevented it from doing so until now.

In early November 2006, the China Southern Power Grid Company announced that its subsidiary, the Guangxi Power Industry Surveying and Design Institute, would conduct a new feasibility study for the Sambor Hydropower Project. China Southern Power Grid Company had earlier signed an MoU with MIME at the GMS expo in Nan Ning in October 2006[87].

According to newspaper reports, China Southern Power Grid Company is considering two design options[88]. A larger scheme, proposed by the Mekong Secretariat, would see a 10 km long, 54 meter high barrage blocking the Mekong River to create a reservoir of 880 km^2 and generating 3300 megawatt of electricity. Alternatively, a smaller scheme would result in a reservoir of 6 km^2 and generate 465 megawatts of electricity[89].

The company has already commenced a geological survey of the proposed site, although villagers have not yet been fully informed of the potential impacts of the project. However, some villagers have been told that if the project does go ahead, those requiring resettlement would be relocated close to a highway 20 kilometers away.

Detailed evaluation of the environmental and social impacts of the Sambor project is yet to be conducted. The 1994 Mekong Secretariat study of the larger 3,300 megawatt project indicated that 5,120 people would be resettled. A recent assessment by MIME suggested that whilst the larger 3300 MW scheme would have environmental impacts, the smaller scheme would not. Even hydropower consultants TEPSCO, who have promoted other hydropower development in Cambodia, expressed surprise at this evaluation of the smaller scheme, writing "dam construction in the Mekong would have a serious influence on social and environmental aspects."[90] In fact, it is highly probable that both projects would have an inevitable and massive impact on the Mekong River's fisheries, including commercially important species such as the migratory catfish and more exotic species, such as the world's largest freshwater stingray.

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[86] Kimkong, H. "*Draft:* Domestic Hydropower Dam Projects in Cambodia"*, in preparation*.
[87] China Southern Power Grid to build ASEAN electricity highways, *Guangxi Daily* 9 November 2006 http://www.gx.xinhuanet.com/ca/2006-11/09/content_8468809.htm
[88] Chinese Firm To Study Possible Mekong Dam Site, *Cambodia Daily*, 5-6 May, 2007
[89] "Mekong Mainstream Run-of-river Hydropower", Mekong Secretariat, December 1994.
[90] TEPSCO (2006), Lower Stung Russey Chrum Hydropower Project, Draft Final Report. August 2006.

Research by the Mekong River Commission (MRC) identifies, for example, estimates that 75 percent of the total catch from the dai fisheries of Tonle Sap Lake depend on the availability of deep pool fish habitats in Northern Cambodia (from Kratie to the Khone Falls and in the Sesan/Srepok/Sekong catchment)[91]. The research goes on to note that the Sambor rapids and associated deep pools are important fish habitats, particularly for spawning and refuge purposes, and as such construction of the Sambor dam would have "significant" impacts on migratory fish stocks because, according to the MRC[92]:

- the dam would change the hydrology and water levels for a significant distance upstream and downstream of the proposed dam site, including the deep pool stretch between Kratie and Stung Treng. This would eventually lead to deep pool refuge habitats filling up with sediment and disappearing.
- the dam would cut, or significantly impair, migration corridors between floodplain habitats in the south and refuge habitats in the north.
- the dam would interfere with the larval drift system, causing increased direct mortality as well as indirect mortality due to the fact that changed hydrological patterns would prevent larvae from reaching their "intended" destination

IUCN has also identified the Sambor Dam to be a serious threat to the habitat and movements of the endangered Irrawaddy dolphin and its prey, whose territory include numerous deep water pools close to the location of the dam[93].

In an assessment of the transboundary impacts of large water infrastructure, the World Bank and the Asian Development Bank also flagged risks associated with the development of mainstream dams. Observing the significant potential for hydropower development on the Mekong mainstream, they wrote "even a run-of-river dam would inundate a comparatively large area and would have major impacts on fish migration in that stretch of the river. Such development would pose serious ecological, social and economic risks that could outweigh the potential benefits from power generation"[94].

[91] MRC Technical Paper No. 8, October 2002, "Fish migrations of the Lower Mekong River Basin: implications for development, planning and environmental management"
[92] ibid
[93] http://www.iucnredlist.org/search/details.php/44555/doc
[94] World Bank and Asian Development Band, "Joint Working Paper on Future Directions for Water Resources Management in the Mekong River Basin, Mekong Water Resources Assistance Strategy (MWRAS)", June 2006.

Chinese survey boat at Sambor Dam site, June 2007 (Photograph credit: TERRA)

3.3.9 JICA hydropower masterplan for Cambodia

Since July 2007, the Japan International Cooperation Agency (JICA) has been working on a study with MIME to develop a domestic hydropower masterplan, covering the years 2007 to 2027. JICA has conducted a desk-based evaluation of 29 potential projects selected by MIME, according to socio-economic impacts, environmental impacts, project technical issues, economic and financial considerations, and speed of construction criteria. Detailed field surveys are now to be undertaken for the ten projects considered most viable and not already under development[95]. Of concern, eight of these ten potential additional projects are located within protected areas, namely:

- Prek Liang I, IA, and II are located in Virachey National Park
- Stung Metouk II and II are located in Phnom Samkos Wildlife Sanctuary
- Stung Kep II is located in Peam Krasop Wildlife Sanctuary
- Upper Stung Russey Chrum and Bokor Plateau are located in Bokor National Park.

3.3.10 Hydropower schemes on the Sesan and Srepok rivers

The Cambodian government also plans to construct a number of major hydropower schemes on the Sesan and Srepok Rivers, both of which originate in Vietnam's central highlands and flow westwards into Northeast Cambodia before discharging into the

[95] The ten projects selected for further investigation are: Lower Srepok III and Lower Se San III; Prek liang I; Prek Liang IA; Prek Liang II; Middle Stung Russey Chrum; Stung Metoek III; Sung Kep II; Upper Stung Russey Chrum; and Bokor Plateau.

Mekong River. Electricity from the projects would most likely be exported to Vietnam, where the demand for power is growing rapidly.

In August 2006, the Cambodian government announced that it had requested the government of Vietnam to conduct a hydropower feasibility study for the Sesan River, and in June 2007 it was reported that Electricity of Vietnam, the state-owned utility, had signed an agreement with MIME to undertake a feasibility study on the construction of the Lower Se San 1 (90 MW) and Lower Se San 2 (420 MW) [96, 97].

The link between both rivers and the local peoples' livelihoods are well documented, and construction of these dams is likely to have serious environmental and social consequences[98].

[96] 'EVN to Look at Cambodia Power Projects,' VNA, 16 June 2007. http://www.thanhniennews.com/business/?catid=2&newsid=29115

[97] 3SPN (2007) 'Background Briefing Paper 2: Recent Hydropower Developments on the Sesan River', *published January 2007*

[98] For example, see Rutkow, E., Crider, C., and Giannini, T. 2005. "Down River: The consequences of Vietnam's Se San River Dams on Life in Cambodia and Their Meaning in International Law". Published by NGO Forum on Cambodia; and Swift, P. 2006. "Livelihoods in the Srepok River Basin of Cambodia: A baseline survey," Published by NGO Forum on Cambodia.

4. Chinese hydropower companies and their financiers

4.1 Introduction

Political ties between Cambodia and China have warmed considerably in recent years, smoothing the way for increased economic interdependence and trade. In an interplay of politically motivated "development aid" and profit-driven entrepreneurial spirit, Chinese State Owned Enterprises (SOEs) have committed to investing in a number of high-profile infrastructure projects including hydropower dams, bridges, and highways[99]. The Chinese government's "Going-out" policy, which was formally adopted in China's 10th 5 year plan (2001-2005), often backs-up larger Chinese firms' ventures overseas by providing government-backed soft loans and export credits from government-supported "Policy Banks," such as the China Export-Import bank. Other projects, however, secure loans from domestic banks at commercial rates under a conventional commercial operation model. In Cambodia, China was the largest single investor in 2007 with US$763 million in investment approvals[100]. In contrast, in 2003 and 2005, Chinese investment stood at only US$45 million and US$448 million[101] respectively.

This section introduces the key Chinese financial institutions and Chinese companies involved in developing hydropower projects in Cambodia. The environmental policies of the lending institutions are detailed, and commitments by several of the Chinese companies to environmental and social standards through their affiliation with professional industry organizations are also outlined.

4.2 Chinese banks funding hydropower projects in Cambodia

It was not possible to conclusively identify the source of financing for any of the hydropower projects at an advanced stage of planning or approved for construction in Cambodia during the course of this research. There is, however, some evidence to suggest that the China Export-Import Bank and the China Development Bank are financing the Kamchay and Stung Atay hydropower projects respectively. Both banks are 'policy banks' that largely implement the macroeconomic policies and political directives of the Chinese central government. In combination with Sinosure, which was recently established as one of China's official export credit agencies (ECA), these "policy banks" constitute the official overseas lending arms of the Chinese central government.

When compared against the already less-than-admirable environmental and social standards of Western bilateral donors and ECAs, it is of concern that the Chinese institutions are notably weaker. In numerous cases around the world, environmentally and socially risky projects are underway or planned with the support of Chinese financing (in part because Western companies have already secured the rights to the more lucrative investment opportunities). According to a recent assessment by the BankTrack network "currently Chinese banks view environmental issues as a matter of charity rather than a

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[99] See "Building Friendships, Building Dams: China's Charm Offensive in Southeast Asia Bodes Ill for Mekong Basin Rivers", World Rivers Review, June 2007.
http://www.internationalrivers.org/files/WRR%20Sept%202007-11fi.pdf

[100] "Chinese investment pouring into Thailand's neighbours", The Nation, December 3rd, 2007

[101] China's growing influence in Cambodia, *Asia Times On-line*
http://www.atimes.com/atimes/southeast_asia/hj06ae01.html

core business issue - similar to how Western banks viewed their environmental responsibility ten years ago."[102]

The reality is that many borrowing governments, including the Cambodian government, are pleased to accept Chinese support, mainly for the construction of physical infrastructure, that dispenses with burdensome and costly environmental and social safeguards standards in order to accelerate their economic development. The Chinese government, which maintains strong political ties with a number of internationally criticized governments such as Burma, Sudan and Zimbabwe amongst others, considers even serious human rights abuses an internal affair. As such, grants and loans through which the Chinese State Council's foreign policies are implemented are not attached to conditionalities on good governance.

4.2.1 China Export-Import Bank (China Exim)

Established in 1994, China Exim is one of China's two official export credit agencies. China Exim works to finance the overseas operations of Chinese businesses and promote Chinese exports. Aligned with the strategic interests of China's government, particularly in the spheres of industry, trade and foreign investment, it finances physical infrastructure and offers concessional loans in order to strengthen economic and political cooperation between China and partner countries, as well as promote exports from China.

China Exim is supervised by the State Council[103]. In addition, the Ministries of Finance and Commerce, the Peoples' Bank of China, and the China Bank Regulatory Commission oversee some aspects of its business activities[104]. Services offered by the China Exim Bank include: export credits; lending on foreign government loans for projects in China; foreign exchange guarantees; and administration of Chinese government concessional loans to foreign governments. State Owned Enterprises (SOE) are the primary recipients of China Exim Bank's loans[105]. China Exim Bank is the sole lender of concessional loans (low interest or subsidized) on behalf of the Chinese government, and the Ministry of Commerce guides important decisions on these loans [106]. Furthermore, for projects worth more than US$100 million the State Council must approve lending decisions. This arrangement allows a political considerations to influence important decisions that the China Exim Bank must take.

China Exim is one of the world's largest ECAs. In 2005, China Exim approved loans worth approximately US$20 billion (RMB 158.6 billion), and had a total export/ import volume of US$1.4 trillion that ranks it third largest in the world[107]. If the bank's target growth rates are achieved, its lending will grow to around US$40 billion by 2010, which is significantly larger that any other ECA globally as well as that of the World Bank[108].

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[102] For an excellent and current assessment of the Chinese domestic and international banking sectors read Chan-Fishel, M. (2007). Time to Go Green: Environmental Responsibility in the Chinese Banking Sector. Published by the BankTrack Network and Friends of the Earth.
[103] Bosshard, P. (2007) China's Role in Financing African Infrastructure. *Published by International Rivers Network*. www.internationalrivers.org/en/africa/china-s-role-financing-african-infrastructure
[104] ibid
[105] ibid
[106] 'Power Rates Won't Go Down if Loan Interest is High', *Cambodia Daily,* October 28 2005
[107] The Export-Import Bank of China, (2005). Annual Report.
[108] Bosshard, P. (2007) China's Role in Financing African Infrastructure. *Published by International Rivers Network*. www.internationalrivers.org/en/africa/china-s-role-financing-african-infrastructure

Civil society groups have accused China Exim of undermining environmental and social standards by supporting risky development projects that other ECAs have rejected. For example, the China Exim Bank provided US$520 million to support the 1250 MW Merowe Dam on the Nile in Northern Sudan to be completed in 2008/2009. The total cost of the project is US$1.2 billion, with the remainder made up by the Sudanese government and bilateral support by financial institutions from Arab countries. The project will result in the displacement of 50,000 people from the fertile Nile valley to arid desert land, as well as massive environmental impacts. The project had previously been rejected by COFACE, the French ECA.

Multilateral financial institutions, such as the World Bank and the ADB, also increasingly view Chinese lending, including that of the China Exim Bank, as a threat to their loans. Chinese loans are often appealing to borrowing governments because they come without the environmental and social safeguards that the multilateral development banks have adopted. There is concern amongst civil society that a 'race to the bottom' may ensue, with traditional development banks, such as the World Bank and the ADB, lowering their standards to compete with the more readily accessible Chinese financing and thereby maintain their loan portfolios. A growing coalition of Chinese and international NGOs, together with some Organization for Economic Cooperation and Development (OECD) ECAs, are calling on the China Exim Bank to adopt the 'Common Approaches to the Environment and Officially Supported Export Credits' that ECAs of OECD countries signed up to in December 2001[109, 110, 111].

In contrast to China Exim, most ECAs are nowadays concentrating on commercial transactions rather than aid and concessional loans[112]. OECD countries, since 1992, claim they have worked with their national ECAs to ensure that grants or concessional loans are linked only to genuine aid projects, because when tied to commercially viable projects, such as energy projects, this can create an unfair advantage for companies based in the donor country. Recently, some OECD ECAs have expressed concern that China Exim's increasingly influential concession lending practices are not cooperating with international efforts to reduce the trade-distorting efforts of tied-aid[113].

China Exim is known already to have supported controversial projects in Cambodia. For instance, in 2001, China Exim provided a soft loan of $70 million to China Cooperative State Farm Group to establish a massive plantation in Kompong Chhnang and Pursat provinces in partnership with the Cambodian company Pheapimex. In mainland Southeast Asia, China Exim has been linked to several dubious hydropower projects including: the Nam Mang 3 Dam in Laos, which is blamed for opening the area up to illegal logging and destroying local spawning grounds and the habitat of several endangered species; and a US$200 million loan for the construction of the Yeywa Dam

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[109] Recommendation on Common Approaches on Environment and Officially Supported Export Credits, formally adopted by the OECD Council on December 18, 2003.
[110] Bosshard, P. (2007) China's Role in Financing African Infrastructure. *Published by International Rivers Network*. www.internationalrivers.org/en/africa/china-s-role-financing-african-infrastructure
[111] Suzuki, E. (2007). Bi-lateral Policy orientation in the Multilateral Development Policy: A Challenge for the China Exim Bank and its Accountability. *Chinese Journal of International Law*, published 9th February, 2007.
[112] Chan-Fishel, M. (2007). Time to Go Green: Environmental Responsibility in the Chinese Banking Sector. Published by the BankTrack Network and Friends of the Earth
[113] ibid

in Burma. The Yeywa dam has been criticized for its displacement of local residents and submergence of religious sites, in addition to its implicit support to the military junta[114].

In its 2005 Annual Report, the China Exim Bank President indicated that the bank would contribute "to the strong support for sustainable economic and social development and the harmonious coexistence of human and nature."[115] Bosshard, however, observes that whilst these steps are encouraging "decisions about important projects are not necessarily taken by China Exim Bank's management, but by the Ministry of Commerce (in the case of concessional loans), and the State Council (in case of projects with a size of more than $100 million).[116]"

China Exim Bank adopted an environmental policy in November 2004, although it was only publicly released in April 2007[117]. The policy details are sparse, although there are indications the bank would like to strengthen the policy. According to an unofficial translation from Chinese, the policy states:

> China Exim Bank is paying high-level of attention to our funded projects' environmental impacts. We enhance environmental monitoring and management before, during and after the project implementation
>
> (1) Before – Project Review: China Exim Bank considers projects' environmental impact assessment as one of the basic requirements and elements during the project review. We require the funded projects to conduct feasibility study of environmental impacts, and obtain recognition or approval from the recipient country's environmental administration. Those projects that are harmful to environment or do not gain recognition or approval from environmental administration will not be funded. This policy is enacted throughout thousands of China Exim Bank's funded projects.
>
> (2) During – Project Examination: China Exim Bank conducts regular examination for project implementation, which includes the project's environmental impacts. Once any unacceptable negative environmental impacts have resulted during the project implementation, China Exim Bank will require the implementation unit to take immediate remedial or preventive measures. Otherwise, they will discontinue financial support.
>
> (3) After – Post-project review: When the project is stopped or completed, China Exim Bank will conduct post-project review in project implementation and completion status, and its impacts. Environmental assessment is a necessity in the post-project review. According to the post-project review, China Exim Bank will revise the measures taken before and during the project implementation for similar projects. If necessary, the related requirements and policies will be fully revised.

Following the environmental policy's public release, a number of NGOs submitted to China Exim Bank in September 2007 detailed recommendations regarding how this policy can be strengthened. The recommendations identify generally accepted elements of good practice in environmental assessment, and present examples of such practice

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[114] Akimoto, Y. 2004. Hydro-powering the regime. *Irrawaddy* Published 30 June 2004. http://www.threegorgesprobe.org/pi/index.cfm?DSP=content&ContentID=10963

[115] The Export-Import Bank of China, 2005 Annual Report.

[116] Bosshard, P. (2007) China's Role in Financing African Infrastructure. *Published by International Rivers Network*. www.internationalrivers.org/en/africa/china-s-role-financing-african-infrastructure

[117] http://www.pacificenvironment.org/article.php?id=2362

from the policies of other financial institutions from industrialized and developing countries[118].

4.2.2 China Development Bank

The China Development Bank (CDB), founded in 1994, is China's largest state policy bank and is under the direct jurisdiction of the State Council, which appoints the Board of Supervisors and Governors. The Governor of the bank is Mr. Chen Yuan, a government Minister. Board members include representatives from the Ministry of Finance and the China Banking Regulatory Commission.

CDB has traditionally lent only to key domestic infrastructure projects. Recently, however, the CDB has begun to offer some services to overseas buyers of Chinese goods and services. At present, overseas loans constitute just under two percent of its loan portfolio. CDB has significant experience in lending to the power sector; funding from CDB constitutes 21% of total lending to China's domestic power sector and 19.4% of CDB's loan portfolio[119]. It has financed, among other power projects, the Three Gorges Dam and the Guangdong Ling'ao Nuclear Power Station.

CDB publicly disclosed a summary of its environmental policy in its 2004 global bond prospectus, although it appears to refer predominantly to its domestic loans and it is not clear whether the policy applies to its overseas lending[120]:

> "In recent years, environmental compliance has become an aspect of our loan evaluation process. We will not consider a loan application complete until the applicant has obtained approval from the relevant environmental agencies and we are otherwise satisfied with its environmental compliance. Under the Law on Environmental Impact Assessment effective September 1, 2003, project companies must submit environmental impact assessment reports to the State Environmental Protection Administration at the relevant national, provincial or local levels with respect to environmentally sensitive projects. In accordance with this law, the State Environmental Protection Administration has published a catalog, which lists environmentally sensitive projects and specifies the requirements and coverage of their environmental impact assessment reports. The catalog currently lists many industries subject to this reporting requirement, including coal mining, oil and gas exploration and development, pulp mill, petroleum refinery, chemical and petrochemical production, machinery and equipment manufacturing, power generation and transmission, hydropower facilities, urban transportation infrastructure, waste disposal facilities, railways, highways, ports, and nuclear facilities. A project company must engage an independent and qualified environmental appraiser to assess the environmental impact and to prepare the report for submission to the government. In addition, the law does not permit any project listed in the catalog to begin construction until government regulators are satisfied with the environmental impact assessment."

Chan-Fishel observes, "many large-scale projects funded by CDB, most notably the Three Gorges Dam and the South-to-North Water Diversion project, have dubious environmental reputations. A reflection of its role as a state policy bank, CDB bases its finance decisions on state priority; thus funding for projects are based on the political

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[118] http://www.internationalrivers.org/en/china/chinas-global-role/civil-society-recommendations-regarding-china-exim-banks-environmental-poli

[119] Chan-Fishel, M. (2007). Time to Go Green: Environmental Responsibility in the Chinese Banking Sector. Published by the BankTrack Network and Friends of the Earth

[120] Luxemburg Stock Exchange Listing Offering Circular : China Development Bank, October 5th 2004. www.cdb.com.cn/cdb_c/upfile/europrospectus.pdf

favor and priority they receive from the government, not necessarily on the impact they have on the environment."

4.3 Chinese hydropower companies operating in Cambodia

In China, since the 1950s under the planned political economy, State Owned Enterprises (SOEs) have been the predominant organizational arrangement responsible for the production of goods and services for the Chinese economy. The original form of an SOE in China entailed the State holding all property ownership and managerial rights to the company, which operated to fulfill the production plans prepared by the government. Since China's gradual shift to the market economy starting in 1992, SOEs have transitioned towards a model comparable to that of a US corporation, in which state ownership and the SOE management rights are separated, and SOE executives are directly responsible for maximizing the SOE's profits[121]. Furthermore, ownership of an SOE may now include non-state actors, although in key industries at least, the state typically remains the majority shareholder of the SOE.

Contracts for overseas infrastructure projects that are financed through Chinese concessional loans or grants are typically awarded to Chinese SOEs, much the same as Western aid is usually tied to funding Western companies and consultancies. In Cambodia, all of the Chinese hydropower developers known to be active are SOEs. None of the companies have an environmental policy on their websites.

4.3.1 Sinohydro Corporation

Sinohydro Corporation, formerly known as the China National Water Resources and Hydropower Engineering Corporation, is China's largest hydropower company[122]. It has 20 wholly owned subsidiaries, four holding companies, 16 overseas divisions, and around 35,000 employees. Sinohydro has been involved in the construction of approximately 80% of China's large- and medium-scale dams, including the Three Gorges Dams on the Yangtze River in Hubei province, and the Manwan, Dachaoshan and Xiaowan dams on the Mekong mainstream in Yunnan Province[123].

Sinohydro is owned entirely by the Chinese central government, and its assets and finance is managed by the Ministry of Finance[124]. Sinohydro Corporation's specialties are wide-ranging, and include: investment; project financing; consulting; construction; mechanical and electrical plant manufacture and installation; construction equipment manufacture; and trading in the industries of water conservancy, power generation, transportation, public utilities, and building. According to the construction industry magazine *Engineering News Record*, Sinohydro was the world's 68th largest construction contractor in 2006, up from 136th in 2000[125]. In 2006, the China Enterprises Federation and China Entrepreneurs Association ranked Sinohydro 93rd in a list of the top 500 Chinese enterprises.

Sinohydro has recently been involved in several controversial international hydropower projects. Sinohydro is a major contractor for the contentious 1250 MW Merowe Dam on

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[121] Schipani, C.A. and Liu, J. (2002). Corporate Governance in China: Then and Now. *Columbia Business Law Review*.
[122] www.conexpoasia.com/EN/overview/partners/index.asp
[123] Sinohydro 'downgraded' over accident record', Kelly Haggart, *Financial Times* 1 September 2006
[124] Sinohydro is one of 155 state-own companies under direct supervision of state-owned assets supervision and administration commission of the state council (www.sasac.gov.cn).
[125] http://enr.construction.com/people/topLists/topIntlCont/topIntlCont_A-Z.asp

the Nile in Northern Sudan, financed largely by the China Exim bank[126]. In June 2006, Sinohydro signed a contract with the Electricity Generating Authority of Thailand to develop the controversial Hatgyi Dam on the Salween River in Burma. Sinohydro has numerous other dams proposed in the Mekong Basin, including the Nam Ou 8 in Laos, which if constructed would affect approximately 50,000 people, and inundate parts of an important national biodiversity conservation area.

Sinohydro Corporation was criticized in an annual performance review of SOEs conducted by the state-owned Assets Supervision and Administration Commission for unspecified "safety or environmental pollution accidents."[127]. Sinohydro was one of four companies downgraded out of a total of 166 centrally owned SOEs assessed for their 2005 performance. This reprimand followed similar criticism by the National Audit Office for Sinohydro's poor quality work on Yangtze River flood control structures in 2004, for which the company was fined.

4.3.2 China Electric Power Technology Import & Export Corporation (CETIC)

CETIC is a limited liability subsidiary of the state-owned State Grid Corporation of China. CETIC's main businesses are: international project contracting; import and export trade; and industry investment[128]. CETIC has been in operation for over 20 years. According to the company's website it "always focus on hydro power industry … and domestic or foreign power construction projects."[129]

4.3.3 The China Yunnan Corporation for International Techo-Economic Cooperation (CYC)

CYC is a SOE directly supervised by the Yunnan Provincial government, approved by the central government on 12th June 1984[130]. The company specializes in trade and investment. Its main business interests include: overseas project contracts; dispatching overseas experts and labor force from China; establishing joint companies and solely owned subsidiary companies overseas; and implementing Chinese government ODA projects. According to the company's website, CYC is regarded as one of the top 500 companies in China. Since the company was established it has implemented over 140 projects overseas and has sent over 9000 experts and technicians overseas. Projects that the company have been involved in include[131, 132]:

- Mauritius: Airport and roads (10 large/ medium scale project)
- Burma: Sugar processing factory, seafood processing factory, bamboo pulp factory[133]
- Pakistan: Bridge, water supply system, sewage treatment plant (6 projects)
- Maldives: Residential buildings, power plants, commercial buildings, the National Assembly building, and a seawater treatment plant
- Laos: Cement factory, electricity sub-stations, airport runway, water pipes, Laos National Culture Centre
- Vietnam: Aluminum factory

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[126] Bosshard, P. (2007) 'China Exim Bank in Africa', published by International Rivers Network.
[127] Sinohydro 'downgraded' over accident record', Kelly Haggart, *Financial Times* 1 September 2006
[128] http://www.winne.com/asia/cambodia/2004/to04.php
[129] http://www.cetic.com.cn/Template/English/catalog.jsp?currCatalogID=20060216928892
[130] www.bofcom.gov.cn/bofcom/438822787226796032/20051113/4851.html
[131] ibid
[132] http://wjc.yunnan.mofcom.gov.cn/aarticle/swyj/200611/20061103611337.html
[133] http://www.mofa.gov.mm/news/jan01_sat05_4.html

CYC has had an office in Phnom Penh since 2004 and is registered in Cambodia as 'Cambodia Hydropower Development Co. Ltd.' However, CYC is not a hydropower company. Rather, it specializes in getting contracts and then sub-contracting construction companies to develop the projects. In the case of the Stung Atay hydropower project, at the time of writing, CYC were not known to have yet taken bids from construction companies[134].

4.3.4 Yunnan Southeast-Asia Economy and Technology Investment Industrial Co Ltd (YSE)

YSE, as noted above, was set up especially to develop the high voltage transmission lines associated with the Stung Atay dam project. No further information is readily available on the company.

4.3.5 China Southern Power Grid Limited Company (CSG)

China Southern Power Grid Co., Ltd. (CSG) is a 'super-large' SOE that was established on 29th December, 2002, when it separated from the State Grid Corporation of China[135]. Its core business is managing power purchases and sales, and investment, construction and management of the Southern China power grid network that serves China's five Southern provinces (Guangdong, Guangxi, Yunnan, Guizhou and Hainan). CSG is administered by the Central government, and as such is responsible for implementing the Chinese government's policies and commitments. These include the 'Western Overall Development Program' and the 'West to East Power Transmission' initiative.

The largest shareholder of CSG is the state-owned Assets Supervision Administration of Guangdong Province (37.2%). Other shareholders include China Life Insurance (30%), State Grid Corporation of China (26.4%) and Hainan Provincial government (3.2%)[136]. China Life Insurance is China's largest insurance company and is registered on the Shanghai stock-exchange[137]. All major decisions of CSG must be approved by the Central government, which is also responsible for appointing the company's Board of Governors.

The CSG has been appointed by the State Council to be executor of the Greater Mekong Sub-region (GMS) power cooperation program on behalf of the Chinese government. In this role, at regional GMS meetings, such as the Regional Power Trade Coordination Committee, a delegation from the company represents the Chinese government[138]. On the ground, CSG began exporting power to Vietnam in 2004 through a 110 kV transmission line from Yunnan Province. The CSG website notes the project "marks the beginning of supplying Chinese electric power in large scale to the neighboring countries". In 2007, a total of five transmission lines will export 2.5 billion KWh of

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[134] Meeting between CYC and Oxfam America project officer, April 2007.
[135] http://www.csg.net.cn/english.aspx
[136] http://translate.google.com/translate?hl=en&sl=zh-CN&u=http://finance.sina.com.cn/blank/qygc3.shtml&sa=X&oi=translate&resnum=2&ct=result&prev=/search%3Fq%3D%25E5%259B%25BD%25E6%259C%2589%25E6%258E%25A7%25E8%2582%25A1%2B%25E5%258D%2597%25E6%2596%25B9%25E7%2594%25B5%25E7%25BD%2591%26start%3D10%26hl%3Den%26newwindow%3D1%26sa%3DN
[137] www.newsgd.com/business/enterprise/200612110032.htm
[138] http://www.adb.org/GMS/sector-activities/energy.asp

electricity to Vietnam[139]. The power exports to Vietnam are taking place despite periodic power shortages in the south of China - according to newspaper reports, Vietnam pays 4.5 US cents per KWh, which is much higher than the power tariff in many of China's regions that are heavily subsidized. In June 2007, an agreement was signed for Thailand to purchase around 3000 MW of power from China by 2017[140].

CSG has also engaged in direct cooperation with Burma. At the Nan Ning GMS Expo in October 2006, the President of CSG discussed with the Burmese minister responsible for electricity the company's potential involvement in the controversial Tasang Dam on the Salween River for electricity imports to China[141].

Beyond direct import/export of electricity with China to neighboring countries, CSG's mandate extends to investing in other domestic and foreign projects. In 2007, CSG had signed MoUs with Laos and Cambodia on three hydropower projects with an installed capacity of 3520 MW, and is also involved in the construction of generation and transmission facilities in Vietnam[142].

4.3.6 China National Heavy Machinery Corporation (CHMC)

CHMC is a SOE established in 1980 that, according to its website, specializes in: the contracting of complete plant and technology for construction projects at home and abroad; import and export; and equipment tendering[143]. The company has worked in more than 20 countries and has contracted over 800 large and middle sized projects in the fields of metallurgy, mining, ports, construction materials, forging and pressing, urban water supply, environmental protection, electrical power, bridges, railways, grain depots, airports, urban construction, chemical industry, water conservation, and nuclear power.

CHMC's experience with hydropower projects began in Burma in March 2004 when it signed an agreement with the military government to build the Kun Hydropower Project. Since then, in September 2005, CHMC joined a consortium of Chinese companies building the 790 MW Yeywa Dam, taking a US$ 45.84 million contract to construct the project's transmission lines[144].

4.4 Corporate and Social Responsibility of Chinese Hydropower Companies

Several of the larger SOEs developing hydropower projects in Cambodia are members of professional associations that require their membership to aim to abide by a code of conduct. Whilst there is no evidence that these standards are rigorously adhered to, such commitments indicate at least a token signal on the part of the companies in recognizing the need for minimum environmental and social standards when carrying out their business.

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[139] 'China to export 2.5 bln kwh of electricity to Vietnam this year', People's Daily (via Xinhua). 29 April 2007. http://english.people.com.cn/200704/29/eng20070429_370874.html

[140] "Thailand to Buy Power From China in Next Decade to Meet Demand", Bloomberg 25 June 2007. http://www.bloomberg.com/apps/news?pid=20601080&sid=axEK4_oNJVhY&refer=asia

[141] http://www.csg.net.cn/english.aspx

[142] 'China to export 2.5 bln kwh of electricity to Vietnam this year', People's Daily (via Xinhua). 29 April 2007. http://english.people.com.cn/200704/29/eng20070429_370874.html

[143] http://www.chmc2003.com:8640/gsjj.htm

[144] Chinese companies building hydropower projects in Myanmar, *Peoples Daily Online* 2 September 2005. http://english.people.com.cn/200509/02/eng20050902_206116.html

4.4.1 China International Contractors Association

CYC and Sinohydro are members of the China International Contractors Association, based in Beijing[145]. The association conducts research, promotes its members' interests to the Chinese government, coordinates with other international organizations sharing similar interests and Chambers of Commerce, and assists its member companies to secure overseas contracts. The Association's website also states that it 'supervises the conduct of its members according to Chinese Law and the law in the project country'[146].

4.4.2 The International Hydropower Association

The International Hydropower Association (IHA), formed in 1995, is an industry association that works to promote the agenda of the global hydropower industry. Sinohydro became a corporate member of the IHA in January 2005 [147].

In November 2003, the IHA adopted its 'Sustainability Guidelines', whose aim is "to promote greater consideration of environmental, social and economic aspects in the sustainability assessment of new hydro projects and the management and operation of existing power schemes."[148] The guidelines were developed partly in response to the World Commission on Dams report, published in 2000, which the hydropower industry considered overly-critical and too stringent in its detailed recommendations, although at the same time it claims to recognize the core values put forward by the report.

Compared to the Recommendations of the World Commission on Dams, the IHA Sustainability Guidelines significantly lowers the bar for hydropower project standards and its implementation is voluntary for IHA members. That said, it does put forward at least a minimum set of standards by which the hydropower industry claims to recognize it should abide by.

[145] http://www.chinca.org/magz/chinca_responsibility.aspx
[146] http://www.chinca.org/magz/chinca_responsibility.aspx
[147] http://www.hydropower.org/Newsletters/news_Jan05/Welcome_Corporate.htm
[148] IHA, 2004. International Hydropower Association Sustainability Guidelines, *Published by International Hydropower Association, February 2004*.

5. The Kamchay Hydropower Project, Kampot Province, Cambodia

5.1 Introduction

In April 2005, the Cambodian government awarded Sinohydro Corporation a contract to develop the Kamchay hydropower scheme in Bokor National Park, Kampot Province, southwest Cambodia. The 110 meter high dam, costing US$280 million, represents the single largest investment by a Chinese company in Cambodia, and has been referred to as Cambodia's own 'Three Gorges Dam'[149]. The 193 MW hydropower scheme will supply Cambodia's capital Phnom Penh and southern provinces - Kampot, Kep, Takeo and Sihanoukville - with 498 GWh of electricity per year[150]. Full-scale construction is expected to commence in August 2007 and to be complete by 2011.

Since the early 1960s Russian, Canadian and Japanese firms have all seriously considered the Kamchay project, strongly encouraged by the Cambodian governments of the time. Most recently, in the early 1990s, the Canadian companies Hydro-Quebec, Pomerleau International and Experco International, with the support of the Canadian International Development Agency (CIDA), investigated the feasibility of the dam. They concluded that the dam could earn US$55 million a year from electricity sales[151]. However, following pressure from a coalition of Cambodian and international NGOs concerned over the project's poor social and environmental standards, especially that the project would be built in the recently designated Bokor national park, CIDA's backing was withdrawn, thus freezing the project.

High-level Cambodian and Chinese government officials have pushed forward the Kamchay Dam's revival in closed-door negotiations that largely left other stakeholders, including the local authorities and the public, out of the process. The project raises important questions regarding both the company and the Cambodian government's commitment to transparency, accountability, public participation, and incorporating adequate environmental and social safeguards.

5.2 The Kamchay River and surrounding area

The Kamchay Dam is located on the Kamchay River (Prek Touk Chhu) in Mak Prang commune, Kampot district, Kampot province, approximately 15 km north of Kampot town. The project, located at the southern tip of the Elephant Mountain Range, is wholly located within the 140,000 ha Bokor National Park (BNP) that was established as a protected area by Royal Decree in 1993[152].

The BNP, which encompasses most of the Elephant Mountain Range, is predominantly covered with tropical evergreen forests and dominated by a plateau that rises to 1000 meters above sea level. The southern area of BNP, where the dam is sited, is classified as wet lowland evergreen forest with some areas of mixed bamboo forest[153]. The BNP is widely recognized for its high biodiversity, although some localities have been damaged

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149 http://www.newsmekong.org/stories/roundup/sinohydro.html

150 http://english.people.com.cn/200602/23/eng20060223_245315.html

151 'Kampot dam gets green light: Agreement meets three key local demands', *Phnom Penh Post,* March 24 – April 6, 2006.

152 Royal Decree 126 on 'The Creation and Designation of Protected Areas' (1st November 1993)

153 EXPERCO (2002), Kamchay Hydroelectric Project Feasibility Study: Annex F Social Impact Assessment and Environmental Impact Assessment. *Ministry of Industry Mines and Energy, Kingdom of Cambodia*

in the past[154]. A field-survey in 2002 identified thirty-one mammals to inhabit the Kamchay Dam reservoir area, ten species of which are listed in the 2000 IUCN Red List of Threatened Species including the Asian Elephant (*Elephas maximus*), Bear (*Helatctos*), Leopard Cat (*Prienailurus bengalensis*) and Tiger (*Panthera tigris*)[155].

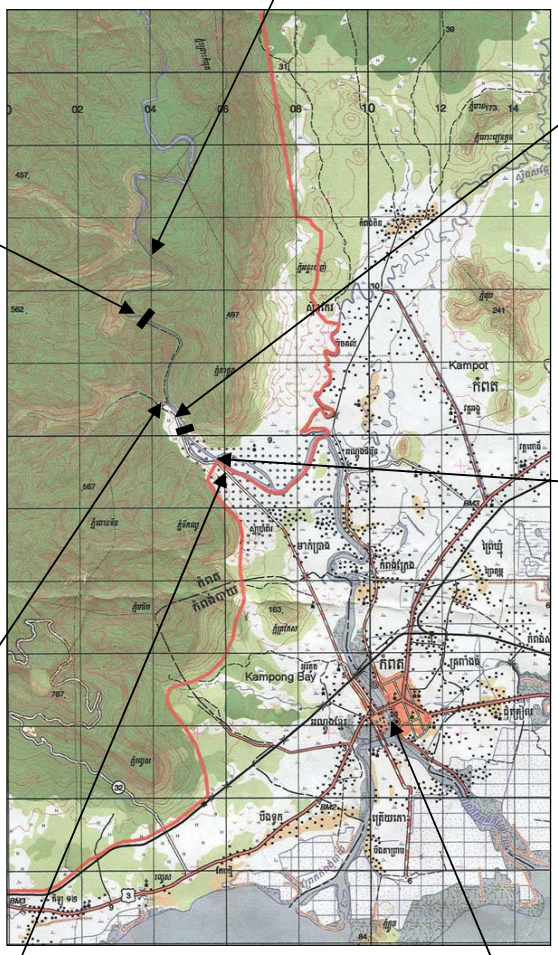
The Kamchay River originates in the central mountains of BNP, flowing southwards. Just before leaving the BNP, it passes through a series of rapids that form the Touk Chhu tourist resort. Exiting BNP, the river crosses an agricultural plain to Kampot Town, where it transforms into a delta and empties into the Gulf of Thailand five km to the south (see figure 4).

The Kamchay River is subject to occasional flooding during the rainy season, submerging land near the river[156]. Serious damage, however, is not usually incurred as local people are able to anticipate the flooding and take preventative action[157]. During the dry season, the river's size reduces significantly.

[154] ibid
[155] ibid
[156] Interview with Mak Prang Commune Chief, 6.4.07
[157] Environmental Core Team, 2006. 'Kamchay Dam Primary Investigation' (draft), NGO Forum on Cambodia, October 2006.

Forested valley upstream of the main dam that will be flooded

Preparations at the main dam site



Road along side Kamchay River, and preparations for the regulating dam

Sellers at Touk Chhu resort

Durian plantations close to the location of the regulating dam

Children playing in the rapids at Touk Chhu resort

Kampot water supply extraction point

Kamchay River in Kampot town

Figure 4 : The Kamchay River and location of dam site

5.3 Approval process of Kamchay Dam

According to media reports, open international bidding for the Kamchay Dam was held between June 2004 to January 2005, with at least 17 companies from Cambodia, Korea, Japan and China preparing bids [158, 159]. The contract to develop the project was awarded to Sinohydro Corporation by MIME on April 27th, 2005, beating China Guodian Corporation after three other companies, including one from Canada and one from Japan, dropped out[160]. On 4th July 2005, at the second Greater Mekong Subregion (GMS) summit held in Kunming, Yunnan Province, China, Sinohydro and Cambodia's MIME consolidated the deal by signing a further agreement witnessed by Chinese Premier Wen Jiabao and Cambodia's Prime Minister Hun Sen[161].

MIME and the Ministry of Finance signed a 44-year Build-Operate-Transfer (BOT) contract for the Kamchay Dam project with Sinohydro on 23rd February 2006, following a letter of authorization from Samdech Hun Sen[162]. At the signing ceremony, the Chinese Ambassador to Cambodia, Mr. Zhang Jinfeng, said that the project demonstrated the 'friendly cooperation between China and Cambodia'[163]. Cambodia's Deputy Prime Minister, H.E. Sok An said that 'To build a hydroelectric dam in Kamchay has been a cherished dream by Cambodia since the 1960s.'

The Kamchay Dam is financed as part of a US$600 million aid package to Cambodia that was announced by the Chinese government in April 2006. The actual Chinese lender, however, has not been disclosed. However, in 2005, the *Cambodia Daily* reported that Sinohydro had sought to secure a low interest loan from the China Exim Bank for the Kamchay Dam[164]. When China Exim Bank offered Sinohydro a 6% interest loan the Cambodian government also became involved in the loan negotiations, because a low interest loan of 2% was considered necessary for the Kamchay Dam to be financially viable. In light of the fact that other projects financed by the US$600 million aid package are supported by the China Exim Bank, that Sinohydro has previously approached the China Exim Bank, and that most of China's development aid is channeled through the China Exim Bank, it is likely that China Exim Bank is the source of financing for the Kamchay Dam.

On July 26th 2006, Cambodia's National Assembly voted to provide a guarantee to Sinohydro in which financial compensation would be provided to the company by the Cambodian government if the project faced difficulties or if the project under-performs [165, 166]. The National Assembly justified the guarantee claiming that it was necessary to secure Sinohydro's investment, and that the project would in turn generate cheap electricity which would attract foreign investors to Cambodia. Whilst 69 lawmakers approved the project, ten abstained. One abstaining lawmaker, H.E. Keo Remy, said that the contract offered to Sinohydro had not been revealed to the lawmakers. Another lawmaker, H.E. Yim Sovann, questioned the 44-year length of the BOT contract, which

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158 http://ccb-cambodia.com/index.php?q=main&p=news&n_id=178

159 SAWAC Consultants for Development, October 2006: 'Development of Kamchay Hydroelectric Project, Initial Environmental and Social Impact Assessment'

160 'Power Rates Won't Go Down if Loan Interest is High', *Cambodia Daily,* October 28 2005.

161 http://www.newsmekong.org/stories/roundup/sinohydro.html

162 SAWAC IEIA report, October 2006 (In Khmer)

163 http://english.people.com.cn/200602/23/eng20060223_245315.html

164 'Power Rates Won't Go Down if Loan Interest is High', *Cambodia Daily,* October 28 2005.

165 'NA Votes to Guarantee Chinese Dam Investment', *Cambodia Daily* July 27, 2006.

166 'China's growing influence in Cambodia', *Asia Times On-Line* Oct 6, 2006 http://www.atimes.com/atimes/Southeast_Asia/HJ06Ae01.html

are usually granted for between 25 and 30 years, and told the National Assembly "Such a long period benefits the Chinese more than the government." Furthermore, the *Asia Times On-line* reported that "Opposition politicians and investment consultants privately contend that Beijing has already lent the funds to Hun Sen to ensure that the Chinese state-owned utility's investment [in Kamchay Dam] at least appears financially viable during its start-up phase."

Mr. Taing Sophanara, a consultant who prepared the Kamchay Dam's environmental impact assessment (EIA), told the *Phnom Penh Post* in January 2007 that because of the high cost of building the Kamchay Dam, the price of electricity will be higher than imports from Vietnam[167]. The wholesale price of Kamchay power will be about 700 riel/ KWh, whereas imported electricity costs 600-650 riel/KWh. However, in Kampot town the present cost of electricity from diesel-fueled generators is around 1200 riel/ KWh, making either option desirable. Mr. Sophanara added that companies that had considered the Kamchay project in the past had rejected it on the basis of its high cost, but suggested that Cambodia would benefit from operating its own electric plants rather than depending on imports.

It appears probable that without the Chinese government subsidies and the Cambodian government's risk guarantees, the Kamchay Dam would not be an economically viable project. Indeed, the strong support for the project by the Chinese government appears to be more about gaining political points with the Cambodian government than Sinohydro making a large profit.

5.4 Local livelihoods in Mak Prang commune

Communities in Mak Prang commune are mainly engaged in agricultural activities. There are three villages in Mak Prang commune - Bot Kabal Domray, Mot Pium, and Snom Bram Pi. According to the IEIA 10,733 people (2091 households) could be affected by the project[168]. This number is derived from the IEIA's assumption that villagers up to 5 km either side of the river could be affected somehow, although the extent of the impact is not explored in further detail. Whilst the physical infrastructure of the project requires very little resettlement, this is mainly due to the fact that the project is located within a national park which is, as such, essentially unpopulated[169].

5.4.1 Agriculture

According to the commune chief, around 70% of families in the commune have irrigated gardens, and grow durian, as well as other fruits (bananas, jackfruits and mangoes), vegetables, and rice[170]. Water for irrigation is sourced from the Kamchay River. The remaining 30% of families that do not have access to irrigation grow only wet season rice[171]. Some of these families also have other jobs such as road-side sellers, working at Touk Chhu tourist resort, and cattle raising[172]. There are also a number of large fruit plantations in the area, mainly durian, which employ local people as laborers.

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[167] 'Kampot poised to enter world of hydroelectric power', *Phnom Penh Post,* January 12-25, 2007.
[168] The projects IEIA calculated the total number of potentially affected people as those living between four and five kilometers either side of the Kamchay river from the BNP boundary to the railway bridge just upstream of Kampot Town.
[169] The presence of Khmer Rouge soldiers in the area until 1998 also prevented villagers from settling in the hills, before it was designated a national park in 1993.
[170] Interview with Mak Prang Commune Chief, 6.4.07
[171] According to SAWAC report the main occupation of the local residents are 66% farmers, 17% government staff, 17% sellers, and others are NTFP collectors, wild hunting and cattle raising
[172] Interview with Mak Prang Commune Chief, 6.4.07

5.4.2 Non Timber Forest Product (NTFP) collection

For those poorer families that grow only wet-season rice or do not have land, collecting non-timber forest products (NTFP) is an important source of supplementary income, especially during the dry season [173]. At present, they routinely go up into the forests that will soon be flooded by the Kamchay Dam reservoir to collect bamboo, rattan, Samrong, liana and Chan Krisnar (*aloewood-Aquilaria sp.*), depending upon the season. Income from NTFP collection can range from around US$2.5 - $5 per day[174], a significant income in Cambodia. Mushrooms, resin, medicinal plants and edible fruits are also collected for home consumption. Local people are permitted to collect NTFP in the national park as long as it is family-scale harvesting[175].

Locally made woven baskets for sale at the road-side

Rattan collection occurs mainly during the dry season (November to May) when the BNP is accessible by trucks. A piece of rattan 6-8 meters long, and 2-4 cm thick will sell for around US$ 0.25 [176]. Bamboo is collected throughout the year and is often weaved into baskets and other items for sale in the local markets or in Phnom Penh via middlemen.

Another important NTFP collected is Samrong (mulva nuts). The Samrong tree bears fruit on a 5-7 year rotation from April to June and grows in some areas of BNP, including close to the Kamchay River[177]. In recent years, there has been increasing demand for Samrong in China and Vietnam, peaking in 2002. This has resulted in non-sustainable harvesting practices by some local communities and migrant collectors, whereby trees are cut down whole rather than the fruits harvested without damage to the

[173] ibid
[174] Rith, S. (2006). China Revives Dreams of Megadam in Cambodia, http://www.newsmekong.org/china_revives_dreams_of_megadam_in_cambodia ; Environmental Core Team, 2006. 'Kamchay Dam Primary Investigation' (draft), NGO Forum on Cambodia, October 2006.
[175] Interview with Mr. Heng, Head of Provincial Department of Environment, Kampot (5.4.07).
[176] Ham Kimkong, (2004). Study of current situation of practical harvest of Samrong tree specie (*Scaphium Lychnophorum*) and its impacts in Bokor National Park. *A research report published by the Royal University of Phnom Penh, October 2004*.
[177] ibid

tree. Kimkong (2006) identifies that most NTFP collection methods have become increasingly unsustainable and damaging to the BNP, although he also highlights the potential for sustainable use that could contribute significantly to the local economy.

Mulva nuts collected from Bokor national park drying by the roadside

5.4.3 Fishing

Fishing in the Kamchay River is not an important source of income for communities in Mak Prang commune, because the river does not contain any fish of commercial value. Some villagers living close to the river catch fish for home consumption using small-scale gear, and, due to the limited exploitation, fish levels are fairly stable in the river[178, 179].

5.4.4 Touk Chhu tourist resort

The Touk Chhu resort is a series of river rapids located at the boundary of BNP, where visitors can take a picnic in huts next to the river, explore the islands in the center of the river, and go swimming. It is a popular attraction for local people, and for Cambodian and international tourists visiting Kampot Province. It has been recognized as a resort since the 1950s [180]. The Provincial Department of Tourism estimate that around 200 local people work at Touk Chhu, varying according to season. The resort therefore is an important source of income for many local families who sell food, beverages, local fruits, and hand-made souvenirs to visitors. The Provincial Department of Tourism has observed that over the past few years tourism has continued to grow in Kampot province, generating a revenue of around US$3 million per year.

5.4.5 Water Supply and Sanitation

Water supply for Kampot town's 40,000 residents is sourced from the Kamchay River[181]. Because of salt water intrusion, especially during the dry season, water is extracted from just south of the Touk Chhu tourist resort and pumped to the town for treatment. The re-regulation dam is planned to be built 500 meters upstream from the pumping

[178] Interview with Mr. Heng, Head of Provincial Department of Environment, Kampot (5.4.07).
[179] Interview with Mak Prang Commune Chief, 6.4.07
[180] Interview with Mr. Say Sinol, Deputy Director of Kampot Tourism Department, 5.4.07
[181] ibid

station[182]. According to the Director of Kampot Water Supply (KWS), the station is able to supply 30% of the water demand of the local residents in Kampot. KWS has rapidly improved first under support of the Dutch government and more recently with loans from the ADB. Overall, the river's water quality is good and only basic water treatment is required before distribution.

Kampot waterworks, located in Kampot Town, processes water extracted from the Kamchay River at Touk Chuu resort

Villagers living in Mak Prang commune outside of Kampot town do not receive water from the water treatment works. According to the commune chief, approximately 30% collect their water directly from the Kamchay River and the remainder use wells. During the dry season, however, everybody uses the wells as the river becomes too salty.

5.5 Development of the Kamchay Dam

Since Sinohydro won final approval for the Kamchay Dam in mid-2006, progress at the construction site has been rapid. At the time of our field-research[183], heavy construction machinery had arrived, imported from China, and construction of two access roads that run either side of the Kamchay river to the dam site were almost complete. Full construction of the dam itself was planned to commence in August 2007.

Even amongst those villagers living close to the dam, there is little concern about the projects impacts at present. One reason for this is that there has been very little information disseminated amongst communities about the potential impacts, and there are limited details within the projects IEIA report. The main concern raised by local communities was that the dam might collapse[184].

National government agencies, led by MIME, justify the Kamchay Dam through its relatively cheap electricity, over which Cambodia will have sovereignty. It is therefore hoped the dam will catalyze further investment and job creation in Cambodia, stimulating development. Benefits touted at the local level include flood prevention,

[182] SAWAC IEIA report, October 2006 (In Khmer)
[183] International Rivers and NGO Forum on Cambodia fieldtrip to Kampot province, 5-7 April, 2007.
[184] ibid

reduced pressure on firewood fuel sources that will protect forest, and that the dam will become a tourist attraction.

On the other hand, the dam is to be constructed wholly within Bokor National Park. The Kamchay Dam therefore ultimately invokes value-laden questions of 'Conservation versus Development'.

5.5.1 Preparation of Initial Environmental Impact Assessment (IEIA)

As required by the Sub-decree on Environmental Impact Assessment Process (1999), Sinohydro submitted an Initial Environmental Impact Assessment (IEIA) to the Ministry of Environment, dated October 2006 and prepared by a Cambodian consultancy company, SAWAC. Despite the dam's imminent construction, the IEIA remains in draft form and has not been publicly released. Whether Sinohydro have accepted the recommendations of the draft IEIA has also not been confirmed.

Between the 4th and 16th September 2006, SAWAC interviewed local stakeholders including the relevant provincial government offices, the Kampot Provincial Governor, the Bokor National Park Director, and the Mak Prang Commune Council. A consultation on the draft IEIA was organized on 24th November, 2006, although it was not widely open to civil society. The majority of the participants were from the government agencies and only one international NGO was invited (WildAid), allegedly due to space limitations.

5.5.2 Impacts on Bokor National Park

The issue of most concern related to the development of the Kamchay Dam is its location within a national park. Project advocates, such as MIME and the provincial government line agencies, argue that the total area of park lost to the reservoir (2,000 ha) amounts to less than 2% of the park's total area, and that this is acceptable when the benefits of the project are considered. According to the project's IEIA, 140 ha of bamboo forest and 1,417 ha of semi-evergreen forest will be lost to the main reservoir[185].

Nevertheless, the loss of 2% of a national park is significant and will entail a notable loss of forest biodiversity and wildlife habitat. According to local government officials, including the Provincial Department of Environment, the forest in the reservoir area is not really degraded[186]. As noted above, a survey in 2002 also found an abundance of wildlife to be present within the reservoir area, including endangered species. According to the project's draft IEIA, the habitat to be flooded is home to 39 mammals, 68 bird species, 23 reptiles, and 37 fish species.

According to the draft IEIA report, Sinohydro will replant 2000 ha of new forest to replace that submerged by the reservoir. At present, however, it is proving difficult to identify new land close to the national park for replanting[187]. Furthermore, it is highly unlikely that the replanted secondary forest will constitute suitable habitat for the displaced wildlife.

Sinohydro will also provide US$400,000 per year for 30 years to implement an environmental management plan, according to the draft IEIA report. Further details regarding the nature of the environmental management plan have not been made public,

[185] SAWAC IEIA report, October 2006 (In Khmer)
[186] Interview with Mr. Heng, Head of Provincial Department of Environment, Kampot (5.4.07).
[187] ibid.

including whether Sinohydro would provide the funds directly to the BNP management or administer the fund itself. It is also not clear whether this contribution is towards the management of the overall park, or just the Kamchay River watershed, which would directly benefit the operation of the dam. Why the period of time for providing the environment funds is less that the BOT contract, which was signed before the IEIA report was prepared, is also presently unexplained.

5.5.3 Access to Non Timber Forest Products (NTFP)

The most significant impact on local livelihoods from the Kamchay Dam will be the loss of the significant NTFP resources that will be flooded by the dam's reservoir. As highlighted above, the Mak Prang Commune chief estimates that the poorest 30% of villagers in the commune depend on NTFP collection to supplement their income, especially during the dry season.

When Sinohydro won the contract in April 2005, the *Cambodia Daily* reported that the company had agreed to permit continued access for bamboo cutters during the four-year construction period[188]. Provincial government departments, such as the Department of Environment, also said that local people will be able to work as laborers during construction to replace any lost income.

Beyond the construction period, however, there is an assumption that cheap electricity will attract further investment to Kampot Province that will provide alternative employment for those families who previously collected NTFP. Some provincial government agencies said that Sinohydro have also suggested planting a 'bamboo plantation' or establishing a community protected area in the national park, although no official plan exists. At present, however, there is no livelihoods restoration plan prepared to assist vulnerable community members that currently collect NTFP products, but will be unable to do so once the dam is commissioned.

5.5.4 Water quality

The water quality of the Kamchay River is presently known to be good. As noted above, water is extracted from the river for irrigated agriculture and Kampot town's water supply, which requires very little treatment before distribution. The river is also a source of drinking water during the rainy season for villagers living nearby, and produces fish for home consumption. At Touk Chhu resort the good water quality allows people to bathe in the river.

The draft IEIA recognizes the risk to water quality posed by the project during the construction phase, but concludes that impacts will not be significant. Forest is planned to be removed prior to reservoir flooding, although this is linked to recovering valuable timber. It is not clear whether the clearance will extend to all biomass that otherwise will rot and may cause poor water quality within the reservoir (and downstream as it is released). Other risks to water quality that the company plans to mitigate are increased sediment load, especially arising from construction activity, and managing waste water and sewage originating from the temporary construction worker camps.

Another water-associated risk is the increased incidence of dengue and malaria should the reservoir becomes a breeding ground for mosquitoes. Forested regions in Cambodia,

[188] 'Kampot dam gets green light: Agreement meets three key local demands', *Phnom Penh Post,* March 24 – April 6, 2006.

such as Bokor, are well-known to be infested with mosquitoes and must be monitored accordingly.

5.5.5 Touk Chhu tourist resort

The rapids and pools at Touk Chhu are the resort's major attraction, and are obviously dependent on the quality and quantity of water in the Kamchay River. Negative changes will affect the resort's appeal, and consequently impact income generated by local people who work at the resort.

The Kamchay Dam will provide electricity according to demand, and therefore will essentially turn the river flow on and off. To mitigate this impact, Sinohydro will build a re-regulation weir just north of the Touk Chhu resort. If well-designed and operated correctly, this structure should minimize daily and hourly variations in downstream flow by storing the uneven discharges from the main dam in a small reservoir and releasing it downstream at a constant rate. Overall, as a result of the dam's operation, compared to the Kamchay River's current flow regime the dam-modified flow will increase during the dry season and decrease during the rainy season. However, during initial filling of the reservoir, water flow in the Kamchay River could be reduced throughout the entire year, affecting the rapids.

Representatives from Sinohydro met sellers at Touk Chhu resort in late 2006, informing them that there might be some flooding and that some stalls would have to be moved to widen the access road to the dam site. At present, sellers at Touk Chhu resort are unsure what would be flooded, which stalls would be moved, and whether there would be compensation. Overall, workers at Touk Chhu do not fully understand the plans for the project, or how it will affect Touk Chhu resort.

The main concern of sellers at Touk Chhu is that construction traffic will deter visitors[189]. Some sellers have requested Sinohydro to re-route the access road to avoid the resort completely, although, at the time of writing they had not yet received a response. Talking to the *Phnom Penh Post*, Sinohydro's Mr. Sovan acknowledged that visitors might be deterred from visiting Touk Chhu during the three-year construction period, but suggested that ultimately the dam could be a tourist attraction.

Sinohydro's general affairs officer, Kim Sovan, told the *Phnom Penh Post* in January 2007; "We will develop Touk Chhu to become the most beautiful tourism resort"[190], although the Provincial Department of Tourism and the sellers at Touk Chhu are unaware of any plans[191].

5.5.6 Downstream flooding

It is possible that by storing water in the rainy season, flooding downstream along the Kamchay River can be reduced, although exceptional flood events would still impact downstream if the dam is already filled to capacity. Conceivably, higher dry season water flows could also be of benefit both for irrigated agriculture and for reducing the impact of salt water intrusion, which can almost reach the Kampot town water supply inlet during the dry season.

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[189] Interviews with sellers at Touk Chhu, International Rivers and NGO Forum fieldtrip 6.4.07
[190] 'Kampot poised to enter world of hydroelectric power', *Phnom Penh Post,* January 12-25, 2007.
[191] Interview with Mr. Say Sinol, Deputy Director of Kampot Tourism Department, 5.4.07

At the same time, altering the Kamchay River's hydrological cycle may also result in unforeseen impacts, such as changes to the downstream river and floodplain ecology. For example, the river's present flood cycle deposits fertile nutrients on the flooded land, nourishing the soil for agriculture. Controlling flooding may therefore result in farmers increasing their dependence on synthetic fertilizers, resulting in other environmental and health risks, as well as additional expenses.

The draft IEIA recommends that the minimum flow rate in the river should be 6 m^3 per second to ensure that people downstream can depend upon the river and the ecology will survive[192]. However, no explanation is given for how this figure was derived. The calculation of an "environmental-flow" and the necessary operation-regime for the dam's water releases to maintain this flows will be of paramount importance to maintaining the vitality of the Kamchay River downstream.

5.5.7 Loss of farmland and compensation

Because the Kamchay dam is built within Bokor National Park, which is uninhabited, there is very little resettlement. However, north of Touk Chhu resort and technically within the BNP, numerous irrigated durian plantations have been established, some of which will be flooded by the re-regulation dam reservoir. According to the draft IEIA, local villagers from Snom Bram Pi and Mot Pium villages have occupied a total of 110 Ha of land, although villagers also reported that some of this land belonged to people living outside the commune[193]. Whilst the land is actually encroachment into the BNP, ownership is recognized by the local authorities at the village and commune level. The villagers' claim to ownership is under articles 5 and 30 of the Land Law, because ownership of the land has been uncontested for five years. Contradictorily, however, because the land is in a protected area they are not permitted to receive land titles.

According to the Mak Prang Commune chief, in December 2006, the Commune Council and the Provincial Department of Industry, Mines and Energy identified that 6 durian farmers would be affected by construction of the re-regulation dam, although this appears only to include those that would be affected by the infrastructure itself and not including those to be flooded by the re-regulation dam reservoir[194]. Negotiations between Sinohydro and the durian tree owners were underway. According to farmers interviewed living along the road, Sinohydro had offered to compensate US$600 per durian tree, although the farmers thought this price too low and were requesting a higher price[195]. Additionally, several families who tend the durian plantations have houses alongside the road and have been told they will have to move to make way for the widened access road. They were unsure where they would relocate to and thought that they would not receive any compensation.

Previously, in January 2007, Sinohydro's general affairs officer, Kim Sovan, told the *Phnom Penh Post* that whilst Sinohydro is aware of likely adverse effects on local residents it was the government's responsibility to compensate them[196]. However, the company has

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[192] SAWAC IEIA report, October 2006 (In Khmer)
[193] ibid
[194] Interview with Chea Ton, Mak Prang Commune Chief, 6.4.07
[195] According to a Durian farmer interviewed downstream of Touk Chuu resort, whose land will not be reclaimed, he can sell Durian for 10,000 Riel each, and each tree can grow between 30-50 fruit per year (total per tree per year is US$75 – US$125 per year)
[196] Kampot poised to enter world of hydroelectric power', *Phnom Penh Post,* January 12-25, 2007.

not publicly detailed either the extent of the resettlement and land that will be occupied by the project, or the compensation arrangements.

5.5.8 Employment

A second commitment made by Sinohydro in April 2005 when accepting the Kamchay Dam contract was that at least 90% of the workforce would be Khmer workers[197]. Yet, according to the draft IEIA, the project plans to employ 800 local and 400 Chinese workers. In other words, only 66% of the workforce is planned to be Khmer.

Furthermore, whilst construction remains at an early stage - limited to a detailed geological survey and construction of access roads - the Mak Prang Commune chief observed that that the Khmer employees presently employed had mostly migrated from other provinces rather than being sourced locally[198]. Many of the skilled construction staff, such as truck drivers, excavator operators, site surveyors and managers, are Chinese[199].

It is the common experience elsewhere in the region, that beyond the construction period dams employ only a few technicians and there is virtually no employment for local people.

5.5.9 Rural electricity supply

At present, according to the Commune chief, approximately 30% of the families in Mak Prang Commune have access to electricity. They are generally those families that live near provincial road 38 and can afford the cost of connection and consumption; connection for villagers further away from the road is often prohibitively expensive[200]. In 2006, the Asian Development Bank backed the construction of a new 5 MW diesel-fueled generator system for Kampot town, reinforcing the earlier system (a 1 MW privately-owned diesel-fueled generator). However, even prior to this newly installed generator, a small transmission line followed the road providing sporadic electricity to some families in Mak Prang Commune.

Despite an expectation amongst villagers in Mak Prang Commune that they will gain access to cheap electricity, no plans have been announced to expand the distribution network as part of the Kamchay Dam project or to provide discounted electricity to those affected by the dam[201, 202].

5.6 The role of provincial government line agencies and the local authorities

The Provincial Department of Industry, Mines and Energy (DeIME) is the lead provincial government agency responsible for development of the Kamchay Dam. Other provincial government agencies, such as the Department of Environment, the Department of Water Resources and Meteorology, and the Department of Tourism, despite the relevance of their mandates, have been involved only in a cursory manner, such as participating in the occasional meeting called by the DeIME.

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[197] 'Kampot dam gets green light: Agreement meets three key local demands', *Phnom Penh Post,* March 24 – April 6, 2006.
[198] Interview with Mak Prang Commune Chief, 6.4.07
[199] Personal observation during fieldwork, 7.4.07
[200] Interview with Mak Prang Commune Chief, 6.4.07
[201] ibid
[202] Rith, S. (2006). China Revives Dreams of Megadam in Cambodia, http://www.newsmekong.org/china_revives_dreams_of_megadam_in_cambodia

A 'Provincial Monitoring Committee' is supposed to be established for the project, chaired by the Kampot Province Vice-Governor, although at the time of field research the committee was yet to be formed[203]. Amongst other tasks, the role of the Provincial Monitoring Committee would be to ensure the environmental management plan derived from the IEIA is implemented correctly[204].

There is clearly a lot of political pressure on both national and provincial government departments not to criticize the Kamchay Dam project. All agencies interviewed emphasized that they did not have any concerns about the project, citing for example that so many studies had already been conducted.

The role of the commune level authorities within the development of the project is minimal. As the Mak Prang Commune council chief stressed, "We are the local authority. This is the development plan of the National government, so we don't need to worry."

5.7 Conclusions on the Kamchay Project

The Kamchay Dam is already at an advanced stage of preparation, and it appears almost inevitable that construction will go ahead as planned. The loss of national park is of concern, especially considering that the forest is relatively intact and of rich biodiversity. This decision sets a dangerous precedent for future projects proposed to be located within Cambodia's national parks. At the same time, project proponents claim that the economic benefits gained from developing the project outweigh the environmental costs due to the loss of the national park area.

Due to its long history, the Kamchay Dam project is comparatively heavily studied when compared against other proposed hydropower projects in Cambodia. Despite this, key reports that would manage the environmental and social impacts of the projects, such as the environmental management plan and a livelihoods restoration plan, have not been publicly disclosed. As such, it remains uncertain whether the project will benefit local people that will be affected by the project though its development.

As Cambodia's first major hydropower project, it is vital that high standards are adopted in the development, construction and operation of the Kamchay Dam. Central to ensuring that high standards are maintained will be an accountable decision-making process, transparent dissemination of relevant information, and wide public participation amongst local affected people and civil society organizations.

5.8 Recommendations towards the Kamchay Dam Project

The following recommendations are offered by International Rivers and the Rivers Coalition in Cambodia to Sinohydro and the Cambodian government to minimize the social and environmental costs of the project, whilst maximizing and ensuring the equitable allocation of the project's benefits:

- As a matter of urgency, the finalized IEIA should be made readily available to the public. The associated social and environmental management plans should also be made publicly available. The financial arrangements to implement these plans, together with the role and responsibility of implementing agencies, should be clearly

[203] Environmental Core Team, 2006. 'Kamchay Dam Primary Investigation' (draft), NGO Forum on Cambodia, October 2006.
[204] Interview with Mr. Heng, Head of Provincial Department of Environment, Kampot (5.4.07).

detailed. The relevant sections of the each plan should be actively disseminated to communities likely to be affected by the project.

- To monitor Sinohydro's compliance with the IEIA, the "Provincial Monitoring Committee" should be formed before construction commences. To ensure transparency, community leaders and non-government organizations should also be invited to sit on the committee.
- According to the sub-decree on Environmental Impact Assessment Process the Kamchay dam should be subject to a detailed EIA. As discussed in section 2, however, there are a number of constraints to the implementation of this sub-decree. In any case, elements of the IEIA that are found to be inadequate by the Provincial Committee should be subject to more detailed study.
- The greatest social impact likely to arise from the dam's construction is the loss of access to NTFPs presently harvested by the poorest community members of Mak Prang commune. A credible livelihoods restoration plan should be prepared for these villagers through a participatory process. Furthermore, as promised by Sinohydro in April 2005, access to the NTFP's in the reservoir area should be kept open to Mak Prang commune villagers until the area is flooded.
- A study should be conducted to determine the minimum flows required in the Kamchay River to maintain its ecosystem functions. Likewise, dam operation should also ensure that water quality and quantity at the Touk Chhu resort is not negatively impacted.
- A study should be commissioned to explore potential synergies between dam operation and downstream water-users. For example, it should be investigated whether modifying the water flows could benefit irrigated agriculture for local people.
- Access to electricity in rural areas is widely viewed as a critical factor in improving livelihoods and alleviating poverty. The Kamchay Dam offers the opportunity to implement an extensive rural electrification program in Mak Prang commune and surrounding areas, thus bringing definite benefits from the project directly to the local population. The Cambodian government should seriously consider extending the electricity distribution network throughout these communes beyond the houses along Provincial Road number 38.
- In order to minimize the impact to Touk Chuu resort during construction, Sinohydro should reroute the construction road away from the resort, as requested by some stall holders.
- Sinohydro should clarify and formalize its commitment to reinvest some of its revenue from electricity sales to protect and manage the remainder of the BNP.
- Sinohydro should work with the BNP authorities to identify locations to implement the proposed 2,000 ha tree re-planting program.
- Sinohydro should prepare and publicly disclose plans for compensation arising from any negative impacts resulting from accidental releases of water from the Kamchay Dam. The plans should be prepared and approved with the participation of local communities.
- In order for local communities to benefit from the construction of the project, Sinohydro must ensure that sufficient jobs are made available to local laborers - paid a reasonable salary - when full construction commences at the end of 2007. As promised by Sinohydro in 2005, 90% of the workforce should be Khmer. Programs for skills transfer should be implemented to strengthen the capacity of Cambodia's workforce.

- There is a high risk of poor water quality during the construction period of a dam, together with the first couple of years following commissioning. Considering the importance of the river to communities downstream of the Kamchay dam, it is vital that all necessary steps are taken to maintain water quality. Therefore:
    - A monitoring program should be instigated throughout construction and during operation to ensure water quality is maintained and to alert the authorities if problems arise. Whilst a baseline water quality survey should have been conducted, the projects immanent construction now precludes this step.
    - Risk of poor water quality should be minimized by clearing the reservoir area of all vegetation prior to filling.
    - Appropriate measures to manage wastewater from the construction workers camp should be adopted.

6. Conclusions and recommendations

Cambodia, at present, remains in the fortunate position of possessing a significant natural wealth in the form of its free-flowing rivers and ecologically rich protected areas. There is a strong linkage between the health of these abundant natural resources and the livelihood of many of Cambodia's predominantly rural population, especially the more vulnerable members of the population that depend upon natural resources, such as fisheries and non-timber forest products, as either an important source of income or as a safety net during times of hardship.

The wide-spread exploitation of Cambodia's domestic hydropower potential is increasingly on the agenda of Cambodia's government, made possible in large part as a result of support from Chinese companies and their financiers. The potential economic, social and environmental benefits of increased availability of electricity, predominantly for urban centers, are readily apparent. At the same time, many of the proposed hydropower projects are located in environmentally sensitive regions and could incur significant environmental and social consequences. As such, there is a risk that uncoordinated and poorly conceived hydropower development that damages the natural resource base will undermine Cambodia's sustainable development.

Inevitably decisions will have to be made over the relative cost and benefits of each project. Whilst hydropower projects may appear tempting on first inspection, due diligence should be conducted to ensure that projects are both environmentally sustainable and socially equitable.

The report offers the following conclusions and recommendations:

6.1 Implementing the recommendations of the World Commission on Dams report

Cambodia has the opportunity to learn from the experience of other countries both in the Mekong Region and globally that have suffered ecological and social disaster as a result of poorly thought out and implemented hydropower schemes. At this early, yet critical, stage in Cambodia's hydropower development planning, it is of the utmost importance that an appropriate planning process is adopted that would differentiate projects in which benefits outweigh costs and should go forward, and projects in which the costs are too great and should be put aside.

The recommendations of the World Commission on Dams (WCD) are highly relevant to Cambodia's current circumstance and could provide wise counsel to Cambodia's decision-makers[205]. The WCD report, published in 2000, is widely-recognized as the most comprehensive evaluation of the development effectiveness of large dams to date. The blue ribbon commission comprised representatives from all sectors of the dams debate, including the industry, governments, civil society, and academics. The WCD found that while "dams have made an important and significant contribution to human development, and benefits derived from them have been considerable... in too many cases an unacceptable and often unnecessary price has been paid to secure those benefits, especially in social and environmental terms, by people displaced, by communities downstream, by taxpayers and by the natural environment."

[205] World Commission on Dams, (2000). 'Dams and Development: A New Framework for Decision Making' *Earthscans Publications Ltd. London, UK.*

The WCD report proposed a series of recommendations for future development in the water and energy sectors in which those that would be adversely affected by a project are entitled to fully participate in the decision–making and planning process, and have a share in project benefits. The Commission's main recommendations include the following:

- Comprehensive and participatory assessments of people's water and energy needs, and different options for meeting these needs, should be developed before proceeding with any project.
- Priority should be given to maximizing the efficiency of existing water and energy systems before building new projects.
- No dam should be built without "demonstrable acceptance" of affected people, and without free, prior and informed consent of affected indigenous and tribal peoples.
- Mechanisms should be developed to provide reparations, or retroactive compensation, for those who are suffering from existing dams, and to restore damaged ecosystems.

The WCD report called for a 'fundamental shift' in options assessment and in the planning and project cycles for water and energy resource development, promoting a framework for decision-making that is based on five core values: equity; efficiency; participatory decision-making; sustainability; and accountability. The WCD identifies that the recognition of rights and the assessment of risks is necessary to identify legitimate stakeholder groups, and these groups are entitled to a formal role in the consultation process. The WCD goes on to identify seven strategic priorities and corresponding policy principles for water and energy resources development, namely: gaining public acceptance; comprehensive options assessment; addressing existing dams; sustaining rivers and livelihoods; recognizing entitlements and sharing benefits; ensuring compliance; and sharing rivers for peace, development, and security.

> *Recommendation:* **Cambodian decision makers should establish a multi-stakeholder process to examine the recommendations of the World Commission on Dams report and to discuss how these recommendations could be adopted in Cambodian Law.**

6.2 Public participation in decision making

It is widely recognized that for development to be equitable and sustainable there must be public acceptance of key decisions, especially for high-impact and high-risk infrastructure projects such as hydropower dams. Unfortunately, many decisions taken to date on hydropower development in Cambodia have been behind closed doors and without meaningful public consultation.

Meaningful public participation lends legitimacy and trust to a project and its developer from affected communities and other concerned stakeholders. If all stakeholders agree that a project is necessary, public participation also can ensure transparency and accountability as a project proceeds. On the other hand, if affected communities remain poorly consulted and livelihoods are threatened, this can result in costly project delays midway through construction as communities challenge the project. Furthermore, unanticipated claims for compensation can raise the project costs resulting in budget

over-runs. In order to gain acceptance, project proponents must recognize rights, address risks and safeguard the entitlements of all groups of affected people.

Cambodian policy and law contain many provisions for public participation in decision-making processes. For example, Cambodia's overarching development strategy, the "Rectangular Strategy for Growth, Employment, Equity and Efficiency," places good governance as a cornerstone to sustainable and equitable economic development, to which public participation is considered an essential element. In reality, however, much remains to be done to see the good governance aspirations of the Rectangular Strategy translated into action.

> *Recommendation:* **The Cambodian government and hydropower project developers should commit to ensuring the informed and full participation of all concerned stakeholders throughout a project's development cycle** (identification, construction, operation and decommissioning). There should be demonstrable acceptance of a project on the part of all stakeholders before a proposed hydropower project is approved for development.
>
> *Recommendation:* **The Cambodian government should endorse the "Rights and Risk" approach in identifying all legitimate stakeholders to be consulted on a proposed hydropower project, as outlined in the WCD report**[206].

6.3 Project planning process

To date, Cambodia's power sector planning process has demonstrated limited transparency or accountability to Cambodia's citizens. This despite the fact that a number of donors that claim to support participatory processes, notably the World Bank, have recently funded projects associated with the revision of a Power Development Plan for Cambodia. In Cambodia, the selection of major power generation projects for prospective development, which consist mostly of large hydropower projects, appears to be driven more by a private company's willingness to invest in the project than careful and strategic selection on the part of the Ministry of Industry, Mines and Energy (MIME). The Department of Hydropower Development within MIME on many counts remains inaccessible to civil society scrutiny.

In the context of Cambodia's recent discovery of significant oil and natural gas reserves within its marine territories, there is a risk that the development of power stations fueled by natural gas in the near future may leave Cambodia's hydropower plants as stranded investments. Hydropower development in Cambodia is comparatively expensive compared to other countries in the region; in the case of Kamchay Dam, the price of electricity is around eight cents per kWh, which, although cheaper than current diesel fuel generated electricity in Cambodia, is more than the cost of hydropower generated electricity in Laos and Thailand. If substantial gas reserves are proven, the net result could be overly expensive electricity bills for businesses and domestic consumers, as Electricity du Cambodge remained committed to long-term power purchase agreements from rashly developed hydropower projects. Ultimately, hydropower commitments could act as a drag on Cambodia's economic growth.

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[206] The WCD concludes that the recognition of rights and the assessment of risks (i.e. the 'Rights and Risks' approach) is necessary to identify legitimate stakeholder groups that should be entitled to a formal role in the consultation process.

Integrated Resources Planning (IRP) is now widely held as the international best practice in modern electricity planning processes[207]. In contrast to traditional planning methods that consider only the least financial cost of meeting electricity demand through the development of supply-side options, IRP considers a full range of economically feasible supply-side and demand-side options. Furthermore, in IRP, electricity infrastructure investments are chosen based on the criteria that they provide reliable electricity services at the lowest overall economic *cost to society* (including social and environmental costs as well as risk) - rather than the lowest commercial cost to investors. An important aspect of IRP is the central role that public participation should play in determining the values from which planning objectives are derived. Major decisions are made through a process that includes informed, rigorous and meaningful public participation. A competent, fair, and independent energy regulator oversees the process, in the case of Cambodia namely the Electricity Authority of Cambodia.

Furthering the IRP concept, the WCD puts forward a wider framework in the form of a "Comprehensive Options Assessment" (COA). The process combines sustainable water and energy planning practices and would prove a useful integrated template for Cambodia where proposed power development is heavily dependent on exploiting water resources. The options assessment considers a series of scenarios incorporating both demand-side and supply-side options to meet energy and water needs, and fully integrating social, environmental and economic factors. Scenario selection is based on a comprehensive and participatory assessment of the full range of policy, institutional and technical options.

It is important to note that, in contrast to traditional energy planning that is founded on narrow least-cost financial considerations, both IRP and COA attempt to internalize environmental and social costs through a number of increasingly well established economic tools. These include: Cost Benefit Analysis; Environmental, Social, Poverty and Technical Assessments; Sustainable Development Indicators; and Multi-Criteria Analysis.

> *Recommendation:* **Before proceeding further along the road of extensive hydropower development, MIME should first undertake a participatory assessment of Cambodia's energy needs and the best options for meeting these needs, either in the form of Integrated Resources Planning or, ideally, a Comprehensive Options Assessment.** At the root of sound energy development are transparent, accountable and participatory energy planning practices, and adopting modern planning practices will pay dividends in the long term.

6.4 Decentralized energy for rural electrification

At present, Cambodia's national electricity plans, on the whole, are dominated by the construction of a national transmission grid and large-scale electricity generation plants, which propagate the traditional logic of the electricity industry and are mainly orientated around the provision of electricity to urban populations. In following this approach it will be many decades before most Cambodians have access to a quality electricity supply at a reasonable cost and many rural communities will never be served because

[207] For an excellent introduction to the principles of IRP, read "Best Practices Guide: Integrated Resources Planning For Electricity", the Tellus Institute (2000) available for download at http://www.goodcents.com/info/Best%20Practices%20Guide_IRP%20Planning.pdf

transmission grids are unable to economically supply sparsely populated remote rural areas such as those found over much of Cambodia.

In 2003, with support from the World Bank, Cambodia finalized an innovative Renewable Energy Action Plan (REAP)[208]. In essence the plan proposes small-scale, decentralized generation of electricity for rural communities, advocating the use of renewable technologies including solar, micro-hydro and biomass for more remote villages, and promoting the role of private sector Rural Electricity Enterprises to catalyze the spread of electricity generation technologies. Whilst the REAP faces some challenges, such as a limited number of bankable projects under Cambodia's current financial sector conditions, overall the plan offers a fresh approach to providing electric services.

Cambodia's limited investment to date in expensive transmission infrastructure and associated equipment offers an exceptional opportunity to pursue innovative electrification options that are not available to other countries that have already invested in a grid.

> *Recommendation*: **Options for meeting rural and urban energy needs through decentralized energy solutions should be seriously explored by the Cambodian government and fully integrated into Cambodia's national energy plan.**

6.5 Benefits and drawbacks of the Cambodia's integration into regional power trade arrangements

Under the Asian Development Bank's Greater Mekong Subregion (GMS) program, the regional integration of power is envisioned through a network of high voltage transmission lines. The crux of the plan involves the development of the massive hydropower potential in Laos, Yunnan Province China, and Burma for export to the energy hungry cities of Thailand and Vietnam. In the case of Cambodia, according to the plan, regional transmission lines will at first enable power imports into Cambodia from Vietnam, Laos and Thailand. As Cambodia develops its hydropower potential it is envisioned that Cambodia will become a net exporter of electricity.

Considering the potentially high economic, environmental and social cost of hydropower development in Cambodia, the economics of the regional power integration plan for Cambodia remain essentially unproven and therefore are unable to justify this model of development. Furthermore, at present, hydropower development, especially with regard to its environmental costs, is justified to the Cambodian public on the basis of providing electricity for the domestic market for Cambodia's own consumption.

If hydropower projects are to be developed for electricity export, further debate is required regarding the development benefits of such projects, especially in light of the fact that Chinese companies will be operating the hydropower projects and therefore gaining a large share of the profits from the electricity export sales.

> *Recommendation*: **If it is planned that hydropower projects are to be developed in Cambodia for electricity export, wider debate should be instigated amongst all stakeholders over the relative benefits and costs.**

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[208] Project website is www.recambodia.org/reap.htm . A convenient summary is given by Ryder, G. (2004) "Cambodia's plan for decentralized power", *Watershed*, Vol 9. No 2, pp39-42.

6.6 Project bidding and approval

Criteria by which companies are selected as eligible for investing in Cambodia's essential infrastructure remain unclear. Whereas the Kamchay Dam was ostensibly subject to an open bidding process, it is unclear whether subsequent projects, for example the Stung Atay dam, have been subject to the same process. Furthermore, information regarding the sources of financing for projects approved to date is not readily available in the public domain. Details on the contractual agreement between the Cambodian government and project developers remain undisclosed to the public. This lack of transparency potentially opens the door to poor development practices and corruption.

> *Recommendation*: **The Cambodian government should commit to fully transparent company eligibility criteria and bidding processes in the project approval processes.**

> *Recommendation*: **The Cambodian government should commit to the public disclosure of non-commercially confidential sections of Concession Agreements and Power Purchase Agreements.**

6.7 Committing to environmental protection and social equity

Cambodia already has a number of strong laws in place that should afford a degree of environmental protection and social equity in the selection and development of major infrastructure projects, such as hydropower schemes. Unfortunately, it is widely recognized that these laws are at present weakly enforced for a number of reasons including limited resources and weak capacity in government agencies, and at times limited political will. Whilst the Sub-Decree on EIA Process is comparatively comprehensive, in practice - for example in the case of Kamchay dam - its provisions are not fully implemented and follow-up monitoring for compliance and review appears unplanned.

It is of concern that many hydropower projects planned are located in close vicinity to or within protected areas; the Kamchay Dam is actually located within a protected area. Whilst it appears inevitable that the Kamchay Dam will go ahead, the Cambodian government should seriously consider the importance of working to protect other areas of Cambodia's natural heritage.

Environmental and social impact assessments should not be viewed as an impediment to development, but rather as necessary steps to ensure that development is sustainable. Rapid yet poorly planned infrastructure development in the long-term is not conducive to sustained economic development, or environmentally sustainable and socially equitable development. It should be noted that, increasingly, modern environmental planning is moving beyond the use of EIAs alone. Comparatively well-established tools now include Cumulative Impact Assessments for hydropower cascades within a river basin and Strategic Impact Assessments for evaluating environmental impact scenarios at the sector-level.

In addition to EIA reports, where communities are displaced or otherwise affected by a hydropower project, Resettlement Action Plans (RAPs) and Livelihood Restoration Plans (LRPs) are also needed to mitigate social impacts. In Cambodia, there is a strong dependence between rural communities and natural resources, such as fisheries and non-timber forest products, that are commonly negatively impacted by hydropower

developments. RAPs and LRPs can only be effectively developed with the full participation and approval of the affected communities, and should be finalized well in advance of the development of the project.

In order for a project to be acceptable to affected communities, EIAs, RAPs, LRPs and other management plans should establish equitable sharing of benefits including adequate compensation for loss of access to natural resources, new livelihood options that afford an equivalent or better level of livelihood and security than pre-project conditions, and a share in any benefits derived from the project, for example, the opportunity for employment and access to cheap electricity. Furthermore, affected communities should not shoulder a disproportionate burden of risk associated with the project.

Recommendation: **Recognizing the present limited capacity of the Cambodian government Ministries and their line agencies, due caution should be exercised in committing to major infrastructure projects such as large hydropower dams**. Furthermore, the Cambodian government should only enter into agreements with consultants and companies of established international reputation to ensure that the quality of projects is to international standards.

Recommendation: **It is vital that Environmental Impact Assessments (EIAs) be recognized by the responsible government agencies as essential documents necessary to ensure that destructive projects remain undeveloped, and for projects that are developed the environmental impacts are minimized**. EIAs should be appropriately resourced and reviewed, and compliance monitored by the responsible government agency, namely the Ministry of Environment.

Recommendation: **RAPs and LRPs should be prepared with the full participation of the affected community**. RAPs and LRPs should be released to the affected community and the wider public before project construction commences. It is widely accepted amongst development practitioners that sustainable livelihoods programs are more appropriate than cash compensation arrangements for affected communities.

Recommendation: **Mitigation and development programs, as detailed in EIAs, RAPs and LRPs reports, should be recognized as legal obligations on the part of the Cambodian government and the Project Developer**. Before a project commences, appropriate legal arrangements should be reached between the affected communities, the Cambodian government and the Project Developer

Recommendation: **Information should be made available to the public regarding the location and status of the Stung Atay Hydropower Project under development by China Yunnan Corporation for International Techno-Economic Cooperation, including its location and likely impacts.**

Recommendation: **In Cambodia, a wider public debate is urgently needed about the relative importance of conservation versus economic development, and how they may actually be complimentary, in order to inform government decision makers as they face difficult development decisions**.

6.8 Recommendations to Chinese companies

As political and business ties between Cambodia and China continue to strengthen, Chinese companies will gain an increasing opportunity to play a proactive and positive role in furthering Cambodia's development. Environmentally and socially responsible projects can contribute towards equitable and sustainable development, but poorly conceived projects can undermine progress made to date. Transparent and accountable actions in the eyes of the Cambodian government and public will build trust and strengthen relationships that ultimately will lead to mutually beneficial partnerships.

Recommendation: **Where limited resources limit the Cambodian Government's ability to monitor compliance with its laws, Chinese companies should demonstrate a verifiable commitment to rigorously following the law by making their activities transparent and accountable**. Where Cambodia's legislation requires further development recognized international standards of best practice should be adopted.

Recommendation: **Chinese companies should adopt a pro-active and sincere approach to public participation that meets international standards.** It is widely recognized that complex infrastructure projects ultimately benefit from deep consultation with all concerned stakeholders. In partnership with the Cambodian Government, clear processes for public consultation on planned projects should be developed early in the project planning stage and due consideration given to concerns raised by the public, including a willingness to withdraw from a project if it is determined that environmental, social or cultural costs are too high.

Recommendation: **Where a project is determined, though a public consultation process, to be the best solution to meet energy and water needs, planning to mitigate environmental and social impacts should be treated as a priority by both the company and the government**. Before a project moves ahead key documents including an Environmental Impact Assessment, Social Impact Assessments, Environmental Management Plan, Resettlement Action Plan and Livelihood Restoration Plan, should all be prepared and mutually agreed amongst stakeholders.

Recommendation: **Detailed project information should be made readily available to all concerned stakeholders**. This could be achieved through setting up information dissemination centers in villages that could be affected by a project and identifying a company staff member who would act as a contact point to meet concerned members of the public and who has sufficient power to address concerns raised. The company contact point staff should hold skills appropriate to this role.

Recommendation: **Chinese companies could adopt a positive role in seeking alternative solutions to meeting Cambodia's energy needs that do not impact the natural resources upon which local communities depend**. Specifically, Chinese companies could support Cambodia in its efforts to develop rural electrification schemes through exploring the potential for decentralized energy options powered by renewable energy sources (mini-hydro, solar, biogas *etc*).

Recommendation: **Chinese companies and their financiers could publicly commit to implementing a number of international standards relevant to infrastructure development**. For hydropower project developers, as a first step companies could adopt the International Hydropower Association Sustainability Guidelines. However, the internationally recognized standard for hydropower is the World Commission on Dams (WCD) strategic framework, and it is this standard that hydropower companies should ultimately commit to implement. China's Export Credit Agencies active in Cambodia, namely China Exim Bank, should adopt the Organization for Economic Cooperation and Development (OECD) Common Approaches. Commercial financiers should adopt the Equator Principles, together with individual sector standards – in the case of hydropower the World Commission on Dams (WCD) strategic framework. All commitments should be verifiable by independent observers.