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# Watershed

People's Forum on Ecology

Burma, Cambodia, Lao PDR, Thailand, Vietnam

Watershed

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# The energy future: More clean, more democratic

The generation and supply of electricity is generally portrayed as a necessity and benefit of development. Generally, people welcome a supply of electricity if it is used to reduce their workload (such as the milling of rice or pumping of water), used to support the education of their children (light bulbs by which to read and study in the evening), and then, if possible, even to provide for their entertainment (television).

But, also generally, local communities are not willing to sacrifice their sources of food and livelihood for the generation of electricity. In other words, if the generation of electricity requires the destruction of the rivers, forests, and lands upon which the economic and food security of local communities depends, these communities will not willingly accept the loss of the basis of their security. Along the Mun River in Thailand, local communities opposed the Pak Mun dam because the dam would destroy the fisheries that were their main source of food. Said a village elder to an Executive Director of the World Bank (that funded construction of Pak Mun), "We are not against the dam. We are against the disintegration of our communities [that would occur if the dam were built]." In Stung Treng province of Cambodia, where the operation of the Yali Falls dam in Vietnam has caused flooding of rice fields along the Se San River, "If we have electricity and we are still hungry, should we just sit and look at the light? Will that fill our stomachs?...We can survive without electricity, but we cannot survive without rice." Many village people, not just along the Mun and Se San rivers but throughout the Mekong River Basin, say, "You can not eat electricity!"

These people have their priorities: ensure their use and conservation of their natural resources as the source of their livelihood security. Then, and only then, will a supply of electricity be of benefit to them. These priorities should define all further development of electricity generation and supply in the Mekong Region.

Electricity generation facilities must not damage the people's rivers, lands and forests. These resources are the foundation of the food and livelihood security of millions of people living in local communities. These resources also provide nearly all of the food consumed by all the people living in the region. The rivers, lands and forests of the region must be conserved and wherever possible, the health of these ecosystems should be recovered according to the knowledge and potential of local communities.

Decades of experience indicates that large-scale electricity generation facilities, particularly large dams and coal-fuelled plants, damage or destroy natural resources and the livelihood security of local communities. These projects also cause social conflict, and if implemented, are often responsible for violations of fundamental human rights while increasing social and economic inequalities within societies.

The fact is, viable alternatives to these destructive projects are available. The generation of electricity using the methane gas produced by decaying plant and animal waste (known as bio-mass and bio-gas), using sunlight (solar), wind, micro-hydro, and the heat generated by industrial processes (known as co-generation), are among the technologies increasingly used to generate electricity. Solar- and wind-generated electricity are particularly relevant to local communities in the Mekong Region, as these technologies take advantage of the natural conditions of the region and can supply electricity to communities far less expensively than supplying electricity through construction of electricity transmission systems supplied by large-scale generation projects. These technologies are of potentially huge benefit to the local communities and governments of countries in which large projects and transmission systems have not yet been built – in other words, Cambodia and Lao PDR, and many parts of Vietnam.

But these technologies can only provide genuine benefits to local communities if these communities are responsible for the planning, installation and management of these systems. Local communities will need technical support and guidance so as to fulfill these responsibilities, but as most communities wish to have access to the benefits of electricity their acceptance of support and consequent responsibilities is likely.

Much of the possible short-term success of supplying electricity through these technologies depends on government policies. Programmes that support the import and use of these technologies would provide a myriad of economic and social opportunities for the people of the Mekong countries. These opportunities do not only relate to the benefits of an electricity supply, but the emergence of an economic sector providing employment and skills training to disseminate, install and maintain these technologies. The benefits for society and a country's economy are difficult to underestimate.

Government support for these technologies and community-managed electricity supply systems, and the consequent benefits to society, would also indicate that the governments of the Mekong Region are able to

transcend the obsolete economic and development models that have proven to be so destructive. It is time for these governments to show some long-overdue respect for the rights of the people of these countries, including community-based decision-making and management of electricity supply systems and natural ecosystems. Much of the social conflict of the present and the future could be averted if governments acknowledge these rights and support local communities – in both rural and urban areas – in accessing and managing services and resources.

Unfortunately, the obstacles to adoption of these technologies and acceptance of the abilities of local communities are both the cause and effect of obsolete and authoritarian structures of economic and political power. These obstacles include centralised, bureaucratic structures of planning and decision-making, and the corrupting influence of the "development" industry, particularly the international financial institutions and trans-national corporations that fund and profit from construction of large-scale infrastructure projects. Most of all, the people inhabiting governments, corporations, or institutions like the Asian Development Bank, are trapped in an intellectual black-hole. Their lust for power, influence and profits narrows their vision to a 'business-as-usual' approach based on a 200 year-old economic model. Decentralised, small-scale, non-polluting, community- and household-based approaches to anything from electricity generation to forest conservation are threats to the privileges enjoyed by these officials of the power-structure.

Fortunately, these obstacles can be, and are being, overcome by a combination of the technological advances described above and changing perceptions within societies.

The time when local communities could be forced to move from their homelands and/or suffer the impacts of large-scale electricity generation projects is coming to an end. Experience of the impacts and suffering caused by these projects in the Mekong Region, especially in Thailand, is now well-known. As communities are becoming better informed about these impacts, they are refusing to accept the impacts and questioning the rationale of these projects. Governments, corporations and institutions like the World Bank that successfully implemented these projects in the past have, by their very success, lost much of their legitimacy to govern or to define "development".

There is also a steadily increasing awareness that old-fashioned projects like dams, coal-fuelled plants, and nuclear power are no longer necessary. Although the proponents of these technologies and the economic model on which they are based have attempted to downplay the potential of the alternatives, the fact is that people in many parts of the world want to use electricity that has been generated without damaging the environment or communities. Experience in Europe and North America shows that an increasing number of people and local governments are demanding policies and programmes that support alternative 'green' energy; and electricity supply companies are meeting these demands by building solar and wind facilities, as well as supporting consumers in reducing their electricity consumption by increasing the efficiency of light bulbs and electrical appliances used in people's homes.

Associated social trends are those of 'self-sufficiency' and 'decentralisation'. Self-sufficiency is being sought by communities and households by generating their own 'green' electricity and reducing the amount of electricity they consume. Solar- and wind-based electricity generation systems are perfectly appropriate for self-sufficiency. Meanwhile, decentralisation means that as self-sufficiency is based on locally available and managed electricity supply systems, the generation systems based on centralised planning and decision-making and expensive, large-scale infrastructure is no longer needed or wanted by society.

Perhaps most importantly, there is the emerging world-wide trend that questions the basic assumptions of the political/economic power structure. Increasingly, people everywhere are realising that the damage to the environment, injustice and inequalities, at the local level and at the global level, are the result of assumptions that economic growth through the exploitation of people and nature is the main objective of humanity, now and forever. As more people understand the insanity and destruction caused by these structures, the more people are working to reject them and develop different approaches to life and living.

Thus, alternative technologies of electricity generation and supply are important components of an over-all approach to receiving the benefits of electricity but doing so with little or no impact on the environment or society. These technologies can and will provide many benefits to the people and communities of the Mekong Region. But these are only technologies. The destruction and suffering caused by large-scale electricity generation facilities must be put to an end, but this would not put an end to the exploitation, consumption and waste that are inevitable in a system of never-ending economic growth. However, major technological advances in the means by which electricity is generated and supplied is coinciding with a social movement demanding the rights of communities and societies to define their relationships with each other and with nature. It may be a long process, but the old political and economic systems of exploitation and waste are coming to an end. New ideas and approaches are only just beginning.

**This issue of *Watershed* is published in memory of Anil Agarwal, founder and director of the Centre for Science and Environment in India, founder and editor of the fortnightly science and environment news magazine *Down to Earth*.**

## Inspection into Klong Dan finds ADB violated its own policies

An independent Inspection Panel authorised by the Asian Development Bank (ADB) to inspect into the Samut Prakarn Wastewater Management Plant (SPWMP) found that the ADB has violated six of its own policies and procedures in implementation of the US$948 million project.

The controversial SPWMP has been facing intense opposition from local communities in Samut Prakarn and Chachoengsao provinces who are concerned that the project's release of semi-treated effluents into the coastal areas would adversely affect their fishing and sea-based livelihoods. Allegations of corruption involving the ADB, Thai government officials and the private contractors surrounding the acquisition of land for the project also remain unresolved.

Faced with increasing local opposition, the ADB authorised a three-member Inspection Panel to look into ADB policy violations in the project in July 2001.

The Inspection Panel report states that the ADB did not comply with six of its own policies including:

(1) Supplementary Financing of Cost Overruns: "in not carrying out a reappraisal of the entire project for the supplementary loan proposal there was non-compliance by the Bank of [the policy on Supplementary Financing of Cost Overruns ]… This omission became a crucial factor from which other consequences followed."

(2) Bank Operational Missions: "the Bank did not comply with the policy."

(3) Environmental Considerations in Bank Operations: "the key to all the allegations of violations of environmental policies lies in the Bank's initial categorization of the Project."

(4) Involuntary Resettlement: "the Bank failed to do an ISA [Initial Social Assessment] and failed to do a resettlement plan that covered potential impacts of the Project on the livelihood of the local community…Only in a very late stage of implementation of the Project, and after significant protests from the community, an awareness of the need for compensation for eventual negative impacts seems to have emerged."

(5) Incorporation of Social Dimensions in Bank Operations: "the Bank did not comply with its policy on the incorporation of social dimensions."

(6) Governance: "it appears to the Panel that Management is applying a rather narrow and legalistic concept of governance."

The Inspection Panel states that "The rights and interests of some of the people whose livelihood depends upon the activities in the vicinity of economic exclusion zone could also be adversely affected due to the potential problems caused by the dilution of salinity, release of toxins or heavy metal…

"The rights and interests of people, who are in the vicinities of the treatment plant, could be adversely affected by the odor, lowering of property value and potential problems caused by the existence of toxin and heavy metal in the sludge management."

Although the Inspection Panel found that the Bank failed to comply with a number of Bank policies, the ADB's Board Inspection Committee (BIC) subsequently produced a list of recommendations in February 2002 that failed to acknowledge and address the breach of Bank policies and their impacts on local communities. The Board of Directors approved these recommendations in a meeting in March 2002.

In a letter to the ADB President Tadao Chino dated 26 March 2002, the day after the Board met, the local communities stated that: "It is evident that the ADB's leadership and senior management appear unwilling to take responsibility for their own actions and initiate appropriate action to correct their own mistakes."

The letter also criticised the inspection process for being flawed since the Inspection Panel failed to visit the project site and carry out consultations with local communities to be affected by the SPWMP.

Local communities of Klong Dan and Song Klong subdistricts who would be adversely affected by the SPWMP urged the ADB to immediately stop all financial support for the project since it is now clear that "the ADB has made serious errors in the appraisal, approval and implementation process of the SPWMP."

On 28 March 2002, nearly 100 representatives of Klong Dan and Song Klong subdistricts rallied in front of Parliament to petition Prime Minister Thaksin Shinawatra, urging the Government to stop the project on the grounds of non-transparency of ADB's implementation process. The letter stated that; "We strongly demand that the government take this opportunity to stop the project. Continuing the project will seriously damage the coastal and marine livelihoods of hundreds of local people and the coastal ecosystem as well as contribute to increasing the debt burden of the national budget and the tax-paying citizens of Thailand."

Mr. Chalao Timthong, a local leader, stated that, "The ADB now admitted that the process is not transparent, so we want the Prime Minister to suspend the construction and conduct an investigation for the whole processes, as well as all the political parties who have been involved with the project."

Sources: Final Report of Inspection Panel on Samut Prakarn Wastewater Management Project 14 December 2001; Report and Recommendation of the Inspection Committee to the Board of Directors of Asian Development Bank on Inspection Request: Samut Prakarn Wastewater Management Project 28 February 2002; Klong Dan Press Release 26.3.02, 28.3.02; *Phu Jad Karn* 27.3.02; *Krungthep Thurakit* 27.3.02; *Matichon* 9.4.02.

## Thailand rejects dubious "debt for forest" proposal

The Thai government has rejected a "forest conservation" proposal by the United States (US) that would establish tree plantations to meet the US targets for reducing carbon dioxide ($CO_2$) emissions in return for reducing debt owed by Thailand to the US.

The US proposal would transfer US$12.6 million (Bt550 million) comprising repayment of Thailand's debt into a "Tropical Forest Conservation Fund" (TFCF) over a period of 28 years. In return, the TFCF would establish tree plantations in Thailand to absorb $CO_2$ and allow the US to obtain "emission credits" for reducing emissions of greenhouse gases.

Thailand's local community groups, nongovernmental organisations (NGOs), and academics opposed the proposal, stating that the risks involved for local communities and forests in Thailand were not worth the money.

On 1 March 2002, after concluding a two-hour meeting among five government ministries about the proposal, the Thai Foreign Minister Surakiart Sathirathai said that the government decided not to accept the proposal because the ministries of Science, Technology and the Environment (STE) and Agriculture, which examined the draft proposal, felt that the US had not responded to Thailand's main concerns.

Without giving details, Mr. Surakiart said these concerns involved questions of access to forests and "carbon credits". The minister added that negotiations between the two governments would continue and if the US government accepted Thailand's position, the TFCF agreement might be signed next year.

"But our stance will not change. That is, we will not trade off our forest resources and 'carbon credit' for debt reduction," he added.

The government wanted the agreement to be delinked from "carbon credits" under the Kyoto Protocol (which Thailand has not yet ratified) stating that without this delinkage, Thailand may not receive help in future from industrial countries in the reduction of greenhouse gases.

The Kyoto Protocol requires industrialised developed countries to reduce emissions of "greenhouse gases" such as carbon dioxide, methane, and nitrous oxide. The developed countries can get carbon credits – more permits to pollute – if they spend money to plant trees as "carbon sinks" in developing countries to "absorb" some of the $CO_2$.

The amount of $CO_2$ consumed by these sinks would then be subtracted from the amount of $CO_2$ emitted by these rich countries. However, questions remain over the effectiveness of carbon sinks since there is no reliable method of calculating the amount of $CO_2$ removed from the atmosphere by sinks.

Over the past several years, industrialised countries particularly the US have attempted to avoid making cuts in their greenhouse gas emissions as required by the Kyoto Protocol by proposing projects similar to the TFCF. Complaining that cuttting down on emissions would affect their economies, the governments of these nations – in particular the US, Canada, Australia and Japan – are unwilling to take effective action in their own countries, and are seeking to transfer the burden of solving the problems of climate change to developing countries.

Detcharat Sukkamnoed of the Thai environmental group Sustainable Energy Network said: "I believe Washington would keep trying to urge Thailand to establish the fund because they could claim carbon credits from such a programme. The Thai government should make it clear that we would not let industrialised countries claim credits over reforestation projects in our country," said.

Another concern is that the TFCF would provide access for US corporations and researchers to Thailand's biological diversity.

Jakkrit Kuanpoth, director of the Research and Rule of Law Bureau of Thailand's National Human Rights Commission (NHRC) said the details of the proposal were similar to the US's own 1998 Tropical Forest Conservation (TFC) Act.

"If we agree to the proposal then this means that the Thai government accepts that the US law can be enforced on Thai territory and any national law and regulations that violates the US law can not be implemented," he said.

Under the TFCF, Thailand would not be able to enforce its laws on biodiversity, protection of natural resources and intellectual property but conform to US laws as per the original proposal.

"It is obvious that the real goal of the US in the proposal is to use Thai biological resources to serve its own pharmaceutical and agricultural industry," said Jakkrit, "as well as to collect credit in reducing greenhouse gases [by setting up tree plantations under the Fund]."

## Small-scale farmers in North Thailand fight for their rights

With the beginning of *Songkran*, the Thai New Year festival, small-scale farmers in Thailand's northern provinces succeeded in a year-long campaign to convince the government of Prime Minister Thaksin Shinawatra to investigate complaints relating to their rights to land, forest and citizenship.

In March 2001, representatives of local communities under the auspices of the Northern Federation of Peasants (NFP), petitioned the government for the resolution of eight issues affecting the livelihoods of local communities.

A year later, in March 2002, the petition still had not been considered by the government. Prapat Phanyachartrak, the Deputy Minister of Agriculture and Cooperatives informed the NFP that the eight petitions were perceived by the government as "too large to swallow".

On 13 March, Prime Minister Thaksin Shinawatra met with representatives of the demonstration and pledged to do everything in his power to solve the problems. On 16 March, more than 5,000 farmers established the Northern Village Federation of Peasants in front of Chiang Mai City Hall to continue to pressure the government

Three days later, after further negotiations between farmers and government ministers, the Council of Ministers resolved that all relevant ministers should enter into discussions with the farmers. The farmers insisted that the government must have completed negotiations before the 9 April Cabinet meeting.

On 9 April, the Cabinet resolved the following:

1. Forest encroachment: Farmers sought their rights to participate in management of community forests. The details of a Cabinet resolution have not yet been announced.

2. Land rights: Farmers requested the government to solve the inequalities in land ownership that have emerged from iniquities in land rights. The government agreed to set up a committee with representatives from the Interior, Agriculture, and Finance ministries to find a solution.

3.Water management: Farmers want increased local participation in management of water resources. The government agreed to delay the enactment of laws affecting water resources, including privatisation of water, and to set up a national water-policy committee to consider input from farmers.

4. Failing crop prices: Long-term low prices of agriculture products and the government's over-arching plan to increase 'free trade' have left many farmers in debt. The government will set up a committee to study the effects of liberalisation on the agriculture industry. Onion farmers will be subsidised and the government will establish a trust fund to help raise the price of longan fruit.

5. Indebted farmers: A committee studying the problem has yet to find ways to help farmers in debt.

6. Ethnic minorities: People of ethnic minorities requested the right to Thai citizenship and legal status. The government will set up a committee to study the situation and decide to expand the rights of the highland people, review and categorise people in different areas. The highland people who have already received identity cards will receive health insurance from the government.

7. Home-made liquor: Farmers request the right to make local and traditional whiskies, currently made illegal to "protect" the corporate and state-controlled monopoly of alcohol production. A government committee is to consider a temporary order by which the Excise Department will not arrest village people making traditional whiskies, while another committee will review the 1950 Liquor Law.

8. Environmental impacts from three projects – the Mae Mok reservoir in Lampang province; a longan-drying plant in Chiang Mai province at which an explosion two years ago killed many people and caused environmental pollution; and the Mae Moh lignite-fired power plants in Lampang province. The government has agreed to help people whose livelihoods have been affected by the three projects and events.

Although the 9 April Cabinet resolutions did not meet all their demands, the farmers agreed to end their month-long protest.

In the "school for politics" organised within the protest village, Dr. Nithi Eiowsrivong, a well-known academic from Chiang Mai University, said: "The only way you can have the state respond to your needs and set up the policies that can solve your problems is to do what you are all doing now. This is the 'politics of the people sector'. We should not leave our hopes with any political parties, but try to use the parts of the Constitution that allow us to pressure the government, simply like what we are doing now."

Sources: *The Nation* 9.4.02; Communications with representatives of NFP.

## Dying to play golf? The Thai government has plans for you…

For those of you wanting to give an arm or a leg to play golf in the Mekong Region, the Thai government is planning an international golf course with tourist facilities including resorts, war museum and a centre for mountain climbing and trekking on a tract of land straddling the border areas of Thailand, Lao PDR and Cambodia recently named as the Emerald Triangle.

The golf plans for the proposed tract of land that sits on a high, thickly forested mountain ridge threaten to destroy some of the last remaining contiguous forests along Thailand's northeastern border areas.

The area was a key battlefield during the Indochina wars in the 1970s and is littered with thousands of unexploded anti-tank and anti-personnel mines. The Laos side also sees sporadic fighting between Laotian government troops and rebels while drug smugglers operate in the Thai part of the region called Chong Bok in northeast Thailand's Ubon Ratchathani province where the borders of Cambodia, Laos and Thailand meet. Ridding the area of the thousands of mines is expected to take at least one year to complete and cost about 500 million baht.

The area's borders have not been completely demarcated, posing problems for tourism development as the Thai government prohibits any type of project or construction where border agreement has not been reached to avoid border conflicts.

Among the three countries, Thailand and Laos have agreed on most of the borderline along the area except for a one-kilometre stretch along Thailand's Chong Bok and Laos' Champassak province in Laos; the demarcation talks between Thailand and Cambodia have made little progress.

"It is impossible to go ahead with the Emerald Triangle's tourism development project even after demining is completed," said Thailand's Deputy Defence Minister Yuthasak, "The army could handle the task of demining the area but it would need a huge budget to buy equipment and pay demining specialists."

Lao and Cambodian officials at the meeting, while agreeing with the concept of the project in principle, stated the need to study the proposal in more detail.

The proposed area is part of the Doi Phu Jong-Na Yoi National Park along the Phanom Dong Rak mountain range in Ubon Ratchathani province, and forms the upper catchments for several rivers in the Mun River basin including the Lam Dom Yai River.

Opened in 1997, the national park covers 428,750 *rai* [69,000 hectares] and contains dense forest that is habitat for rare wildlife species such as gaur, tiger, bear, wild pig, barking deer and siamese fireback. The area is known for its rich biodiversity and comes under the management of the Pha Taem Protected Forest Complex project that "aims to promote cooperation for transboundary biodiversity conservation between Thailand, Cambodia and Laos".

Although the tourism plan will require revoking the national park status, Thailand's Deputy Minister for Agriculture Prapat Panyachatrak favours the plan: "It is necessary to revoke the national park status to serve tourism because the activity will bring a large amount of revenue."

The golfing plans have raised concern among Thailand's environmental groups and nature conservationists. Ms. Sayamon Kaiyoorawong, director of the Bangkok-based Project for Ecological Recovery (PER) said the government plans reflected a "double standard" in forest conservation.

"While local villagers are prohibited from using forest land or settling on it, state agencies can occupy it easily for commercial purposes," she said.

The former head of Thailand's Royal Forestry Department, Senator Pong Leng-ee, said it was illegal to build golf courses in a national park.

"It would destroy the environment and natural resources in Ubon Ratchathani province. People who want to play golf on courses straddling three countries are just mentally deranged," he said.

# Rethinking energy in the Mekong Region

**Energy planners in the Mekong Region from governments and energy institutions to multilateral financial institutions and energy technocrats view constantly increasing energy consumption as a necessary condition for "economic growth" that is then equated to "development". This view requires that energy planners need to continually identify conventional sources of energy such as coal, hydropower or nuclear and build large-scale power stations to supply this ever-increasing "demand" while ignoring issues of ecological impacts, the efficient use of energy, and renewable energy sources.**

***Watershed* talks with an energy planner from Thailand, an academic working on renewable energy issues in Lao PDR, and experts on renewable energy systems in Cambodia and Vietnam, to explore the dominant views on energy planning in the Mekong Region and the renewable energy options for the future.**

## "As you know, I was born to be in the power business in this country."

**Mr. Sitthiporn Ratanopas is the Deputy Governor for Policy and Planning of Electricity Generating Authority of Thailand (EGAT) and the President of the Electricity Generating Company (EGCO). He worked with EGAT for more than 30 years starting in the construction department and moving into planning and demand side management before becoming the deputy governor. He has been President for EGCO since April 2000.**

**When and why was EGCO formed?**
The Electricity Generating Authority of Thailand (EGAT) formed the Electricity Generating Company (EGCO) in May 1992. EGAT created EGCO, funded it and owned 100 per cent of the company. EGCO was then given the option by EGAT to purchase the first Independent Power Producers (IPP) project from EGAT, the natural gas-fuelled Rayong power plant. After this, EGAT reduced its shareholdings in EGCO from owning 100 per cent to 49 per cent of the company and listed the company on the stock exchange to obtain capital. It was the decision of EGAT to spin EGCO off to be a private company. Now EGCO is a truly private company listed under the stock exchange of Thailand, and EGAT has reduced its ownership from 49 to 25 per cent. Another strategic partner is the China Light Power Company from Hong Kong, which also holds 25 per cent. The remaining 50 per cent is listed with the stock exchange.

**When was the first IPP programme brought in?**
EGCO is the first IPP project. EGCO was the holding company for the first IPP in Rayong in 1993.

***Mr. Sitthiporn Ratanopas: "When you compare between natural gas and coal, the amount of gas in Thailand can be used for not more than 14 years. But you can still get coal for another 100 years from around the world. You cannot move gas like you can move coal around the world."***

**Is EGCO interested in alternative or renewable energy?**
Sure. We have one project under construction at the moment. It is a rice husk project of about 10 megawatts (MW) in Roi Et province. EGCO Green Energy, a joint venture between EGCO and Electric Power Development Company of Japan holds 95 per cent of the project, the remaining five

per cent belongs to Sommai Roi Et Rice Mill partnerships.

**Is it possible for the rice husk project in Roi Et just to supply electricity to the local area?**
The electricity demand in Roi Et province is more than 10 MW and our plant capacity is only 10 MW. It is not possible for a small project to supply the local area, the electricity goes to the central grid. This is in the Small Power Producers (SPP) programme of EGAT.

**How does EGCO decide whether to invest in a small generation project like the rice husk in Roi Et or a large project like in Rayong. Is the decision based solely on financial matters?**
Of course, we have to focus on the financial side, but we have to make people understand that we do not do only the profit-oriented business but we also take care of the social side as well. The rice husk project can prove to the public that we really care about the environment and also shows how we can utilise the agricultural waste.

EGCO is positioning itself to the public that we are friendly to the environment. Our slogan is "We give you more than just brighness". It means we conserve the environment for everybody and we treat the world like our family.

**What are the benefits of the rice husk project?**
We focus on having the local people to work with us. That is our policy, that whenever we implement a project we try to utilise the people around that area to become our employees.

**However, local people are opposing the coal-fired power plant project in Prachuab Khiri Khan province in South Thailand. Why did EGCO invest in this large project and how will EGCO resolve the current situation?**
As you know, I was born to be in the power business in this country. I worked with the power sector for more than 30 years. I have spent many years in the policy section of EGAT. First of all, EGCO invested in such a project because we realise that in the future we cannot avoid using coal. Today in Thailand almost 70 per cent of the country's energy is from natural gas. When you depend so much on power from one type of fuel, it means that if you have a problem with that fuel, for example with the price, it affects the price of power. So we have to look for alternatives. When you compare between natural gas and coal, the amount of gas in Thailand can be used for not more than 14 years. But you can still get coal for another 100 years from around the world. You cannot move gas like you can move coal around the world. You have to spend a lot of money to move gas. The coal deposits are much more than gas in the world and the coal price is more stable compared to gas. The second reason for EGCO's investment is that the project will provide financial benefit for the country.

We are taking care of the local people. The number of people who support the project is more than the number of people who are against the project. This is the true story. When you go to the site you realise how different the news [about the protests] is from the reality. EGCO has set up funds for the local people of eight million baht per year to develop the public assets for local people. Each company in the project contributes to this fund, annually eight million baht for 25 years [the period of the contract]. We also have another 150 million baht insurance to insure against environmental damage and to correct the environmental effects.

**So why are local people opposing the project if there are benefits to the local community?**
Very good question. I wish I knew. But anyway, not only in our project but for any project across the country, they have such kinds of people to protest the project like that.

**"Our slogan now is 'We give you more than just brightness'. It means we conserve the environment for everybody."**

**So how do you think the conflict at Bo Nok can be resolved? Do you think it is up to the Prime Minister to resolve it?**
Yes. Because EGCO is not in the position to solve the issue by ourselves, the government must handle such problems.

**Is EGAT involved in the Bo Nok project?**
No.

**But the electricity from Bo Nok will be sold to EGAT?**
Yes. 100 per cent.

**And EGAT's subsidiary company EGCO is involved in the same project?**
No. EGCO got involved after the successful bidding for the Independent Power Producers (IPP) programme.

**So the only role for EGAT is to buy the electricity?**
Yes.

**Is the National Energy Policy Office (NEPO) involved in the negotiations?**
Yes, NEPO is in one of the committees set up by the government.

**As far as EGCO's role in IPP contracts, is there any conflict of interest between its relationship with EGAT and it's bidding for IPP contracts?**
This is a commercial negotiation. Anybody can negotiate with EGAT.

**But who decides who wins the bids?**
A committee. And there are EGAT regulations for the bidding.

**Part of the discussion about the Bo Nok case concerns the IPP contract. What do these discussions involve?**
To know the reality of this, you have to look back at 1994 when we invited investors to invest in this country. At that time the government had a limit to the amount of money it could invest in the country. The government learnt that if they let EGAT invest in the power sector we have to spend more than 100 billion baht per year every year. So it meant that we needed to cut the budget from other things to build the power system. During that time, the IPPs across the world were very successful and there were many investors interested in many things. So Thailand looked for investors for the power sector because we wanted to keep the government budget for other things. So many countries in this region – not just Thailand but also Malaysia, Indonesia, Philippines, every country needed the money from investors. So the government of Thailand thought about how it can make the conditions in Thailand so that investors will come to Thailand and not go to the other countries. That is why the conditions for investment are very soft because we have no choice. Someone has called this the slave contract. But the reasoning in those days was quite different from today. Because we needed the money from outside to invest in the country – so the conditions were soft and the situation is different from today.

**"In those days, I was the one involved in setting conditions, we learnt that we need the money and we need the investors from outside and we were afraid that other countries would win investors to them and that is why the contracts had to be soft."**

In those days, I was the one involved in setting conditions, we learnt that we need the money and we need the investors from outside and we were afraid that other countries would win investors to them and that is why the contracts had to be soft.

**What other types of projects does EGCO have?**
We have hydropower as well as natural gas. Now within EGCO we have almost 3,000 MW of capacity of which more than 2,000 MW is gas-fired. We have one hydropower project under construction in Laos. We have the Gulf Power Project, which is coal-fired. So we need a balance in EGCO, we need gas, coal and water to balance our supply.

**But EGCO does not have many renewable energy projects?**
We have very few. Under Gulf Electric, we have the SPP gas project in Suphanburi province and coal-fired power plant at Bo Nok and we have created another two projects that use wood chips, 20 MW each.

**Can shareholders in EGCO influence the company?**
They can ask any question they want at our Annual General Meeting (AGM).

**If there was a push from the public for a move towards more renewable energy would EGCO be happy to move in that direction?**
For sure.

**What prospects do you see for SPP in Thailand?**
We also have some SPP under negotiation. But SPP is not only for renewable energy projects as some are still conventional power.

**Do you think SPP contributes positively to the energy situation in Thailand or does it compete with the IPP programme?**
Yes and no. Some SPPs are good for the country because they can use more advanced technology compared to the IPPs. They can use the cogeneration technique to produce power and also steam [which can then be used] and this is more efficient. Some kinds of SPP use the conventional fuels and just want to sell their power to the grid. That's why I say yes and no. But one of the disadvantages of SPPs is the size of SPP is smaller than the size of IPP.

**The "power pool" where companies would sell their generated electricity is scheduled to start in 2003. Is EGCO looking forward to participating in the power pool?**
EGCO is looking forward to the power pool, which has been postponed for now. But we have to worry about the site of the power plants in this country and also the ability of the people to buy the power.

I think the difficulty of the power pool for Thailand is that we still have too many people who are poor. The tariff structure is quite different from other countries, some customers still need some subsidies for power and residential tariff is cheaper than commercial/industrial tariffs. In the power pool, the tariff structure should be back to normal. The customer who uses the power for constructive use should pay cheaper prices than a non-constructive one like residential users. In many countries the tariff is two or three times higher than the commercial one but in this country it is different. So I think we will have to wait for another five or six years for the power pool.

**What has caused the delay in the introduction of the power pool?**
The delay was caused by the recent bad events in the energy sector in California – so NEPO is analysing the California experience.

**Is it true that the Edison Company from the United States (US), one of the companies involved with EGCO in the Bo Nok coal-fired power project, was partly blamed for the energy problems in California?**
Yes, Edison is one of the players in California.

**Is it true that the power pool in Thailand is to be quite similar to the California model?**
The power pool model is conceptually based on the United Kingdom (UK) model. But now we must think carefully about the concept of the power pool – the same as California or the UK.

**So the idea of the power pool is to introduce competition that can reduce power prices?**
That's what they believe but I cannot say that. I never believe that the pricing in the power pool is less. It should be cheaper than in the past in Thailand. But I never believe that. There are a lot of controversial issues about the power pool.

**Will the Association of Southeast Asian Nations (ASEAN) regional power grid benefit Thailand?**
It will benefit all of ASEAN not only Thailand. Because of the geography of ASEAN, in the north part of ASEAN we have a lot of hydropower and in the southern part we have a lot of fuel like coal. The technique of the operation of power is to use hydropower for peak loads and the coal as the base load. So if the ASEAN can be a single grid, you can mobilise cheap power in the daytime from the south up to the north and in the peak time you can utilise the cheap hydropower from the north down to the south by using the grid across the ASEAN countries. That is the concept of the ASEAN grid. On 26 April 2000, we had a meeting of the ASEAN heads of power utilities hosted by EGAT. The meeting decided to set up a committee to study the ASEAN grid to make use of the power across the area of ASEAN as a single grid and EGAT is the head of that committee.

**One of the benefits of smaller renewable power projects means that they can be located closer to populations, are less-polluting and do not have energy distribution loss in transporting along the grid. But will the ASEAN regional grid favour larger power projects that are more polluting and less energy efficient?**
The concept of power is that bigger is cheaper, so the bigger the project, it becomes cheaper per kilowatt of investment. This is on the side of technology. But if you can make renewable energy last long then that is good. If you use rice husk, we are sure today we have rice husk but nobody knows if we can have rice husk in ten years. If you can get the benefit from rice husks to use in another way then you can change the rice husk to another fuel type. So the Roi Et rice husk project is a risk for us at the moment.

**But hydropower and coal are also risky?**
No, hydropower is less risky than rice husk because hydropower is located upstream and the rain comes every year. The catchment can get the rain and bring it to the reservoir, so the hydropower is renewable. Even if you use more water in the upstream and then have less in the reservoir, however, every year the rain comes anyway. The risk is the season may differ with how much water there is in the reservoir and the rainfall may not be the same each year.

But the rice husk or wood chips is different from hydropower since nobody knows what will happen to the rice husk supply in the next ten years. Maybe the agriculture will change or maybe there will be a decision to use the rice husk for other things, or maybe they bring greater benefit if they're left on the field.

**But what about other renewable fuel sources such as solar, wind and biogas?**
The investment is very high requiring more than two or three times the investment compared to conventional energy.

**So EGCO will focus on large power projects using conventional fuel sources?**
Yes, it is very hard to do large power projects with renewable fuels.

**Do you think that the future for energy is using more gas, coal and hydropower sources?**
Yes, with today's technology. But in the future we realise that solar technology is good and getting cheaper. In Japan now the cost of solar power is the same as the energy pricing for the residential areas. But you have to realise that the residential tariff in Japan is three times that of the commercial users. But possibly with technological advances there is possibility for more renewable energy if you can make the price of renewable comparable to conventional energy. I think if it were possible, everybody would like to use renewable energy.

**Is there a problem with the pricing of electricity in Thailand at the moment?**
No, the people thought they had a problem but in reality we are the second cheapest in ASEAN. The cheapest is Indonesia and that is because of subsidies. Thailand is the cheapest amongst those without subsidies for pricing.

**So why does the public think the electricity price is too high?**
They compare among the last two years when the oil price was US$15 per barrel which is much cheaper than today's $20. I try to convince them to look back to the last 50 years. The last 50 years had the same price as it is today. If there is an oversupply like there is today then I can believe that the pricing might be down but when is greater than demand supply the price may go up. We do not know yet.

**Is EGCO investing in projects outside Thailand?**
Yes, in Laos and in the Philippines. We can invest within ASEAN countries.

**Can you tell me about the project in Laos?**
It is the Nam Theun 2 hydropower project to produce electricity for Thailand.

**What led EGCO to invest in hydropower in Laos?**
It was a business decision. Also, under EGCO's energy balance we needed to diversify our fuel types – coal in Bo Nok,

gas in Rayong, and hydropower in Laos.

**What plans does the company have for dealing with the potential social impacts from investing in dams in Laos?**
We will follow the guidelines of the World Bank. The problems lie between the Thai government and the Laos government. The Lao government is very decisive to build things compared to the Thai government. The Nam Theun 2 project is not the first hydropower project in Laos, they have at least another two projects and the other two are very successful.

**"It is difficult to make a clear understanding among the people about the business of power generation. Of course we can build the power from many resources. We can build from the sun, sand, sea, wind, whatever."**

**Are there plans to buy electricity from hydropower sources in China and Burma?**
Yes.

**Do you think conflicts in the country will increase if the regional power grid brings in more large-scale energy projects? Would a change in policy on the fuel types to cleaner and more renewable energy sources be a better solution?**
It is difficult to make a clear understanding among the people about the business of power generation. Of course we can build the power from many resources. We can build from the sun, sand, sea, wind, whatever. But the magnitude of the power from these types of resources cannot compare to the conventional ones. The growth in energy demand is 1,000 MW per year. If you try to meet this demand by solar cells, do you know how many square kilometres of solar cells is required? I think you'd need to use every square inch of Bangkok as a solar cell to make 1,000 MW of solar cell power.

**Is the NEPO building powered by solar cells on the roof?**
It would never be possible. Our EGCO building uses about 5 MW of electricity. If you used solar power that would need about five square kilometres of solar cells. It is very difficult for protestors to understand this. On the first week I joined EGCO the people protesting at Bo Nok area came to my office and asked me to change the fuel from coal to solar. It is not possible.

NEPO has a programme for a hundred houses to have solar cells on their roofs. The investment for each house is about one million baht [US$20,000]. They used 500,000 baht from the energy conservation fund to give to each house. Even with the 50 per cent subsidy from the energy conservation fund, energy from the solar cell costs six baht [US14 cents] per kilowatt-hour compared to less than three baht from the main grid. The high cost is for investment in the solar cell. The cost of these renewables is too high. If the people can accept whatever it costs, then we can build it and we can make the clean projects.

I would like to tell you that you should start with Demand Side Management (DSM) because I created that project. DSM is good for the country at any situation during slow growth or high growth. So we would like to create more projects for DSM for the country.

The country is still growing in economic terms so we cannot avoid new power projects because the GDP growth requires that we make investments. But in this country we have a limitation in resource for power so we have to import from outside the country. If the people still protest the project the cost goes up higher and higher and the cost goes back to the people anyway.

**Does EGCO have a policy on energy? Is EGCO interested in DSM?**
No. We are a producer so we will not do such types of things in EGCO.

**Would DSM help EGCO?**
DSM has to grow but we have to change the source of money. DSM would not help EGCO. It would help the country.

**Could you explain the EGAT's demand side management programme?**
Although I am no longer in charge of the demand side management programme, by order of the government, today I am on the sub-committee to take care of the policy side of the energy saving of the country. The sub-committee is under the Minister for Energy.

It was the recommendation of the World Bank to bring the money from the Global Environment Facility (GEF) to sponsor a grant for this project – 6.5 million US dollars as a grant. And the government set up DSM under EGAT and they got money from the Energy Saving Fund that they collect from the oil fuel charge.

DSM did not spend its own money, only money from outside, from GEF and the Energy Conservation Fund.

DSM built up from four strategies. First one was called market transformation. This was to bring all the equipment that is inefficient to become efficient. For example, they change the fluorescent tube from 40 watt to 36 watt and also they change the refrigerator and the air conditioners make a standard and change the incandescent light to become a fluorescent one. There was advertising to build the image of the higher efficiency equipment.

The second strategy was called customer orientated, to see the users who are using energy inefficiently like the industrial and commercial users to build the plan of the green building. To go to the customer.

The third strategy is the public-private participation. After the project is introduced to the public and commercial buildings they try to convince the investor firm like a bank to support the programme by investing and loaning the money to the owner of the building.

The fourth strategy is to change the attitude of the people to try to introduce the green learning room to the school to teach students from primary to high school across the country. Students would come to learn about energy conservation.

**I understand that the World Bank saw Thailand as a success with DSM.**
Yes.

**What happened with DSM after the economic crisis?**
At that time I moved from DSM to policy and planning. Today, we cannot say that DSM is the success it was in the past because they lack money from the government to support the programme. And they changed the concept from using the Energy Saving Fund to use the budget of EGAT. Before I left the office this is one of the issues that was controversial with the policy. I told them that whenever you use the money from the EGAT budget to implement the project of DSM you can see the conflict of interest amongst EGAT and DSM. This is because EGAT is the power producer meanwhile you introduce DSM to save the power it is a conflict amongst them. If you use the money from within EGAT it means that whenever EGAT doesn't want to implement the DSM project they can save the money. It can make the bottom line profit for EGAT positive. That is the conflict amongst these two activities and that is why DSM has shrunk down now. NEPO is now active in this area but they lack the people to implement it. I do not think DSM is effective anymore for Thailand.

**And the theory of DSM would help reduce the peak load?**
That is the sub item of DSM, not only peak cutting, you can move the peak, you can reduce the difference between the peak and non-peak times, there are many strategies you can implement.

**So, from the point of view of EGAT's policy is this seen as a positive?**
Yes.

**But Thailand is still not willing to put enough budget into DSM?**
No.

**Do you think there is potential for DSM in the future?**
In the future, I think we have to change back to the source of money being outside of EGAT.

**Can DSM help Thailand?**
Sure. It is very important. In the six years of DSM more than 600 MW of electricity can be saved from the peak useage for a cost of about two billion baht. When you compare with a new power plant, which costs about US$1 per one kilowatt (or one million dollar for one MW), DSM is quite cheap. It is a lot cheaper.

**"If you use the money from within EGAT it means that whenever EGAT doesn't want to implement the DSM project they can save the money. That is the conflict amongst these two activities and that is why DSM has shrunk down now."**

**Part of EGAT's mandate was to provide power whether that is to build a new power plant or by implementing DSM. So why doesn't EGAT invest more in DSM?**
Sure but the demand growth for electricity is more than 600 MW per year – it is 1,000 MW and DSM has been able to save just 600 MW over six years so we still have to build new plants anyway. But it is still important for the country to save energy through DSM.

## I think Laos must depend on renewable energy as the main energy source for domestic uses.

**Dr. Khamphone Nanthavong is a specialist in renewable energy conservation and technology and graduated from the Moscow Power Engineering Institute, Russia, in 1994. He is presently a lecturer in the Faculty of Engineering and Architecture, National University of Lao PDR.**

**What are your perspectives on alternative energy resources in Laos?**
Laos is a landlocked, developing country with no conventional fuel sources such as oil and natural gas and only small quantities of coal. So Laos imports oil and natural gas. Laos has few choices in terms of conventional energy sources and our dependence on imported oil and natural gas is expensive. However, we have abundant renewable energy sources such as the sun, water, and biomass. Therefore, to develop sustainably, Laos needs to rely on renewable energy sources. The first energy potential for Laos is hydroelectric energy, which is considered a renewable energy, solar energy and biomass. These energy resources can serve the energy needs of Laos over the long-term.

**Does the state energy policy give importance to renewable energy sources?**
Recently, the Lao government has realised the potential of developing renewable energy and one of the state policies is to promote solar energy in rural areas under the rural electrification project.

The government has borrowed money from the World Bank for this project that has its primary objective to bring electricity to rural people by installing solar cells in rural

areas. Laos does not have a nationwide electricity grid system. The areas that are connected to the grid system get inexpensive electricity but other areas cannot get electricity. Extending the national grid to these other areas is still not economically viable. Therefore the government is focusing on the development of solar energy and micro-hydropower to attain the primary goal of providing power for lighting in rural areas, for refrigerators to keep vaccines in hospitals, and for communication tools in schools.

**"The people in Tha Khek province cannot afford to buy electricity directly from the Theun Hinboun dam and therefore buy electricity from EGAT."**

**Does the government have a policy for the development of renewable energy sources in Laos?**

In the past, Laos did not have any policy on renewable energy, but the Science, Technology and Environment Agency (STEA) is a government agency who is in charge of developing the policy on renewable energy for the country. We have just started to talk about alternative energy sources recently. Now many provinces have begun projects to develop renewable energy sources and some companies have set up services for local energy systems. This could be a sign that renewable energy in the local areas is becoming better recognised and could be expanded.

The objective of the state is to develop the national electricity generation and transmission network to connect the whole nation. It is very good if we can do this so that the whole nation can access electricity. But in reality, we have to think whether this is possible in terms of economic viability and technical feasibility. For now, we can say that it is still not technically and economically viable.

Therefore, for the beginning stage, the government plans to connect the electricity transmission grid to the main cities. For example, the electricity transmission from Nam Ngum dam is for Luang Prabang and the northern cities that are viewed as key cities for future economic growth such as the Triangle and Quadrangle Economic Zones that include cities in Thailand, China and Burma.

As you know, although Laos is selling electricity to Thailand, some cities along the Mekong River in Laos are buying electricity from Thailand. For example, Tha Khek in Khammoune province has to buy electricity from Thailand. This is because the electricity generated from the Theun Hinboun dam cannot be sold at a low price due to the demands of its foreign shareholders and investors. We therefore sell it at a higher price to the grid of the Electricity Generating Authority of Thailand (EGAT) to make it economically viable. The people in Tha Khek province cannot afford to buy electricity directly from the Theun Hinboum dam and therefore buy electricity from EGAT.

**Does the Government of Laos plan to expand the electricity transmission system to cover the whole country?**

The government's plan is to get Laos out of the ranks of the developing or the least developed country by the year 2020. One of the conditions for this is improving access to electricity. Therefore, the government has planned that nearly 100 per cent of the country should get access to electricity. However, the government has not said clearly that they will expand the transmission lines nationwide. The plan would be two ways of expansion: First, the transmission of electricity to all the key cities; this development will require borrowing money from foreign financial institutions. Second, the development of local energy sources such as medium and micro hydropower generation systems.

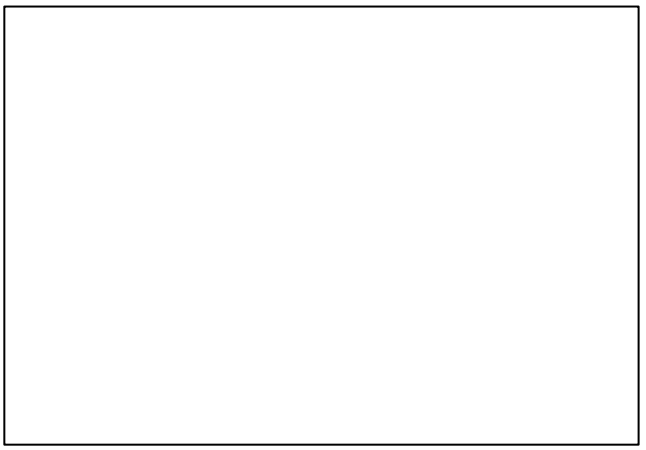


PHOTO BY SUNLABOB

***These solar panels produce 600 watts of electricity, enough for 40 households in Long Ngiad village, Luang Prabang province, Laos. The project was installed by Sunlabob Company with support from the European Union.***

In the rural areas, people now generate electricity by using car batteries. But this is very costly due to the price of oil and other related equipment. Therefore, we have to develop medium and micro hydropower and other renewable energy sources like solar energy.

**Electricity is generated in Laos both for domestic use and to export. Are the electricity generation projects for domestic use and projects designed to export electricity different?**

In my personal view as an academic, large-scale hydropower dams require high investment cost. The government does not have money. In general, borrowing money to build dams and generate electricity for domestic use is still not economically viable since the Lao industry is small. However, for the main cities, investment in electricity generation is definitely necessary and economically viable. So the government seeks support from foreign financial institutions. For example, the Nam Theun 2 dam project will generate electricity to sell to Thailand.

However, building large-scale dams creates many problems and obstacles. Unlike oil that can be stored and sold later, electricity from hydropower cannot be stored, it

needs to be sold when it is generated. So if we don't have the market to sell electricity, electricity generation becomes meaningless.

The Lao government relies on the Thai electricity market. However, the politics of energy issues in Thailand is complicated as illustrated by the protests about dams or coal-fired power plants and the issue of purchasing electricity from Laos. Therefore, for Laos to rely on the Thai electricity market is unstable and risky and the electricity price will go lower. To sell electricity to Thailand in the peak time, the price will be only US$0.07, while in the normal time the price will be about US$0.03. Therefore relying on foreign funds to build dams and export electricity will definitely face a problem of selling the electricity.

Dam-building can be an answer at one level but we cannot rely on building many dams to sell electricity as the main national income because the Thai market is unstable. Moreover, Thailand will hold the market monopoly because Laos cannot sell the electricity to other countries. Then Thailand could demand a lower price for the electricity. This is a normal thing in the market economy. In this case, Thailand will be in a better bargaining situation. Besides, dams also cause environmental problems such as deforestation and so on. This is also an obstacle for developing hydropower in Laos.

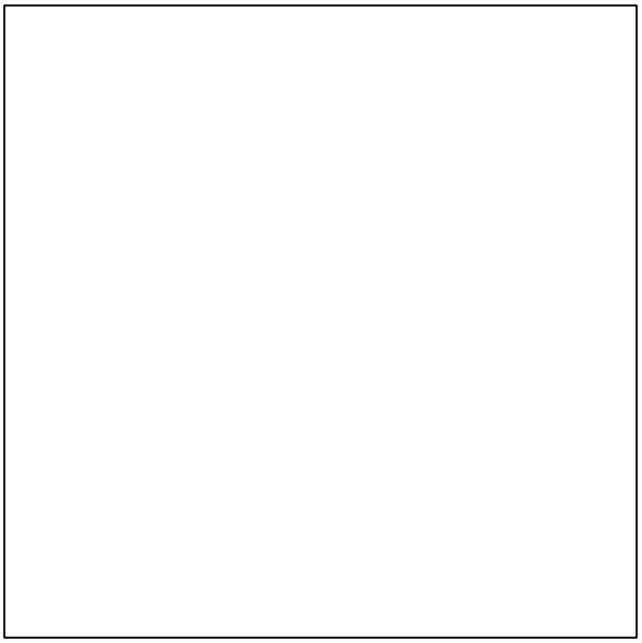
Therefore concerning the economic and environmental issues, the development of hydropower in Laos has some limitations. In my academic view, Laos should develop more suitable energy sources such as micro-hydropower or solar energy for the rural areas.

Hydropower is also categorised as renewable energy. However, technically there are two different sources: hydropower from large-scale dams is regarded as conventional energy but micro hydropower is regarded as non-conventional energy. The non-conventional energy is more suitable since rural areas are sparsely populated. It is not economically viable to link all rural areas to the national grid system.

Rural areas are still poor with very limited economic development. Normally, rural people use energy for rice milling, to operate small machinery, for lighting or for the radio and communication tools. Therefore, it is not economically viable to build big dams to generate electricity for these purposes since it would add up to a large economic cost in the long term. Since the electricity demand is not so high, micro-hydropower systems of about 10 to 20 kilowatts would be more suitable. Solar power and biomass are also appropriate for energy generation, particularly for household cooking.

**Can you describe the development and use of renewable energy like solar power in Laos?**

I have been directly involved in developing solar power generation in Laos since 1997. With the assistance of the nongovernmental organisations such as the Participatory Development and Training Centre (PADETC) and the cooperation of the Faculty of Engineering, we went to see the solar energy generation project in Phitsanulok province in Thailand where they use solar cells in solar ovens to make dried bananas. After coming back to Laos, with the cooperation of PADETC and the Faculty of Engineering, including myself and some final year students, we made simple solar ovens that have become quite successful. We have developed and distributed them to several local communities in Laos. Now, many villages are using these solar ovens to make dried bananas for sale.



***Dr. Khamphone Nanthavong: "The development of hydropower in Laos has some limitations. In my academic view, Laos should develop more suitable energy sources such as micro-hydropower or solar energy for the rural areas."***

**Can you describe the small-scale renewable energy systems including small-scale hydropower systems that are being developed and used in Laos?**

In Laos, small-scale hydropower has been divided into three types, according to the International Standards Office (ISO) system, 30 to 100 kilowatts is called mini-hydropower, five to 30 kilowatts is called micro-hydropower, and below three kilowatts is called pico-hydropower.

In northern Laos, there are many pico-hydropower systems in which local people use cheap imported batteries from China and Vietnam to generate electricity for 100 to 200 light bulbs and black and white television sets. This costs only 450,000 kip [US$50], can be easily installed, and is used widely among the village people. However, the major weak point of this type of battery is that the electricity is always unstable because it relies on the water currents and the life-span of the battery is quite short. So the National University of Laos plans to invent an electrical adapter that can make the battery more stable.

The development of solar energy is also needed in addition to hydropower. In the past, local people did not know how sunlight could be converted into electricity. At present, I am also an advisor for Sunlabob, a private company, in the solar energy business. I realised that after we demonstrated

how solar energy works, many local people become interested and wanted to use it. We found that many households can actually afford to pay US$200 for a solar system to generate light by selling some of their livestock.

**"We must efficiently develop local sources of energy according to the sources available in each rural community."**

Starting this fiscal year, the government has some small funding for the rural electrification projects costing only 100 million kip [US$11,000] as pilot projects. Each province would develop and propose their energy projects to the government.

I think Laos must depend on renewable energy as the main energy source for domestic uses. The agriculture sector does not require as much energy as industry, so we can develop simple alternative energy sources such as micro-hydropower and solar energy.

**Presently, does the development of alternative energy in Laos mainly rely on foreign funding, such as that from the European Union (EU)? Do you think the Laos government could develop renewable energy without relying on outside financial support?**

The development of renewable energy for the rural areas in Laos has at least four approaches.

First, foreign organisations such as the EU countries and Japan have projects on rural development and renewable energy is one of their main concerns. These projects aim to provide electricity to village people.

Second, the government borrows money with low interest from the World Bank and the Asian Development Bank to support the development of renewable energy. The government aims to create projects that provide loans to the village people or local companies. However, these kind of projects have a high risk since people may not be able to pay back the loans. So these projects have to be undertaken by companies who have the financial ability.

Third, the government has allocated part of the national budget for each province which can propose renewable energy projects. But the money for these kind of projects is not much. However, we can see that the government is giving more attention to developing the local renewable energy resources.

Fourth, local people are also investing in simple equipment for small-scale energy production. In the experience of the Sunlabob company, local people can afford to do this but in the past they did not have any knowledge of for example, how solar energy works until we demonstrated the working of a solar cell to give light or boil water. A small solar cell costs US$200, or two million kip. When one person in a village begins to use solar energy, soon other village people also want to get a solar energy system, and finally the whole community has solar energy.

**What is the potential for developing renewable energy in Laos in the future?**

It is quite difficult to answer. From an academic's point of view, I think the conventional energy resources will play a key role in the urban areas. On the other hand, for the next 20 to 30 years in the rural areas, the renewable energy resources will play a crucial role. The micro-hydropower system has the most potential because Laos has many small rivers and streams. But the weak point is that these small rivers and streams dry out during the summer season. However, in summer we have strong sunshine. Therefore in the future, we have to develop these three energy sources at the same time. We must efficiently develop local sources of energy according to the sources available in each rural community.

## "Sunlight may turn out to be Cambodia's greatest natural resource."

**Khmer Solar is a private company established in 1997 and based in Phnom Penh. The company is selling and installing solar-panel systems to generate electricity for schools, public health clinics, and nongovernmental organisations in the rural areas of Cambodia. *Watershed* interviewed Mr. Mao Sangat, Operations Manager, and Mr. Ford Thai, President, about Khmer Solar's activities and their opinions about the potential of solar-based electricity generation in Cambodia.**

**Since 1997, what types of renewable energy systems has Khmer Solar been doing? Is it just solar-powered systems or also things like bio-mass/bio-gas, wind, or micro-hydro systems?**

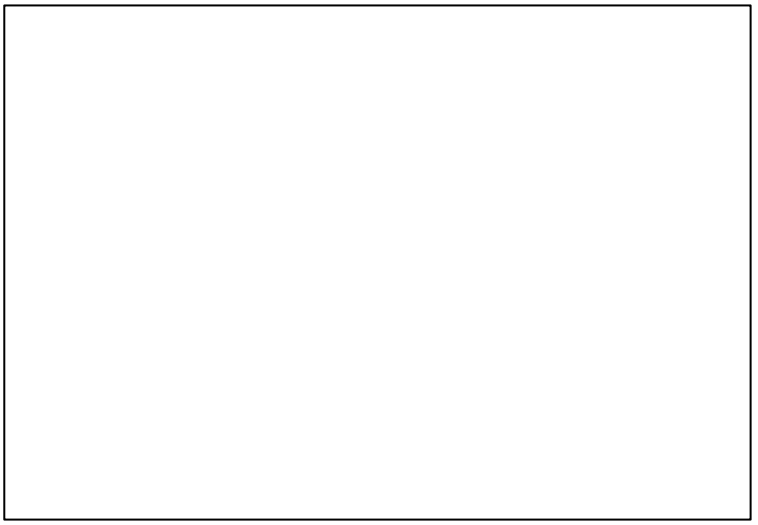
**Mr. Ford Thai:** In the beginning, in addition to solar, we did wind-powered systems, but this is very difficult in Cambodia. In this country, in many places we do not have enough wind, so we also do solar, because in Cambodia there is a lot of sunlight. Sunlight may turn out to be Cambodia's greatest natural resource. In many countries, there is five hours of 'peak sun', but in Cambodia, for much of the year, we have seven hours of 'peak sun'– the amount of time during a day when it is the best time to use the very strong sunlight to make electricity.

**How many projects have you been involved with and who are your main customers?**

I should start out by saying that most of our clients are in rural areas where it is not anticipated that the grid will

extend in the next 10 years. At present only eight per cent of rural households have access to government electricity. For example, Government power stops 25 kilometres outside of Phnom Penh, the largest city. While the World Bank plans provide for extension of the grid, millions of households will remain outside the grid. To reach at least some of these households, the World Bank will support solar electrification. The exact form of that support is under consideration.

Rural nongovernmental organisations (NGOs) are our client base, and we now have installed solar in approximately 300 sites. There are four basic facilities in which NGOs install solar: rural health centres and projects, rural project offices, rural orphanages and rural schools. Right now the biggest project we are involved in is providing systems to schools under the school-building project of the Japan Relief Committee and the American Assistance for Cambodia through the efforts of Mr. Bernard Krisher [Publisher, *Cambodia Daily* newspaper, Phnom Penh]. We install the solar panels for these schools to provide electricity for computers, some of the schools will have internet access through satellites in the schools. Mr. Krisher has raised funds for solar power in 250 schools; to date Khmer Solar has done installations in 74 of these schools.



***Mr. Mao Sangat (left) and Mr. Ford Thai (right).***

**For a solar-powered electricity system installed in a school to run a computer and internet access, how many panels are needed and how many watts of electricity are produced by these systems?**

We install a system of three sixty-watt panels to run the computer and internet satellite dish. The cost is very cheap because Mr. Krisher imports the solar panels himself. Some components are bought from America, for example we buy deep cycle rechargeable batteries from America – deep cycle batteries are rechargeable batteries that can be used for 7-10 years, while a normal car battery can be used for only six months to one year – but Mr. Krisher gets free shipments from America, and it has been arranged that we can buy the batteries without having to pay the customs and taxes because this is a special project. So one system costs about US$1,700.

**Have you also installed systems for the offices of NGOs?**

Some NGOs have offices in the provinces, the rural areas that do not have an electricity grid. So they want solar panels to power their computers, printers, and other office equipment. The cost depends on the size of the system, which depends on the amount of electricity they need to supply their equipment. We have installed office systems for World Vision International, UNDP, Carere, Caritas, Action Against Hunger, Asia Foundation and many other organisations.

The biggest office system we have yet installed is at the Social Service Cambodia's office in Kompong Speu. There are 14 panels of 75 watts each for a total of about one kilowatt. We also donated a windmill for generating electricity, so this is an integrated system using both solar and wind and this project has been very successful.

**Are there any government regulations or costs like taxes relating to the import and use of solar panels and related system equipment?**

The import tax is 35 per cent and then the VAT is applied for another 10 per cent. Together, this is a tax of 48.5 per cent on solar-related. This is very expensive, and we don't know what to do. Compared to our neighbour Thailand, where there is no import tax on solar-related equipment. We have discussed this with the Minister of Commerce, who has said that he will try to reduce or eliminate these taxes, but so far nothing has happened. So this is why solar remains so very expensive, and why people in the rural areas cannot afford to pay for solar power systems.

If you examine the battery-recharging services available in the country-side, people need to recharge a car battery every week to supply electricity for light-bulbs or a television in their house. Each re-charge of the battery costs about 1,000 riel, so each month they spend about US$1 for their electricity.

**In Phnom Penh, are there many NGOs, industries, companies, or institutions like the World Bank or ADB that have installed these systems or supported the use of solar-based electricity supply?**

No.

**The Asian Development Bank office is about 200 metres from your office. Have they contacted you about establishing a solar system to supply electricity to their office? Or have you ever talked with them about this?**

No. But I do know that the World Bank will be sending a mission to meet with the government in June to discuss how to reform government policy so as to better support solar.

These discussions have been going on for the past two years. The World Bank has said that it wants to provide support for a programme to establish solar systems for 10,000 households. According to the Bank, the main barrier to this programme is the government's import tax on the solar equipment. The Bank says that if the government maintains the tax, then the Bank will not support this programme.

**How do the students of the schools or the people in the near-by communities feel about the installation and use of these solar systems?**

**Mr. Mao Sangat:** The people help us to install the systems. They mix the cement for the base for the satellite dish, help to install the structure for the dish, help to install the panels on the rooftops. They are very happy to help us to install the systems, because in most of these places there is no electricity supply for households and communities.

We should also tell you about our rural health centres and hospitals. We have installed solar systems in more than 30 of these facilities. These facilities need lights, radio communication and vaccine refrigerators. Among the NGOs that we have installed for are Health Net Unlimited, Caritas, Assemblies of God, Redd Barnet, Zoa, Medicine Sans Frontiers and TV24Hour Charity Hospital. The only alternative to solar power in these rural areas is a diesel generator. The expense of diesel fuel and the difficulty of carrying the petrol into rural areas are two obstacles that make solar power attractive as a sustainable and convenient source of electricity. Many of the centres that are now run by NGOs will be handed over to the Ministry of Health in the near future. The Ministry of Health's budget cannot pay the cost of diesel fuel in the centres as the Ministry struggles to pay even minimal salaries to the staff and for basic medicines and vaccines.

**"The expense of diesel fuel and the difficulty of carrying the petrol into rural areas are two obstacles that make solar power attractive as a sustainable and convenient source of electricity."**

**Are the systems installed in the schools and these other institutions often the only source of electricity in these villages?**

Yes. These villages are not part of a grid, they have no electricity. The systems installed at the schools are mainly for the computers and internet, and some lights.

**After you set up the system, how does maintenance occur?**

Sometimes, local people can fix the system. But other times, they need us to help and they call us on the phone and we go to the village to fix the system. Actually, the equipment in these systems is very reliable. In fact, a common problem is that the people forget to fill the battery with water, so the battery eventually becomes dry and can not store the electricity. We work to train some people in the school or community to monitor and maintain the battery, and have a training poster that we place near the battery. So this problem happens sometimes, but it is also easy to solve.

Certain rural areas in particular have a high concentration of solar power. When a project works, other NGOs decide to go with solar. This has happened in Ratanakiri where we have installed just under 4,000 watts in Health Unlimited clinics and hospitals, the office of the Cambodian Medical Service Support Organisation, the Carere/UNDP Hilltribe Museum, and as part of literacy projects of the UNDP and World Concern. We have opened a branch office up there, so that people will have someone on the scene to provide maintenance and repair. Ratanakiri is interesting since is it one of the most remote and underdeveloped provinces in the country. It now has the distinction of being the "Solar Capital of Cambodia".

**In countries like Cambodia and Laos, where there are large rural populations living in many villages and there is no centrally-controlled grid for electricity distribution such as that built in Thailand, can solar or other small-scale renewable electricity supply systems contribute much to electricity supply in these villages and countries?**

**Mr. Ford Thai:** Yes. The good thing about solar panels is that electricity supply can be slowly increased according to demand for electricity. Say that you buy a solar panel to supply a light bulb. Then, after a while, maybe you save enough money to buy another panel because you have a television. In this way, electricity supply from solar panels can increase gradually over time to supply households in both the rural areas and in the urban areas.

**What is the main obstacle to the expansion of solar-generated electricity? Is it the cost of purchasing a solar electricity system?**

Yes, it is the cost of the panels. But you know, the Thai Photovoltaic Company will begin to produce solar panels in 2003 in Thailand. I hope that these panels will be less expensive. The least expensive panels being manufactured now cost about US$4. But I understand that Thai Photovoltaic is hoping to reduce this cost down to about $2.50 to $3 per watt.

But there is also the import taxes on the panels, and there is also the government regulation that any thing you can re-charge, like the long-lasting deep-cycle rechargeable batteries we use in the solar electricity systems, is also subject to import taxes. Putting a stop to these import taxes would really help Cambodia to expand solar-powered electricity supply for the people of our country.

Our long term objective is to be able to offer villages solar home electrical systems in a package that includes maintenance that the user can make period payments on. To make this feasible, a World Bank subsidy will probably be necessary, but we are conducting surveys to figure out what consumers can afford on their own. We hope to have a pilot project up and running within the next year.

**"The governments in the Mekong Region need to push renewable energy systems to the forefront of energy policy and practice by providing the level of resources routinely given to conventional sources of energy. The renewable energy technologies are there already and investors are willing to get involved. What is lacking is a wider understanding among developers, banks and governments of the real commercial potential of renewable energy."**

**Mr. Jeff Dickenson has been working on commercial renewable energy projects with E+Co, a company that manufactures and installs small-scale bio-gas and solar home systems as well as large-scale bio-gas systems for the industrial sector.**

**Could you please describe your work on renewable energy projects in the Mekong Region?**

E+CO has been involved in renewable energy projects in Asia since 1995. In the Mekong region we began with investments in two companies in Vietnam. One that manufactures and installs small-scale bio-gas and one that provides Photovoltaic (PV) solar home systems. In Thailand we have an investment in a company that designs and installs large-scale bio-gas systems for commercial animal farms and the food industry. Also in a company that is preparing to build a series of rice husk-fired power plants for the generation of electricity for sale to the grid (EGAT). E+Co also provides business development services to a variety of companies and individuals across the Mekong Region. These services take the form of financial advisory, technical evaluation and business planning.

Technologies supported thus far by E+Co in Asia:

- Mini and small hydropower for electricity generation (Nepal)
- Household scale biogas for cooking and lighting (Vietnam)
- PV solar home systems (India, Nepal, Vietnam)
- Manual irrigation pumps (Bangladesh)
- Bio-gas for running electricity generators and offsetting fossil fuel consumption on commercial farms and food processing factories (Thailand, Philippines)
- Bio-mass as a fuel for running steam boiler/turbines for electricity generation (Thailand)
- Energy Efficiency and renewable energy substitution for industrial applications (Vietnam, Thailand)

**What would you define as renewable energy sources or systems?**

We broadly define renewable energy systems as those that rely on a perennial (e.g. a river) or sustainable (e.g. agricultural crops) source to produce thermal and/or electrical energy.

Sources could include: water, wind, solar, bio-mass, municipal/industrial waste (liquid and solid), and human/animal waste.

**What is your perspective on the use of renewable energy in the Mekong Region and in particular Vietnam?**

There are ample opportunities to use renewable energy in the Mekong Region, as sources of water, wind, biogas, and biomass are readily available. Renewable energy is already being used across the region at a variety of levels, from the household on up to the largest corporations and electricity grids, but not to the extent that is possible given the resources in the region.

**"There are ample opportunities to use renewable energy in the Mekong region, as sources of water, wind, biogas, and biomass are readily available."**

In Vietnam renewable energy (solar PV) has the potential to quickly and affordably deliver electricity into the rural areas. The same could be said for the use of biomass for steam and electricity production. Unfortunately in Vietnam, as in most of the region, the government and industry has not been as fast to understand and adopt renewable energy as the technologies have matured and become commercially viable.

**Do state policies in the Mekong Region give importance to renewable energy?**

In recent years governments in the region have begun to understand and give importance to the use of renewable energy. In Thailand for example there are national programmes to support grid connected generators that use renewable energy, this is a good start. In other countries, such as Vietnam hydropower is already a big part of the state energy supply system.

Unfortunately the multilateral, bilateral and governmental institutions have a certain amount of lethargy toward renewable energy as compared to the conventional ways of doing business.

**How does renewable energy actually work in practice**

**in the Mekong Region given the situation with state energy bureaucracies and centralised energy planning systems?**

Renewable energy can work in Vietnam and across the region as the sources are readily available and businesses are already adopting and using them successfully. As more good examples emerge the state energy organs will eventually catch up as well. It just takes them decades longer than it should in some cases.

**"Unfortunately from my perspective all too often renewable energy is treated as a minor or add- on component of larger generation schemes that rely on fossil fuel and traditional technologies and approaches."**

**Are you also exporting or promoting renewable energy to other countries in the region and elsewhere?**

E+Co is active in making investments and providing enterprise development and advisory services across the Mekong Region. We also have projects in Africa and Latin America as well.

Countries in Asia we are currently active in include: Bangladesh, Cambodia, China, India, Laos, Nepal, Philippines, Thailand, and Vietnam.

**Can you comment on the plans for example by the Asian Development Bank to build a regional energy grid using conventional energy sources like coal and hydropower in the Mekong Region? How will this impact on efforts to expand the use of renewable energy?**

A regional energy grid that functions well, and is equitable to suppliers and consumers across borders would be a benefit to the region. These types of efforts could be quite useful in promoting renewable energy if they actively sought to include renewable energy in meaningful ways into the generation side of the equation. Unfortunately from my perspective all too often renewable energy is treated as a minor or add-on component of larger generation schemes that rely on fossil fuel and traditional technologies and approaches.

**Where or what kind of situations is renewable energy successful in practice? Does renewable energy have inherent limitations?**

In the urban areas the central electricity grid is rather stable and not too expensive for the inhabitants' incomes, so there appears to be little reason for direct renewable energy usage. However more than 80 per cent of Vietnam's population are farmers and a large number of them are still without electricity. So the need for energy is substantial and renewable energy can play a big role in generating this additional electricity to supply the grid. In Thailand we are involved in a project that will put 88 megawatts of power into the grid from bio-mass (rice husk) and the potential in that country is for thousands of megawatts of bio-mass energy. So renewable energy does have a legitimate role in supplying the grid.

Renewable energy can often be more practical and cost effective in rural areas than conventional generating systems or grid extensions, but this should not prevent planners from including it in the overall energy mix of a country.

**Are renewable energy systems affordable, especially for local communities in the Mekong Region who are not reliant on cash-based incomes?**

Yes, these systems can be affordable to local communities when compared with what they already spend for energy, or what it would cost the government to extend the grid into non-serviced areas. Often though consumer credit must also be made available to help carry the seemingly high up-front capital costs of installing renewable energy systems in rural areas.

A note of caution on centralised community solar PV systems: In every country that E+Co works in that has tried centralised PV systems (e.g. 55 kilowatt panel array with battery bank for local distribution) they have failed for technical and/or financial reasons. However, individual home PV systems perform fine in both cases.

**Does renewable energy like solar cell technology get funding assistance/subsidies from international institutions like World Bank or bilaterals like the hydropower or coal industry?**

Generally renewable energy does receive funding assistance and subsidies; but these types of institutions and the consultants they use tend to fall back on conventional systems and have not yet given renewable energy the size role it deserves.

**"Renewable energy systems can be affordable to local communities when compared with what they already spend for energy, or what it would cost the government to extend the grid into non-serviced areas."**

**What do you see as the main obstacles for greater use and expansion of renewable energy in the Mekong Region?**

The governments in the region need to push renewable energy to the forefront of energy policy and practice by providing the level of resources routinely given to conventional sources of energy. The renewable energy technologies are there already and investors are willing to get involved. What is lacking is a wider understanding among developers, banks and governments of the real commercial potential of renewable energy.

# The role of the state in the marginalisation of alternative energy

By Apsara Palettu

**The energy decisions in the past of Thailand's state-owned utilities, planners and bureacrats have resulted in tremendous social, ecological and economic costs. However, the government is planning more large power plants and entering expensive fuel purchase contracts that are surplus to the country's electricity requirements but guarantee profits for energy corporations.**

**Apsara Palettu explores the unaccountable and non-democratic nature of energy decision-making of the Thai state and proposes alternatives for a cleaner, more democratic energy infrastructure for Thailand.**

## Introduction

Whilst few would argue that Thailand is endowed with an electricity infrastructure that provides generally reliable power to a vast majority of the population, this has come at great social and economic cost.

In northeastern Thailand, disenfranchised communities have protested for over 10 years against the Pak Mun hydro-electric dam that has destroyed their fisheries and livelihoods. In northern Thailand, the Electricity Generating Authority of Thailand (EGAT) Mae Moh's lignite-fired power plants have at times run without scrubbers, spewing out 150 tons of sulfur dioxide per hour that has been linked with high rates of respiratory disease. Communities at Bo Nok and Hin Krut in southern Thailand struggle to defend their livelihood and environment against two planned coal-fired power plants that are surplus to Thailand's power requirement but guarantee handsome profits for predominantly foreign investors. Yet Thailand's National Energy Policy Office (NEPO) continues to insist that the coal projects are necessary. Meanwhile, small-scale consumers protest being forced to pay ever-increasing "Ft" fees, fees that pass on to consumers any costs not already included in the fixed price for electricity and which arise mostly from expensive "take or pay" fuel and power purchase contracts that are surplus to the need.

Thailand's state-owned utilities remain bloated, inefficient, and yet politically powerful enough to command huge portions of the government budgets [1]. More recently, a shift towards privatisation has allowed private corporations in the power business to make handsome guaranteed profits using "take or pay" contracts for electricity even though the country faces an electricity glut as a consequence of the economic crisis in 1997.

Communities are left with no voice in an unaccountable and nontransparent decision-making process dominated by government and big business. Thailand has too many power plants, and over 99 per cent of the country's generating capacity is large hydropower, lignite, and natural gas-fired, while renewable energy makes up a fraction of a percent (see Figure: Current installed capacity (2001)). How did we get here? What alternatives exist?

**The history of electrification in Thailand is one and the same as the history of Thai national and local politics, along with the influence of multinational lending organisations.**

The history of electrification in Thailand is one and the same as the history of Thai national and local politics, along with the influence of multinational lending organisations. Two themes weave throughout this history: technology choice and the ownership and control of the electricity system. Thailand has chosen so-called "conventional technologies" such as large centralised power plants using fossil fuels or large hydropower and a centralised electricity transmission and distribution grid. At critical junctures, decision-makers have opted to centralise decision-making power,

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minimise transparency, and exclude opportunities for democratic participation. Over the decades, a system has evolved that is neither economically efficient, nor environmentally responsible, nor publicly accountable.

The growing impacts of past decisions of government bureaucracies about energy projects and energy policy are now under public scrutiny. Today, the Thai public is demanding change. A future without polluting coal-fired power plants and forced relocation from hydroelectric dams and gas pipelines is possible if alternatives to the current centralised monopolistic energy system are implemented towards a cleaner, more democratic energy infrastructure.

| Thailand's current installed capacity (2001) | | |
|---|---|---|
| **Hydropower** | 2,886 MW | 13% |
| **Gas-fired plants** | 15,570 MW | 71% |
| **Lignite** | 2,625 MW | 12% |
| **Others (imports, etc.)**<br>**Biomass**<br>**Solar**<br>**Wind** | 864 MW<br>157 MW<br>5 MW<br>5 MW | 4% |
| **TOTAL** | 21,945 MW | 100% |
| **Peak demand** | 16,126 MW | |

Figure: Thailand's current installed capacity (2001), excluding electricity not connected to the central grid. Renewable energy makes up less than one per cent of total installed capacity of the grid. Installed capacity exceeds peak demand by over 30 per cent.

## Powering Thai Development

> *"Electric lighting serves a particular counter-subversion need by reducing the psychological isolation of villagers, facilitating police surveillance, and inhibiting clandestine infiltration."* Thailand Programme Goals and Projects, US Operations Mission 1965.

During the early 1950s through to the 1960s, Thai military governments under the tutelage of the American experts in military and aid development coordinated a model of electrification in Thailand in which state bureaucracies and centralised planning were hegemonic.

Between 1951 and 1957, Thailand was the beneficiary of US$149 million in economic aid [2] and US$222 million in military aid. These were substantial additions to the Thai budget, which stood at about $200 million per year in the early 1950s. Aid increased further under the military rule of Field Marshall Sarit Thanarat (1959-63), especially after an upsurge in anti-government communist activity in the 1960s, particularly in northeastern Thailand. Between 1958 and 1967, Thailand received US$321.4 million in economic aid and US$379.5 million in military aid from the US.

Following the advice of the World Bank, Sarit initiated state-centralised economic planning. The first five-year plan (1961-65) of the National Economic and Social Development Board (NESDB) emphasised construction of large electricity generating systems together with other infrastructure such as roads, reservoirs. Throughout the 1960s, roads were built to facilitate rapid movement of troops to border areas; irrigation and mechanised agriculture served to improve cash incomes and integrate rural communities into the capitalist economy; and electricity brought lights, improved communications, and the voices of government-controlled radio and television stations into the homes of millions. Local people in northeastern Thailand knew the rural infrastructure development programmes by the Thai phrase, *Nam lai, fai sawang, taang dee* (water flows, lights shine, good road).

**In Thailand, as in many other countries where utilities were allowed to self-regulate, the consequences have been over-investment in electricity generation, reliance on conventional energy sources, high debt, and little public oversight.**

At the behest of the World Bank, American government, and other multilateral funding agencies financed the construction of a number of large hydroelectric dams and large thermal electricity-generating power plants in Thailand. These agencies provided low interest loans, long repayment times, and generous grace periods (initial periods for which no repayment is required). Projects included the Yanhee (also called Bhumipol hydroelectric dam managed by the newly-created Yanhee Generating Authority) and coal-fired power plants in the Mae Moh area (managed by the Lignite Authority) [3]. The projects included the beginnings of the Thai transmission grid, which allowed electricity generated from resources extracted in local areas to be transmitted to industrial, commercial, and residential customers in Bangkok and the surrounding metropolitan area.

In 1960, the Sarit Government established the Provincial Electricity Authority (PEA) as a state enterprise under the supervision of the Ministry of the Interior to establish, reform and upgrade electrification to provincial areas. Two years earlier, the Metropolitan Electricity Authority (MEA) had been formed, under the same ministry, to distribute electric power to the Bangkok Metropolitan area and its adjoining provinces of Nonthaburi and Samut Prakarn. The PEA took over control of decentralised, independent municipal, cooperative and privately owned mini-grids. In the early years, it also expanded by building diesel stations in urban towns, and later substations as the national grid expanded. When it started in 1960, about two per cent of the villages (725 villages out of a total of approximately 30,000) were electrified (Chullakesa 1992).

The World Bank recommended consolidation of electricity generation, and in 1968 various electricity authorities

### Lost opportunity: Aborted Rural Electrification Cooperatives

Community ownership and management is not restricted to renewable energy. Community-managed distribution drawing power from the national grid system has a long history of providing cost-effective, democratic power. In the mid-1960s, there was a significant opportunity in Thailand for nonprofit electricity cooperatives to secure a significant future role in providing power to rural areas. Starting in 1965, the National Energy Authority (NEA), in cooperation with the Thai Department of Credit and Cooperatives Marketing (DCCM) and the US National Rural Electric Cooperatives Association (NRECA), began a rural electrification cooperatives programme that planned to provide electricity to over 14,000 households in 99 villages in northeastern Thailand[1].

Thai villagers in the project area responded with enthusiasm to the prospect of cooperatively owning and managing their own distribution system. In the course of ten days of meetings, 8,141 villagers signed membership applications, with subsequent applications received later.

The Provincial Electricity Authority (PEA) was hostile to the notion of community-owned power from the beginning. PEA raised objections that the project interfered with their own rural electrification work, would confuse villagers, that farmer credit cooperatives had been tried earlier in Thailand and had failed, and that organising villagers to manage a cooperative is a waste of time. PEA claimed that providing electricity to rural villages was too expensive relative to the small amount of revenue they could expect to receive from the small, distributed customers, and that precious state resources should be used instead to support PEA's own efforts that concentrated on rural towns. According to PEA, their own efforts at rural electrification were "already participatory", in that they required prospective users to contribute wooden poles, and labour for the projects, and therefore the cooperative was redundant. Finally, PEA pointed out that a comprehensive power survey was soon to be conducted, and that the rural cooperative programme should await completion of this survey.

A study by NRECA and NEA, with initial cost estimates, financial projections, engineering specifications, and a charter for the cooperative model, determined that the rural electrification cooperative could be successful without the need for grants. The proponents of cooperatives for rural electrification also emphasised that electrification was both a process and an end product. The process itself, NRECA believed, is useful in building technical and managerial capacity, self-sufficiency, cooperation, and democracy.

In 1965, however, PEA's General Manager travelled to Washington D.C. and met with NRECA and the US government's Agency for International Development (USAID) to lobby for the cancellation of the NRECA/NEA cooperative rural electrification programme. Further work on the rural electrification cooperatives was never authorised, and prospects for rural electrification distribution cooperatives in Thailand were never heard of again.

**Sources:** 1. Correspondence and meeting notes from this project are archived in a number of mid-1960s mimeographs in the Chulalongkorn University Library (Davies 1966; Porter 1966; Smith 1966).

merged to form the Electricity Generating Authority of Thailand (EGAT), a state-owned enterprise under the Office of the Prime Minister. EGAT also took over control of a number of hydroelectric projects built by the National Energy Authority (NEA) and the Royal Irrigation Department (RID). This consolidation set the basic arrangements for electricity provision that remains today. EGAT is the state-owned monopoly (under the Office of the Prime Minister) responsible for power generation and transmission. The PEA and MEA (both under the Ministry of the Interior) are responsible for electricity distribution in the Bangkok metropolitan area and provincial towns & rural areas respectively. In addition, the Defence Energy Department is a separate authority that supplies electricity to defence-related sites.

Because of weak government data-collection, analysis and enforcement, the three utilities (EGAT, MEA and PEA) were essentially allowed to self-regulate – with the exception of basic investment and financial requirements set by the NESDB and the Ministry of Finance. As was common with regulated monopolies, the Thai electricity utilities profits were set according to a "cost plus" structure. That is, profits were set by the government to be equal to a certain percentage of expenditures: the more the utilities spent, the more profits they were allowed to collect. In Thailand, as in many other countries where utilities were allowed to self-regulate, the consequences have been over-investment in electricity generation, reliance on conventional energy sources, high debt, and little public oversight.

## The role of bilateral and multilateral agencies in shaping Thailand's energy policies

In the 1950s and 1960s, US involvement in electrical infrastructure provision paved the way for advising and lending by bilateral and multilateral funding agencies such as the World Bank, Canadian International Development Agency (CIDA), the Organisation for Economic Cooperation and Development (OECD), and the Organisation of Petroleum Exporting Countries (OPEC) funds. The ideologies of these organisations have played a large role in shaping the landscape of Thai electrification bureaucracies. Two significant ideological eras can be recognised: the "era of control" and the "era of neo-liberalism".

During the "era of control" (1945-80), bilateral and multilateral agencies provided large amounts of aid to combat the threat of communism. The ideology of this era is perhaps best summarised by Tokyo University economist N. Kitamura

who wrote, "only planned economic development can hope to achieve a rate of growth that is politically acceptable and capable of commanding popular enthusiasm and support" (Bauer 1973). A key tenet of this era was the belief in supreme importance of economies of scale, applied both to the construction of large power plants, as well as the creation of large administrative units. Thai bureaucracies such as the NESDB, PEA, and EGAT were born and grew large in this era.

Inefficiencies that became impossible to ignore in this top-down planning approach formed part of the rationalisation for the "era of neo-liberalism" (1985 – present) that began in the World Bank and others starting under the administration of US President Ronald Reagan in the 1980s. The neoliberal ideology held that the private sector is inherently more efficient than the government, and that the market, if left alone, would arrive at an economically and socially optimum allocation of resources.

The change reflected the Bank's increasing frustration over political influence on electricity utilities' financial and management decisions, and government attempts to use subsidies for various customers as a way to meet overall development objectives. Ultimately, a number of Bank studies concluded that there was insufficient capital available from official financing agencies or from governments to finance expansion needed to meet the expected growth in energy demand in developing countries (Tellam 2000).

The Bank was able to exert pressure on Thailand by issuing loans and government bond guarantees only if Thailand met "conditionalities" such as a requirement to open its energy sector to foreign investment. The shift away from state centralised planning and towards private sector participation was manifest in Thailand's energy sector first in the use of Independent Power Producers (IPPs) for electricity generation. The IPPs signed Power Purchase Agreements (PPAs) with EGAT. While EGAT retained control of the transmission system operation and dispatching of power plants, IPPs were to generate electricity according to specific contracts. To insure healthy profits and low risk to private investors, the PPAs generally required 70 to 80 percent repayment in American dollars to mitigate against currency devaluation, and the use of "take or pay" contracts so that risk of low demand for electricity was placed on EGAT and Thai electricity consumers. Despite the claim that the programme would provide inexpensive electricity to consumers, the Thai IPP programme has resulted in too many contracts signed with too many generators providing too much power at too high a cost.

More recently, so-called "free markets" provide an expanded role for private investment. According to government plans, generation, transmission, and distribution of electricity will be privatised by 2003. EGAT, PEA, and MEA will be broken up into separate companies and the bulk of their assets will be sold to private investors. Private generators will bid into a "power pool". The price of electricity at a particular moment will be determined (in theory) by the economics of supply and demand. The recent debacle in California, where the botched privatisation scheme allowed some private companies to make excessive profits while forcing a power shortage and escalating electricity prices onto consumers, shows the extent to which deregulation of the electricity industry can create dangerous opportunities for price manipulation by the strategic withholding of electricity.

With the shift of World Bank ideologies towards neoliberalism, NEPO emerged as the rising star of energy bureaucracies in Thailand. In comparison with the top-down planning oriented bureaucracies of EGAT, PEA, MEA, and NEA, the World Bank approved of NEPO's market-oriented philosophy promulgated by NEPO's founder, ambitious neoclassical economist Piyasvasti Amranand.

Through the use of neo-liberal discourse of private sector participation, Piyasvasti was and NEPO were able to gain considerable power relative to the utilities and other energy organisations including the NEA, which in 1992 was demoted to become the Department of Energy Development and Promotion (DEDP). Moreover, NEPO managed to secure administration of a substantial portion of the 13 billion baht (US$400 million) Energy Conservation (ENCON) fund.

## ENCON Fund: Funny business

Thailand's Energy Conservation (ENCON) Fund dominates the policy and practice of renewable energy in Thailand. Understanding the Fund and the way it operates is key to understanding the ways in which renewable energy is supported – and marginalised – in the country. The fund was created in 1992 to "provide financial support... for investment in and operations of energy conservation measures... including activities on renewable energy projects."

The creation of the Fund reflected the desire of some within the Thai government to foster clean energy for the country, preserve foreign currencies, and develop energy infrastructure that leaves the country less vulnerable to the fluctuations of crude oil prices. The Fund began with an infusion of 1.5 billion baht (US$33 million) from the country's Petroleum Fund. Subsequently, it was funded with a tax on petroleum sold in the country, varying from 4 to 7 satang (US$0.01 to US$0.015) per litre. From 2000 to 2004, expenditures are predicted to average over 5.8 billion baht (US$135 million) per year.

As good as the ENCON Fund looks on paper, in practice its management leaves much to be desired. Management of the Fund is split between the DEDP and NEPO. But in either case, it has become the exclusive feeding ground of a handful of government agencies and universities that work in close collaboration with well-positioned private companies. Although non-profit organisations are supposedly allowed to request funding, grassroots NGOs have (until recently) never received ENCON funding.

The effectiveness of ENCON Funding appears to be mixed. Some is very well-targeted; for example, a recent ENCON programme provides competitive subsidies for 300 MW of electricity generated from bio-mass. However, much of the ENCON funds are allocated in ways that provide little incentive for efficient spending, and have no requirements for systematic project evaluation. As long as projects

seeking funding are under 10 million baht (US$230,000) then they are allowed a streamlined review process that makes winning funding fairly easy – at least for state utilities and other "preferred recipients". Thus, applicants have little reason to economise on equipment costs as long as they don't exceed the 10 million baht threshold. Typical renewable energy projects built with ENCON funding rely on expensive imported technology (like solar cells). Local participation in project planning, as well as training, operations and maintenance aspects of rural ENCON projects are generally neglected by the implementing groups, and most projects fail. The extent to which these projects continue to function is not known (or at least not publicly known), because there is no truly independent evaluation of the projects. Observers who spend significant time in areas where government renewable energy projects are located, however, provide rich anecdotal evidence of broken or poorly operating solar battery charging stations, solar powered telephones, solar water pumps, and under-used "energy parks" of various kinds.

Projects funded by the ENCON fund appear to be evaluated in two ways – first through an unverified estimation by project initiators of "fuel savings", and second, by comparing actual expenditures with planned expenditures. In other words, the Fund is "successful" when it spends the money that it said it was going to spend.

Worse yet, there is evidence that much of the ENCON Fund is being siphoned off to pay for programs that have nothing to do with energy conservation or renewable energy. On 12 March 2002, Pongpisit Viseshakul, director of the NEPO renewable energy division submitted his resignation letter to NEPO in which he stated "that he was very bored with politicians constantly asking for money from the Fund. Many of their "programmes" were used for political purposes rather than energy-saving campaigns."

Dr. Piyasvasti apparently did not share his ex-subordinate Pongpisut's qualms about misuse of the ENCON Fund. Piyasvasti quickly replaced Pongpisut with a trusted underling, the former Director of NEPO's Petroleum Division, who has never before worked on renewables or energy conservation policies.

NEPO itself may be guilty of misusing the Fund. NEPO has used ENCON to fund a "Study on Thailand's Energy Supply Industry Reform and Power Pool" conducted by foreign management consulting firms such as the renowned Arthur Andersen. The study is a crucial step in carrying out the World Bank's agenda of privatising the electricity supply industry in Thailand. The consultants' contracts were paid out of the ENCON Fund on the highly dubious justification that "consumers will have more options and hence improvement of efficiency, which will ultimately contribute to energy conservation". NEPO elsewhere makes the much more reasonable, but contradictory argument that a power pool will lower electricity prices, which arguably will provide lessened incentives for energy conservation. The Power Pool study program includes a substantial budget for public relations (PR) that has been used recently by NEPO to fund a media campaign. The media campaign defends NEPO's high demand forecasts, and supports the controversial IPP coal power projects planned at Bo Nok and Hin Krut. This illustrates NEPO's significant conflicts of interest in managing the ENCON fund. In order to justify the coal power plants it promotes, it is in NEPO's interest that electricity consumption in Thailand grows as rapidly as NEPO's electricity demand forecasts predict. These goals are directly at odds with the stated goals of the ENCON fund, which are to minimise energy consumption and maximise the use of renewable energy.

## Utilities, government agencies and renewable energy: "Marginalising by doing poorly"

On the one hand the "big three" utilities in Thailand own and operate a number of renewable energy projects, and government expenditure on renewable energy projects is substantial. But at the same time, cost-effective renewable energy options have for the most part been passed over in favour of conventional fossil fuels.

**Government expenditure on renewable energy is substantial. But cost-effective renewable energy options have for the most part been passed over in favour of conventional fossil fuels.**

All three utilities and a number of government bureaucracies have renewable energy projects. EGAT has a wind test site in Phuket, and several solar electricity and solar water heating demonstration projects scattered around the country. PEA has several solar electricity demonstration sites on islands and mountain communities, and runs several small micro-hydropower sites. MEA has a programme in solar electric systems. DEDP has hundreds of solar battery charging stations. And the Department of Public Works has built dozens of solar water pumping schemes. From the perspective of the bureaucracies, these projects serve several important functions – none of which have anything to do with cost-effective use of renewable energy. The projects provide photographic opportunities and public relations value. Pictures of the installations grace the covers of many utility and NEPO documents, giving the impression to the casual observer that these bureaucracies are progressive, modern and care about the environment. Having renewable energy under government control allows utility executives and bureaucrats to "join the club" of electrical utilities and multilateral funding agencies that have dabbled in renewable energy worldwide. These utility representatives thus have the opportunity to attend international conferences and participate in the development of an authoritative discourse that "renewable energy is a nice idea, but the technology is not ready yet, and is too expensive".

While these renewable projects serve a public relations purpose, they do not amount to much benefit. The projects are generally built with foreign aid money or the ENCON Fund, using expensive foreign consultants and equipment, capturing large portions of government-to-government aid and subsidies that are available to promote renewables. The problem is that because of the ease for certain government groups and industry partners in securing ENCON funding for dubious projects, few are willing to do the hard work to develop truly commercially viable renewable energy products and applications.

Meanwhile, when it comes to "real" power generation, renewables are ignored. This can be clearly seen by considering the tiny percentage of energy generation from renewable sources (see figure). In some countries, like Denmark, 17 per cent of total electricity is generated by renewable energy. Many countries have mandated a substantial and increasing percentage of electricity be generated by renewables.

**The lesson here is that there is nothing inherent about renewable energy that makes it necessarily more cost-effective. The crucial factor in many cases is which group implements and manages the project.**

The case of marginalisation of renewables in Thailand is even clearer when it comes to providing electricity to remote areas – an application where renewable energy is often most cost-competitive. Many of the villages not yet connected to the central grid are located on islands, remote mountain areas, or in national forest land where the cost of extending a utility line can be exceedingly high. PEA's plan to extend the grid to electrify 150,000 of these remote households has been provided a budget of 3,650 million baht (US$81.1 million). This plan was approved by the NESDB in 2000. Using conservative estimates for additional generation costs, fuel costs, and maintenance cost, electrifying these households will cost as much as 50,000 baht (US$1,100) per household over the course of 25 years (assuming no inflation and no interest payments).

By comparison, village-level hydroelectricity systems in Thailand, built by villagers with technical and engineering support from the DEDP provide electrification at around 25,000 baht per household for twenty-five years. The projects use equipment made in Thailand, and are locally managed by the village (see Community Voices, this issue). Ironically, many of the villages the PEA is currently connecting to the grid are ones that already have these DEDP micro-hydropower systems. Relatively inexpensive, community-managed renewable energy systems are being abandoned, replaced by the more expensive fossil-fuel powered grid, while Thai taxpayers and ratepayers pick up the bill.

Even where the PEA is installing renewable technology, it is using foreign expertise and equipment, with subsequent higher cost. The lesson here is that there is nothing inherent about renewable energy that makes it necessarily more cost-effective. The crucial factor in many cases is which group implements and manages the project. Projects built and managed by NGOs and communities, using locally made equipment can (if well-designed and well-implemented) be many times less expensive in the long run than projects built by government agencies.

## Hope for renewables in Thailand?

Given this litany of bad experiences with renewable energy in Thailand, is there any reason to believe that there is any alternative to conventional, dirty, centralised power? Yes. The technical potential certainly exists. Studies commissioned by European governments and by NEPO itself indicate significant potential for renewables and energy conservation. The 1998 Ramboll Study commissioned by NEPO found a potential for 3,000 MW of commercially viable electricity generation using biomass while the International Institute for Energy Conservation found that demand side management (DSM) could save 2,200 MW for less money than building new power plants. To put this in context, the combined biomass and DSM potential is over 38 Pak Mun Dams, or more than twice the capacity of the proposed Bo Nok and Hin Krut coal power plants combined. Solar, wind, and small hydropower promise even more.

Thailand also has a number of on-the-ground examples that are built or in the pipeline. In 2002 over 300 MW of renewable energy from Small Power Producers (SPPs) was approved under the ENCON Fund's (well-designed) competitive subsidy programme. A total of 774 MW of power projects applied to the programme, and pending resubmittal with a reduction of subsidy another 224.2 MW has been pre-approved by NEPO.

At a much smaller scale, communities in Prachuab Khiri Khan province have developed their own diesel fuel substitute using coconut oil. With no government subsidy, villagers have created recipes for fuel that can they can use to power farm machinery and boats – for lower cost than burning diesel fuel. (See Community Voices, *Watershed* Vol. 1, No.1.)

## Visions of a clean, democratic energy future

We have discussed the ways in which the current energy infrastructure fails to serve the public interest. What choices do we have? Is it possible to have an energy infrastructure in Thailand that is much more democratic, socially and environmentally responsible, and cost-effective than the current arrangements? We think so. Let us dream what is possible. Let us imagine an energy infrastructure in Thailand that could exist by the year 2020 – and how we could get there.

| A vision for energy in the year 2020, and thoughts on how to get there | |
|---|---|
| **Category** | **Vision for the year 2020** |
| **Technology** | • Coal and large centralised power plants decline in energy mix<br>• Extensive use of energy-efficient equipment, co-generation and renewable energy, and peak demand reduction techniques |
| **Ownership and control of energy infrastructure** | • Variety of ownership models coexist, including:<br>  • Parastatal utilities;<br>  • Cooperatives and municipal utility districts;<br>  • Small private power producers (SPPs); and<br>  • Energy service companies<br>• A democratic energy regulatory authourity keeps all participants honest |
| **Philosophy/ Ethics** | • Widespread ethic of natural resources (energy, water, forest, air, soil) conservation; and fairness, accountability, participation |
| **Demographics** | • People have moved out of grid-locked mega-cities |
| **Policies and public voice** | • Integrated Resource Planning (IRP) take broad economic view in energy planning<br>• True public participation<br>• Diminished role of bi- and multilateral lending agencies in policy formation |

## Looking back from 2020

### *Technology*

In 2020, no new large centralised power plants have been built in Thailand since 2002. Furthermore, existing coal power plants are slowly being phased out, and the use of coal has declined by 50 per cent compared to the level of use in 2002. The main reason for this decline was that new power plants simply were not necessary. More efficient and intelligent use of energy reduced the need for electricity generation. Passive solar architecture, co-generation, energy efficient equipment, peak demand management techniques, and small-scale renewable energy generation gradually eliminated the need for centralised large-scale generation projects.

One of the main technological changes that brought about a load reduction was the use of energy efficient equipment – everything from lighting to office equipment to industrial motors – that provided high energy savings, and at the same time reduced the production of waste heat, reducing the need for air conditioning. Passive solar design principles in buildings – making use of shading, insulation, ventilation, and evaporative cooling – minimised the need for air conditioning which in 2002 formed a significant percentage of Thailand's peak electricity load [6]. Extensive use of rooftop solar thermal systems for industrial process heat and residential and commercial water heating reduced the demand for gas and electricity. In industrial applications, co-generation (using turbines or fuel cells to produce electricity, and using the "waste" heat for industrial processes) became increasingly popular.

In the years leading to 2020, it also proved to be much cheaper to use "smart technologies" to avoid using electricity at critical times, rather than build new power plants. The highest demand for electricity (the 'peak load') in Thailand used to occur on a single afternoon each April – the hottest season of the year when almost every building that had air-cooling systems (air conditioning) were using electricity to power these systems. Rather than build new power plants simply to meet this (very brief) peak load, the diverse range of utilities that were developed to better respond to community needs used radio-controlled "saver switches" to switch off non-critical supplies of electricity for 15-minute intervals during these times of peak demand. This dramatically reduced the amount of electricity that previously had to be generated to meet the demand for electricity during the few hours of "peak annual load" on a single day each year.

Constructing new centralised power plants was rendered unnecessary in part because of the popularity of small-scale customer and community-owned renewable electricity generation systems. Taking advantage of net metering laws that were passed in 2002, residential homes, apartments, office buildings, shopping malls, and factories installed solar electric (photovolatic) modules on their rooftops and sold the electricity they did not use back to the electricity distribution system (the 'grid') so as to sell their excess electricity to supply other electricity consumers. Utilities (being state-owned agencies and privately owned electricity supply companies) liked this situation because the solar panels produced electricity when utilities needed it most – during hot sunny days. Meanwhile, in rural areas, rice husk, palm husks, pig manure, and various other agricultural wastes as well as wind and micro-hydropower formed the basis for productive and local-based electricity generation using these technologies and fuels.

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In rural areas with no centralised grid, renewable energy powered mini-grids and household-scale renewable energy systems replaced expensive, dirty, noisy diesel generation.

Buses, rapid transit trains, and bicycles (with specialised lanes) complement energy-efficient cars (which generally

## Electricity Cooperatives in the United States (US) and Europe

Much electrification in much of the rural US (and in many US cities) was accomplished using a cooperative model in which distribution lines are owned and operated by a local non-profit cooperative and power is purchased in bulk from federal power supply agencies or private power companies. This model arose during the 1930s as American farmers grew tired of waiting for electricity that was enjoyed by urban citizens, and organised among themselves. These farmers' cooperatives are supported by long-term low interest government loans and are given preferential access to electricity from federal power projects [1]. Currently there are 865 distribution and 60 generation and transmission cooperatives in America, operating 44 per cent of America's electric distribution lines, and providing electricity for 35 million Americans in 46 states [2].

The Sacramento Municipal Utility District (SMUD) in Sacramento, California, is one such cooperative utility. Strong citizen participation and activism in the Sacramento area has made this utility the nation's leading utility on renewable energy and energy conservation. Financial incentives such as rebates and low-interest loans encourage homeowners to use solar water heaters, passive solar design for new construction, and solar electric systems on their rooftops. The utility also provides a number of assistance programmes for low income customers. Yet, electricity rates are low. During the California electricity crisis in 2001, SMUD customers' electricity bills were 25 per cent lower than those of the rest of the state.

Rural electrification distribution cooperatives are not limited to the United States. They have also been successful in Argentina, Bangladesh, Brazil, Bolivia, Chile, Costa Rica, India and the Philippines.

Denmark, Germany, the UK, and Sweden provide a noteworthy example of community-owned renewable energy. In these four countries, over 300,000 household investors own over 7,300 megawatts (MW) of wind turbines. This is enough to supply nearly half of Thailand's electricity demand, and accounts for more than 80 per cent of the four countries' total wind power [3].

The successes of community-owned power in other countries hint at what is possible in Thailand for community-owned distributions and generation – perhaps making use of Thailand's 3,000 MW potential for biomass energy.

**Sources:**

1. REA, 1936, REA Electric Service: At a price the farmer can afford, US GPO: 4.
2. NRECA, 2002, America's Cooperative Electric Utilities.
3. Bolinger, M, 2001, Community wind power ownership schemes in Europe and their relevance to the United States, ERG, Berkeley, University of California.

have several passengers) for local transportation. Trains and buses provide safe, reliable transport for longer distances.

All of these technologies were commercially available in 2002. While development of new technologies made the transition even easier, they were not strictly necessary. In 2002 we already had all the basic technology needed to improve efficiency and minimise pollution.

### *Ownership and control of energy infrastructure*

Perhaps more important than the changes in technology were changes in how energy infrastructure was owned and controlled. In 2002 energy infrastructure was owned and controlled largely by state-owned enterprises (EGAT, PEA, MEA), or by huge Thai and multinational corporations (EGCO, Union Group, Mission Energy, Edison, Tomen, and Electricité du France).

By 2020, ownership arrangements had radically diversified. While state-owned enterprises and large corporations still play a role, their contributions are complemented by a variety of small entrepreneurs, cooperatives, and nonprofit organisations that focus on service and accountability rather than only profitability. Managed and owned by members who are also the customers of the electricity produced or distributed, cooperatives are able to be non-profit, charging rates that approximately equal the expenses of the generation and supply of electricity. The performance of these other market players provided visible competition and a benchmark from which to judge the social, economic, and environmental performance of the larger state-owned and private corporations. The basic characteristics of this system are now:

- Non-profit electricity distribution cooperatives that operate in a variety of provinces, purchasing electricity from the national system (and/or generate it themselves) and distribute it to cooperative members. A locally elected board oversees operations;
- Parastatal utilities have become considerably more efficient and accountable. With competition from the cooperatives, and greater public and regulatory scrutiny, the PEA, MEA, and EGAT are more responsive to the public and operate with better transparency;
- Private Energy Service Companies (ESCOs) work with customers to provide guaranteed reductions in utility bills by carefully analysing the ways that electricity demand can be reduced;
- Small private power producers (SPPs) sell co-generated and renewable electricity to the national grid for distribution to other consumers.

Cooperatives and small producers still make use of the national electricity grid, which was developed under the monopolistic government bureaucracies of the 1960s to 1990s. But the national grid is no longer controlled by EGAT, all producers large and small have equal and free access to the grid and its supply of electricity. This allows areas to sometimes import electricity in times of need, and

## Microhydro plants in Lao PDR

In the northern provinces of Lao PDR bordering on China and Vietnam can be found an interesting example of an appropriate technology for generating electricity – rudimentary, low-cost, strong, and not reliant on overseas experts to install. The turbine/generator which is used comprises a propeller turbine located at the lower end of the shaft and rests on a bamboo draft tube. The generator mounted at the upper end of the shaft is covered to protect it from the elements.


Numerous examples of this technology can be found in Muang Samphanhin Laos. Along the Nam Likna, just before it enters the Nam Ou, individual villagers have constructed canals in the streambed to direct a portion of the flow a short distance. This water then flows into one or more short channels each constructed of three wooden planks. The photograph shows three such channels in the foreground and more in the background.

Each channel has a hole at the end of the bottom board while the two side planks are joined by a bucket with its bottom removed and split along it side. This hole leads to a bamboo draft tube into which is inserted the end of the turbine/generator unit. Water drops about one metre and generates an estimated output on the order of 50 W (with greater output for larger drops).

The permanent magnet generator which is located at the top of the shaft from the propeller turbine generates 220 V of alternating current. Two small gauge wires draped over thin bamboo poles and trees and hanging from homes and other structures along the way transmit the electricity for each turbine/generator to the home of the owner of that unit. There, electricity is used for lighting, to power radios and fans, and in a few cases, to power satellite dishes and televisions.


Costs for these entire units, which can be bought a local hardware stores, are below US$100.

**Source:** http://ourworld.compuserve.com/homepages/allen_inversin/Laos.htm

## Demystifying some "conventional wisdom" about electricity[1]

The National Energy Policy Office (NEPO) of Thailand is responsible for analysing the energy situation and needs of the country and advising the government on policy. Whenever the need for a new project (already approved by NEPO) is questioned by the Thai public, NEPO has warned of the risk of "black-outs" that could be caused by a deficit of electricity supply. But how reliable are the "facts" supplied by NEPO?

**Myth #1: A minimum 25 per cent reserve margin is required to maintain power system reliability**

NEPO claims that a "reliable" power system requires a minimum reserve margin (the percentage of generation capacity in excess of peak demand, which is usually for just a few hours in the hottest month of the year) of 25 per cent. Reliability as a technical concept means the probability of not being able to procure adequate supply to serve demand. The level of reliability that is "acceptable" is a political and economic decision.

Higher reliability requires a higher reserve margin. Higher reserve margins mean more electricity-generating plants are built to act as a buffer for the few hours of peak demand. The rest of the time there are many power plants running at low capacity, imposing a burden of increased costs on consumers. There is no single "correct" number for the reserve margin. There is always a trade-off between reliability and costs.

For statistical reasons, bigger electrical systems need a lower reserve margin than smaller electrical systems. Yet, at the beginning of the1990s when the Thai electricity system was about half the size of what it is now, the reserve margin was set at 15 per cent. Why is NEPO now insisting on 25 per cent? The reason is not really about reliabilty. It is about politics: the increase to 25 per cent coincided with the policy to encourage private investment in the power sector, and extra "demand" was necessary to justify these new private plants. Even EGAT disagrees with NEPO. Late in 2001, the Electricity Generating Authority of Thailand (EGAT) expressed confidence in their Power Development Plan (2001) that they could maintain a reliable supply with only a 15 per cent reserve margin.

**Myth #2: Thailand's demand for electricity will continue to grow**

According to NEPO, consumption of electricity in Thailand is likely to expand because the current energy consumption per capita is low compared to developed countries: five times lower compared to Singapore, three times compared to South Korea, and 10 times compared to the US.

Thailand is one of the most inefficient users of electricity in the world: for the same level of economic output (GDP), Thailand uses 2.4 times more electricity than Japan and 1.6 times more than the US. And while most developed countries are using less and less electricity to produce a unit of GDP, Thailand's electrical energy intensity (the ratio of power consumption to GDP) has increased 36 per cent over the past eight years.

There is a lot of room for Thailand to improve on energy efficiency. NEPO manages a 13,000-million-baht Energy Conservation Promotion (ENCON) Fund for the purpose of conserving energy and promoting renewable technology while at the same time NEPO insists that Thailand "needs" more power plants because of increasing demand. A shortfall in the success of the programme may be caused by the conflicting interests in NEPO's policies.

**Myth #3: The large-scale power consumers are subsidising the small ones**

NEPO claims that the small-scale and rural customers in Thailand (mainly families and small farms) are subsidised by the large customers (industrial and commercial enterprises).

It is true that small-scale residential customers (in both urban and rural areas) are subsidised through the implementation of progressive block tariffs – small residential customers pay less per unit of electricity than larger residential customers. And it it is true that rural residential customers pay the same distribution charge as the urban

sell excess production to the grid at other times. An electricity regulatory authority now keeps all participants honest. The regulatory authority has equal representation from all affected parties, including small-scale consumers.

### *Resource Ethics*

The technology shift and changes in ownership were underscored by an even more important shift in ethics. In 2020 there is a widely held ethic of natural resource (energy, water, forest, air, soil) conservation shared by the public as well as government and businesses. People of all ages are aware of the resources they consume, where these resources come from, and the social and environmental consequences of their extraction. Consequently, the average person conscientiously uses no more than he/she needs and tries to minimise waste. This ethic is paralleled by an increasing ethic that values fairness and transparency. It is no longer acceptable that the rich and powerful people manipulate the public and public infrastructure for their own benefit.

No one is sure how this sense of ethics grew. Perhaps it was increasing public dissatisfaction about energy-related "wars". Perhaps it was the growing crisis of global climate change, which increased the frequency and severity of droughts and severe storms, and caused huge disruptions in agricultural yileds. Perhaps increasing costs of fossil fuels, as oil and natural gas production declined, created a general awareness that resources could no longer be consumed with abandon as they were during the 1900s. Or perhaps ethics

counterpart despite the higher costs and lower revenues inherent in rural electrification. But what NEPO conveniently ignores is that distribution costs make up only about 10 per cent of the total of electricity tariffs. The bulk (some 80 per cent) of consumers' power bills comes from costs associated with electricity production.

The cost of generation is the same for all customers. However, industrial and commercial customers have much more to gain from insisting on high reliability of the power system than do residential customers. Industrial and commercial customers stand to suffer economic losses if their power supply is cut even for brief periods, while for most small-scale consumers the cut in power supply is a small inconvenience.

But there can be only one reliability criteria for a large, intensely centralised power system despite varying needs for reliability levels by different classes of customers. A more *reliable* system is achieved by maintaining a high level of reserve margin (higher proportion of "spare" power plants in excess of the peak demand) but this means increased cost burden. Thai planners have favoured industries and commerce while the costs are borne by all consumers: thus, in fact, small-scale customers subsidise large industrial and commercial users.

**Myth #4: Coal is cheap and is needed to maintain the country's fuel diversity**

Electricity from coal is not cheap when environmental and social costs are taken into account. Even if Thailand's environmental laws are properly enforced, a coal-fired power plant still emits more sulfur dioxide, nitrous oxide, carbon dioxide (a greenhouse gas), particulates and heavy metals than other types of power plants. These pollutants have damaging effects on the environment and human health. A study by the international nongovernmental organisation Greenpeace quantified environmental costs ("externalities") of different power plant technologies[2].

Ignoring social and environmental costs, NEPO claims that electricity generated from coal costs 1.64 baht/kilowatt hour (kWh) while that from natural gas is 1.73 baht/kWh. Electricity generated from biomass is said to be even more expensive than natural gas. According to the Greenpeace study, once the externality costs are taken into account electricity from coal becomes significantly more expensive: 66.7 percent and 30.7 percent more expensive than that of natural gas and biomass respectively. According to a Harvard University study, health impacts from a coal-fired power plant cause premature deaths, asthma attacks and respiratory symptoms[3]. "Cheap" electricity from coal is made possible only by forcing local people to accept these hidden costs.

NEPO also cites the need to decrease the country's dependency on gas and diversifying fuel price risks, but building more coal-fired power plants will neither change the predetermined level of gas dependency nor significantly decrease price risks. Thailand has substantial amounts of gas in take-or-pay contracts which it must pay for even if it does not use the gas. NEPO's past decisions have already cost the country 35,500 million baht (US$780 million) for the Burmese (Yadana and Yetagun) gas that is not being used because of excess capacity in the system. The burden of take-or-pay contracts for gas will continue until 2010 when the gas Thailand has committed itself to purchase will be depleted[4].

Further, the price risk of imported coal is linked to the prices of oil and natural gas and does not therefore provide any further security against imported fuel price rises. In contrast, Thailand has plenty of unexploited indigenous renewable energy resources that, if developed, will create income that stays within the country and, compared with coal and natural gas, have less price risks.

**Sources:**
1. Extracted from "Debunking NEPO's Myths about Coal-Fired Power Plants", www.prachuabcoal.com/articles/ accessed 15.3.02.
2. Greenpeace Report "Renewable IPPs: Restructuring the Southeast Asian Electricity Sector Using Sustainable Energy" by IIEC, July 1999.
3. Levy, Spengler, Hlinka and Sullivan, "Estimated Public Heath Impacts of Criteria Pollutant Air Emissions from the Salem Harbor and Brayton Point Power Plants", May 2000.
4. *Raang Nangsue Cheechuan*, PTT Public Company, 29 October 2001.

changed because of growing public intolerance of corporate crime and closed-door decision-making that had characterised energy infrastructure provision in Thailand during the 1900s.

Education certainly had a role as well. Younger generations that grow up during the two decades before 2020 were increasingly aware of the environment, and increasingly provided with education opportunities that nurtured critical thinking, analysis, and even questioning authority.

## Demographics

By 2020 many people had moved out of grid-locked megacities such as Bangkok, spurring economic growth in smaller cities, rural towns, and the countryside as a whole. Decentralisation of government and industry that began in the 1990s created work opportunities in rural areas and regional towns/cities. Cities are actively creating parks and "green space" to improve the quality of life for those people who continue to live in the big cities. Trees also reduce the temperatures in cities and towns.

## Policies and public voice

Much of the changes in energy infrastructure by 2020 can be traced to changes in the way that energy policy was and is developed and implemented. Increasing awareness and interest about energy issues by the Thai public has created an informed and active public voice in energy policy. Energy planning involves genuine and substantial public input from

early stages. Public meetings are called *before* major decisions are made, and the input from these public meetings actually form the basis of decisions. "Public participation" really means that the public participates in decision-making, rather than simply a process of informing the public of decisions made behind closed doors.

In the year 2020, people expect and demand honest politicians and transparent decision-making processes. Crime by bureaucrats and state officials in infrastructure provision is not tolerated. The World Bank, the International Monetary Fund (IMF), and the Asian Development Bank (ADB) have finally become irrelevant. Fewer and fewer countries accept World Bank loans on growing evidence that the mega-projects the Bank supports and the corporate interests that the Bank represents are antithetical to democratic development.

Energy conservation and renewable energy are now included in a national Integrated Resource Planning (IRP) process. The IRP process considers the economic and environmental costs of all options when contemplating changes to the energy infrastructure. The high negative economic costs (previously considered as "externalities" to a project) associated with coal and large hydroelectric projects have made it impossible for these types of projects to compete with energy efficiency and decentralised renewable energy measures.

## Conclusion: Towards a Thai democratic energy system in 2020

The vision for a sane energy infrastructure outlined above is attainable. But it won't happen automatically. Business-as-usual is profitable for some, and control won't be relinquished easily. And for most of us, "energy" is seen as a technical subject best left to the engineers and economists to figure out. As we have seen already, this is dangerous. What seem on the surface to be technical decisions mask important assumptions about technology, ownership, and distribution of impact that leave small-scale consumers and disenfranchised communities to absorb burdens while a small group of others enjoy disproportionate benefits.

The changes in technology, ownership, ethics, and policy process outlined above boil down to several key principles: authority, access, and accountability.

Authority: People need to have the authority to help make decisions.

Access: People need to have the access to information and analytical tools to make informed decisions.

Transparency and accountability: The decision-making process should be transparent and decision-makers should be held accountable for the consequences of their actions.

The transformation will require changes in thinking. The change requires a move away from greed and towards public interest. State monopolies, large corporations, and the government will have to respect sovereignty of local communities and listen to previously disenfranchised segments of the community. The state will have to find better ways to meet energy needs than the present top-down, opaque methods that overinvest in dirty technologies. The state will have to find more useful ways to support renewable energy than poorly conceived, poorly implemented "demonstration projects".

The transition to a democratic, sustainable energy system will only happen if many of us get involved. Consider yourself invited to participate! Grab whatever part of this challenge suits your taste. Take steps to minimise energy waste and maximise efficiency in your home and in your community. Look for opportunities to take energy production into your own hands – generate using natural energy flows for your own use, or sell it to the grid. Existing technology provides the necessary tools – and future technology improvements will provide even better tools in terms of the actual hardware. Find creative ways to encourage the state to do the right thing. Invite yourself to "public meetings" that concern the development of energy infrastructure. Challenge decision-makers to be transparent, honest, and to honor commitments to civil society. Visit communities affected by big, conventional energy projects. Listen to their stories and find ways to communicate these to the public. Comfort the afflicted, and afflict the comfortable. The present paradigm of energy infrastructure is a dead-end road, and now is the time for people to lead the government in defining and implementing a better way.

**Endnotes:**

1. EGAT currently employs over 30,000 people, PEA employs 29,000 and MEA has over 10,000. The Seaboard utility in the UK has about the same number of customers as PEA, and distributes about the same amount of electricity per year. However the Seaboard employs 6000 workers.
2. A considerable portion of this aid found its way to the Swiss Bank accounts of Thai military leaders (See Wyatt 1982).
3. Bhumipol is the first name of the current King of Thailand. Most major hydroelectric projects are named after royal family members. Eventually there were more dams than royal family members, and the King came up with other royal words to bestow upon major hydroelectric projects. Because of the high regard for the royal family held by Thai people, and because of *lese majeste* laws that forbid criticism of the royal family, criticising these projects was seen as unpatriotic, or even grounds for arrest.
4. Peak electricity load occurs each day in the afternoon and each year in the hottest month, April, particularly due to increased use of air conditioners.

**Selected references:**

Bauer, P. T., 1973, USOM Seminar XI: Dissent on Development. Bangkok, USOM: 22.
Chullakesa, 1992, Rural Electrification in Thailand. Rural Electrification Guidebook for Asia and the Pacific.
Tellam, I., Ed., 2000, Fuel for Change: World Bank Policy — Rhetoric vs. Reality. London, Zed Books
USAID, 1966, Thailand Electric Power Supply, US Agency for International Development, United States Operations Mission.
USOM, 1965, USOM Thailand Program Goals and Projects. Bangkok, Thailand, United States Operations Mission: 7.
Voravate, T., and Douglas Barnes, 1997, Renewable Energy Survey for Lao PDR, Washington D.C., The World Bank, Energy Unit, Energy, Mining and Telecommunications Department.
Wyatt, D. K., 1982, Thailand: A Short History, Chiang Mai, Silkworm Books.

# The people and their river: The Xe Bang Fai River Basin, Lao PDR

**By Bruce Shoemaker, Ian Baird and Monsiri Baird**

**There have been few studies of the river-based means of livelihood of communities living along the naturally-flowing rivers of the Mekong River Basin. But a recently published report, *The People and Their River: A survey of river-based livelihoods in the Xe Bang Fai River Basin in Central Lao PDR*, provides a detailed description of the nature-based livelihoods and economies of the local communities in this river basin. The following article is based on the report.**

The Mekong River and its many tributaries are the essence of the natural wealth of the Lao People's Democratic Republic. These rivers and associated ecosystems are the foundation of the means of livelihood security and economies of local communities throughout the country, and the importance of rivers and wetlands are reflected in the knowledge and belief systems, stories, music, and art of the people.

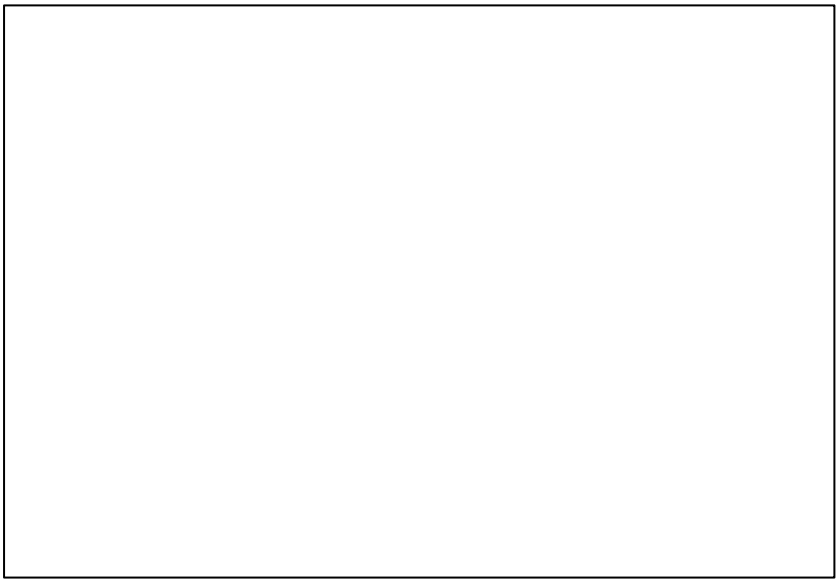
The Xe Bang Fai is one of the great rivers of the Mekong River Basin, and is located in the provinces of Khammouane and Savannakhet, in central Lao PDR. The Xe Bang Fai River Basin's catchment area totals approximately 9,500 square kilometres. Areas of the basin are included within seven districts of Khammouane province – Nong Bok, Xe Bang Fai, Tha Khek, Mahaxay, Nyommalat, Xaibouathong, and Boulapha – and the three districts of Xaibouli, Vilabouli, and Atsaphone in Savannakhet province.

Based on statistics obtained from district administrative offices and interviews with villagers, the survey team estimates that there are 115 villages populated by approximately 50,000 people located on, or very close to, the banks of the mainstream Xe Bang Fai River between its headwaters and its confluence with the Mekong River.

There are many other villages located adjacent to the seven or eight main tributaries of the Xe Bang Fai and along smaller seasonally flowing and permanently flowing tributary streams within the basin. For example, along the Xe Bang Fai's largest tributary, the Xe Noy River and the Xe Noy's tributaries, there are 74 villages. Population data and estimates available for 55 of these villages indicates their combined population to be approximately 17,000 people. (While much of the following information refers to the Xe Bang Fai River, the information also directly relates to the communities living along the Xe Bang Fai's tributaries.)

There are basically two groups of villages that depend on the Xe Bang Fai in various ways and to different extents. The first group includes all the villages situated either directly adjacent or within a few kilometres (km) of the river and its largest tributaries. The second group includes communities situated in the Xe Bang Fai River Basin, but not adjacent to or in the immediate vicinity of these rivers. While the second group of villages clearly relies on the river less than those communities situated directly adjacent to it, they do also have close links with the Xe Bang Fai. People from these outer villages rely on the Xe Bang Fai in various ways, including coming to the river to fish, collect other wildlife and plants, and to garden.

Bruce Shoemaker, Ian Baird and Monsiri Baird undertook research about the means of livelihood of communities living along the Xe Bang Fai River in Lao PDR as part of the Canada Fund for Local Initiatives project identification and review investigations in early 2001. Collectively, the researchers have more than 20 years experience living and working in Laos.



***The Xe Bang Fai River in Mahaxay district, Khammouane province, March 2001. The mountains in the background are part of limestone karst formations that are prevalent in Mahaxay district.***

Based on anecdotal evidence it appears that for every village located right along the Xe Bang Fai and its major tributaries, there is at least one more village located further away but that also relies on the river to some extent. Therefore, it appears that in addition to the minimum of 67,000 people noted above, at least another 60,000 to 70,000 people (living along smaller tributaries or elsewhere in the basin) are also at least partially dependent on the Xe Bang Fai River for their livelihoods. Therefore, the total number of people directly or indirectly linked to the Xe Bang Fai for at least part of their livelihood security is conservatively estimated to be 120,000 people.

## River-based livelihoods

From place to place and from season to season, the people living in the Xe Bang Fai River Basin derive diverse benefits from the rivers and floodplains, wetlands and forests of the basin. Different ethnic groups take advantage of the natural wealth of the basin in different ways, in the same way that women and men in these communities undertake a diverse range of responsibilities in managing and harvesting this wealth.

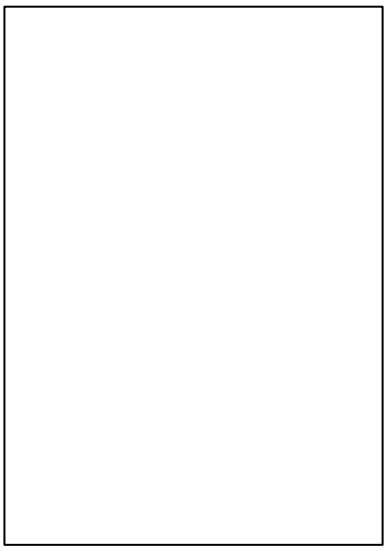
### *Fisheries*

Fish migrations in the Xe Bang Fai River Basin are probably the most important ecological characteristic of the river basin for the livelihood of local people, most obviously in relation to local economies, and as a source of family income, food and nutrition.

The first main fish migration of the year starts at the beginning of the monsoon season. When the rains begin in May or early June, seasonal streams begin flowing, and water levels and flow volumes in the Xe Bang Fai River begin to increase. According to local fishers, it is at this time that a large number of fish species begin migrating up the Xe Bang Fai River from the Mekong River, while other fish species move out from deep-water pools in the Xe Bang Fai, in which they live during the dry season. Together, the species of these two groups of migrators include more than 20 species, including *pa hou mat* (*Pangasius larnaudei*), *pa i-tou* (*Morulius* sp. or spp.), *pa khao* (*Wallago attu*), *pa khe* (*Bagarius* sp.), and *pa yang* (*Pangasius bocourti*). Of fish caught, according to local fishers, *pa mak mang* (*Sikukia gudgeri*) and *pa sakang* (*Puntioplites* sp.) are the most abundant.

At around the same time that fish move up the Xe Bang Fai River, they also begin to migrate up the river's larger tributaries. For example, villagers from Ban Dong Kasin, Nong Bok district, said that fish migrate up the Houay Vay from the Xe Bang Fai at the beginning of the rainy season, and at that time each family is able to catch large amounts of fish that, when sold, provide an average income of 200,000 to 300,000 kip (US$24-36) per family. Villagers are also able to catch fish as they move down the Houay Vay to the Xe Bang Fai River at the end of the rainy season in October and November. The main species caught at both the beginning and end of the rainy season are *pa phia* and *pa i-tou* (*Morulius* sp. or spp.), *pa sakang* or *pa chakang* (*Puntioplites* sp.), *pa kot* (*Hemibagrus nemurus*), and *pa nang* (*Micronema* sp.), although there are certainly other species caught by local fishers as well.

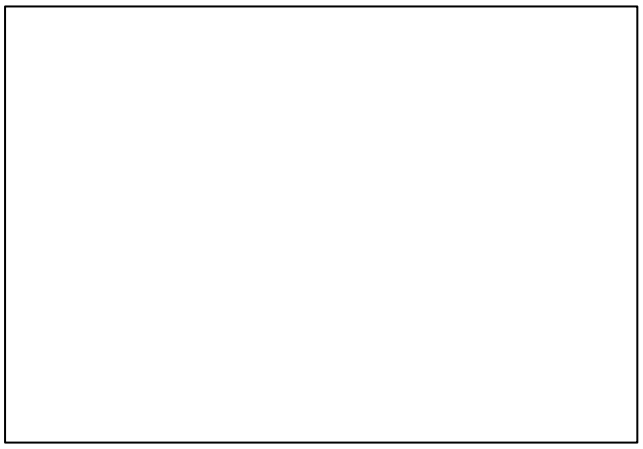
As water levels in the rivers of the basin increase at the beginning of the rainy season, the flooding of natural depressions, oxbow lakes, ponds and rice fields in the floodplains is quickly followed by many other fish species entering these areas in search of food and habitat suitable for spawning. Predominant amongst these fish species are the 'black fishes', including *pa douk* (*Clarius* sp.), *pa kang*



***A boy and his* toum *fish trap. Made of bamboo, this* toum *was made in one day by the boy's father. The fish caught in the* toum *depends on the type of bait used in the trap and the time of year the trap is set to catch fish. During the rainy season,* toum *are set in wetlands, and during the dry season they are set in shallow areas of the river.***

(*Channa gachua*), *pa kho* (*Channa striata*), *pa sieu* (*Rasbora* and *Esomus* sp.).

After the main fish migrations at the beginning of the rainy season have occurred, there is considerable fishing activity in wetlands for the duration of the rainy season, but there are not any significant fisheries in the large rivers.



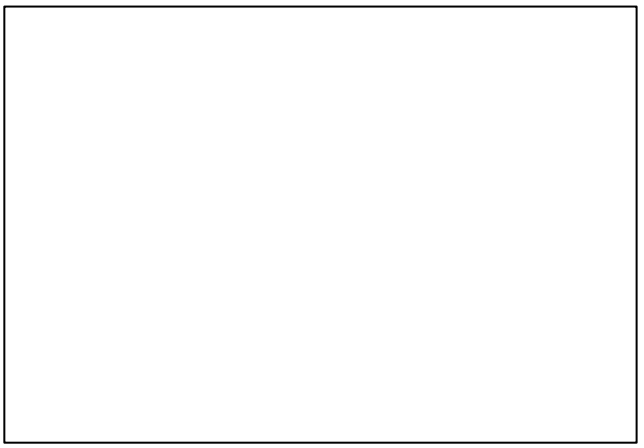
**Sadoung *fishing gear is mostly used by women for fishing in ponds and wetlands during the dry season.***

In October, as the rainy season ends, there is an important fishery based on migrating cyprinids (family of scaled fishes, including carps and minnows). Many small species of cyprinids approximately five to 20 centimetres (cm) in length, identified collectively by local fishers as *pa soi*, are caught all along the Xe Bang Fai and Xe Noy rivers using lift nets (*kadoung* or *sadoung*). Women are the main participants in this fishery, which lasts between just a few days or as long as ten days to two weeks. Many people, such as villagers from Ban Som Sa-at, in Xaibouli district, use these fish to make *pa dek* (fermented fish paste). Most people living along the rivers say that more fish are caught at this time of year than at the beginning of the rainy season. Villagers from Xiang Khai sub-district, in Xaibouli district, reported that each family could catch a total of about 60 or more kilograms (kg) of fish during the period of the *pa soi* fishery. While much of the catch is used to make *pa dek*, some of the fish are also dried in the sun to make *pa katao* .

At about the same time as the *pa soi* fishery is underway, fish are also moving out of rice fields, streams, oxbow lakes and natural depressions to return to the main rivers. At this time many villagers make barrier traps (*tone*) at the edges of rice fields and on streams to catch fish, and in some places large quantities of fish are caught. For example, villagers from Ban Pheet Si Khai, Nyommalat district, reported to the study team that they caught an average of between 50 and 200 kg of fish per barrier trap at the end of the rainy season. Many villagers use much of these fish catches to make *pa dek*.

In October and November each year, most fish in small streams, and wetlands that contain water only during the rainy season, move downstream to find year-round water bodies to take refuge in during the dry season. However, the situation differs in the Houay In, near Ban Thong Kong, in Nyommalat district. The Houay In flows into the Nam Ngo, a tributary of the Xe Bang Fai. According to local fishers, fish of the Houay In migrate upstream and into caves at the end of the rainy season. The species reported to migrate upstream are all of small to medium size. They include *Rasbora* sp. (*pa sieu khao*, not more than 15 cm length), *Systomus* or *Osteochilus* sp. (*pa ka bok*, not more than 20 cm length), and a *Schistura* or *Nemacheilus* sp. (*pa phan*, 5-10 cm length).

About a month after the *pa soi* fishery, and after fish begin to leave the seasonally inundated wetlands, many fish migrate down the Xe Bang Fai River. Villagers often refer to these as 'large fish', and those caught by local fishers include the same species that were caught moving up the river at the beginning of the rainy season. According to local fishers, many of these fish are migrating back to the Mekong River. During this period of fishing activity on the Xe Bang Fai and other rivers, the gill net (*mong*) is the main fishing gear used.



***A boy from Ban Na Phoke Tha, Xe Bang Fai district, catching earthworms along a bank of the Xe Bang Fai River. Earthworms are a fishing bait that is much-used in the Xe Bang Fai basin. This boy uses the earthworms to bait hooks in the Nong Seng wetlands near his village, and not for fishing in the Xe Bang River itself. "It takes a long time to catch the 100 earthworms I need," he told the survey team, "But I couldn't fish if I didn't have them."***

According to local fishers, during the dry season, usually from December to May or June, the best fishing areas in the Xe Bang Fai and Xe Noy rivers are rapids, where the rivers' flow over a layer of rock is relatively rapid and shallow, that connect deep-water pools and stretches of seasonally-inundated forest along the river. Xe Bang Fai district officials told the survey team that the rapids of Keng Sateu are one of the best fishing grounds in the district. Also in Xe Bang Fai district, Ban Keng Pe villagers stated that rapids are some of the best fishing grounds near their village, as did villagers living along the Xe Noy River in Xiang Khai sub-district in Xaibouli district, and villagers in many other places in the river basin. Clearly, river rapids are extremely important for the fish and fisheries of the Xe Bang Fai basin.

## *Wetland management and fisheries*

During both the rainy season and the dry season, people living in the Xe Bang Fai basin catch fish in streams, oxbow

### *Pha Nong* management of the Nong Sok wetlands at Ban Dong Kasin, Nong Bok district

Nong Sok is a wetland about 200 metres long and 100 metres wide and is situated about two kilometres from the ethnic *Lao* village of Ban Dong Kasin in Nong Bok district. As with many natural wetlands in the Xe Bang Fai basin, it is managed according to a *pha nong* regime. Flooded by the Xe Bang Fai River in the rainy season and containing water all year round, fishing in Nong Sok is prohibited for most of the year. Hunting of wildlife and the collection of food plants near Nong Sok is also strictly banned. If anybody 'steals' fish from the *nong* during times when fishing is prohibited, local people believe that the thief will suffer various misfortunes – and the only way to escape these misfortunes is for the thief to organise a ceremony and ask to be forgiven by the spirit (and by extension, the community) protecting Nong Sok.

According to long-established tradition in Ban Dong Kasin, each year on the day of the full moon of the fifth Lao month (April) – which coincides with the Lao New Year (and associated celebrations) – people from the village (and only people born in the village, or married into the village and presently living there) are allowed to fish in the pond, but only for a few hours in the afternoon. Monks come to observe the fishing activities and water from the village (not from the *nong*) is used to wash the Buddhist images in the temple – these images are brought to the *nong* on the same day as fishing takes place.

Before fishing can begin, villagers participate in a ceremony known as *liang seng* or *liang phi ban* ("sacrifice for the wetland" or "sacrifice for the village spirit"). A male elder (*pho cham*) of the village is responsible for the care of Nong Sok and conducts ceremonies related to the *nong.* The spirit of the *nong* is *phi nya khou* (commonly referred to by local people as *nya khou*), the spirit of a long-dead feudal lord (*chao muang*). The spirit's (and perhaps, the feudal lord's) full name is *nya khou sai-nya-vong rasa thelat*, and the spirit reputedly has the ability to appear as a tiger, crocodile or large snake. The village spirit house (*ta ho*) is located adjacent to Nong Sok, and after the *phou cham* recites a chant, he asks the spirit to provide fish for the village. According to villagers, about 15 minutes after the chant has been completed fish begin appearing at the surface of the pond. If the fish rise to the surface, *nya khou* is believed to be happy, and everybody yells out in joy, and begin fishing in the *nong.* If the fish do not rise to the surface, fishing still occurs, but catches are significantly reduced, as *nya khou* has apparently decided to not give as much fish to the villagers.

On the day when fishing is allowed in Nong Sok, each of the 80 families in the village can catch about 20 kilogrammes of fish.

lakes and other wetlands, and flooded natural depressions. Wetland fisheries are particularly important for those communities situated away from the Xe Bang Fai and other major rivers in the basin. For example, people in Nong Bok district probably do more fishing in streams and wetlands than they do in the Xe Bang Fai River. Of course, many of the fish caught in water bodies away from the main rivers do live a large part of their life cycles in the Xe Bang Fai and Mekong rivers.

***A river bank garden of maize and vegetables on a bank of the Xe Bang Fai River.***

Wetlands and wetland fisheries are often managed by communities to conserve these ecosystems, to maximize the productivity of the associated fisheries, and to ensure that all members of these communities share the benefits derived from these management systems. These systems of community wetland and fisheries management in the floodplains of the Xe Bang Fai basin are diverse. Although the general characteristics of one of these systems is described below, it should be noted that even within these systems there are various wetland micro-habitats that are managed and used in different ways depending on environmental and social conditions.

## Pha Nong *systems of managing wetlands and fisheries*

The most common fisheries management system in the wetlands and other water bodies of Xe Bang Fai floodplains is the *pha nong* system developed by lowland ethnic *Lao* communities. *Pha nong* systems are practised in many other parts of rural Laos as well. Although there are many variations of *pha nong*, depending on local ecological and social conditions, most *pha nong* systems share some common characteristics. They are generally used to manage clearly defined wetlands and other water bodies, including year-round, but especially seasonal, oxbow lakes and other wetlands ('seasonal wetlands' have water for part of the dry season, but dry out before the end of the dry season and the onset of the rainy season). *Pha nong* is also occasionally used along stretches of streams, and in *nam keng* – areas of the floodplain where natural depressions in the landscape

allow for floodwaters of greater than average depth (during the rainy season) and where, after the floods recede at the end of the rainy season, floodwaters remain to form a seasonal pond.

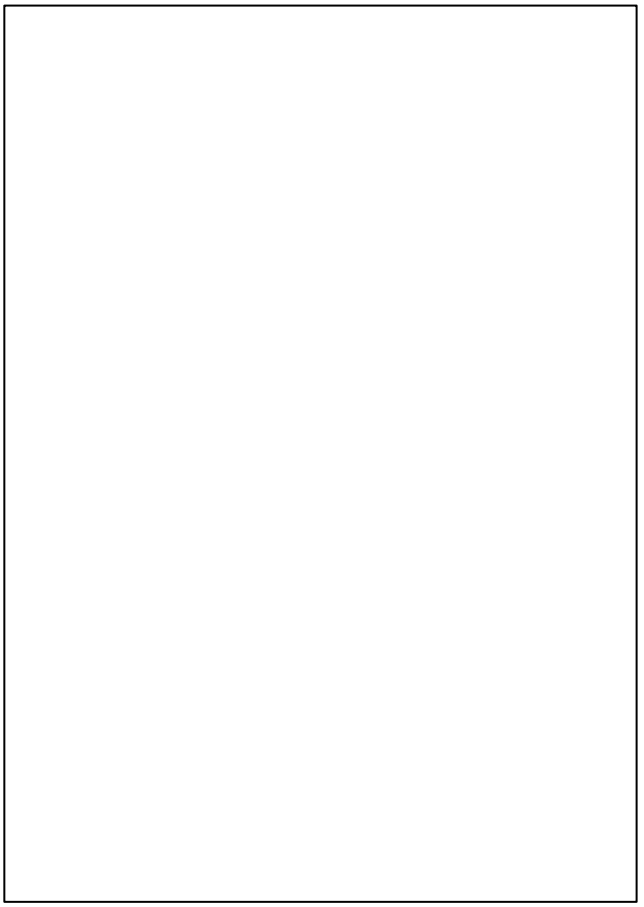
*Pha nong* systems almost always restrict fishing activities in the designated wetlands and water bodies during a certain period of the year. Sometimes fishing is prohibited in all parts of the wetland/water body, while in other *pha nong* systems fishing is permitted in certain areas of the wetlands/water body all year round. There is usually a male elder, or a group of elders, in a community that is responsible for ensuring that the regulations of the management systems are respected. *Pha nong* systems, particularly relating to areas and times when fishing is prohibited, are often founded on local Animist belief systems and respect for the places of abode of village spirits (*phi ban*).

Under the *pha nong* system, after fishing has either been partially or completely prohibited in a wetland or water body for most or all of the year, the villagers set a day and a time in which all people in the community are allowed to fish in the wetland area at the same time. Sometimes only people from the village that manages the wetland are allowed to participate in fishing activities, while in other places people from neighbouring villages are welcomed. The day and time for fishing is usually near the end of the dry season, although it can be earlier if the area will dry out before the beginning of the rainy season. The total catch of fish is divided amongst those who have participated in the fishing. The area is then either closed to fishing again, or in the case of most seasonal wetlands and water bodies, is opened up for the rest of the dry season to anybody who wants to fish. Basically, *pha nong* systems are designed to provide fish time to grow before being harvested as late as possible in the dry season and then ensure the equitable distribution of the wetland fisheries amongst community members. These systems also maintain and increase solidarity within and between communities.

## Fishing and local livelihoods

Wild-capture fisheries are clearly one of the most important livelihood resources for people living in the Xe Bang Fai River Basin. And while fisheries have always been important to local people in the basin, the relative importance of the Xe Bang Fai fisheries to the national society and economy of Laos may actually be increasing. Until recently, most fishing was for subsistence purposes – there were few markets where fish could be sold, and many people caught fish for their own consumption and that of their family members. Now, however, fishing in the Xe Bang Fai basin not only supplies local families with their most important source of dietary protein, but is also an important means of gaining income, as fish are sold in local markets and often transported as far as Vientiane for sale.

In many villages in the Xe Bang Fai basin, annual rice harvests are not sufficient to supply families with a year-long supply of this staple food. In many villages, the vagaries of soil quality, rainfall and natural flooding, or official restrictions on land-use in upland areas, are often the major factors causing rice shortages, while in the middle and lower basin, natural floods of longer-than-usual duration or higher-than-usual levels can significantly reduce rice yields. Consequently, wild capture fisheries provide people in rice-deficient villages with their main means for getting rice – either through direct barter trade with other villages or through selling fish at market and using the income to buy rice. In the ethnic *Brou* villages of Ban Tha Hat in Xe Bang Fai district and Ban Na Kieu in Mahaxay district, both of which experience chronic rice shortages, the barter and sale of fish secures sufficient supplies of rice. Villagers in Ban Keng Pe, Xe Bang Fai district, also reported that in the dry season it is often possible to catch 8 to10 kg of fish per day that could then be sold at market, the proceeds being used to purchase rice. As Ban Keng Pe frequently experiences rice shortages, the importance of fish for the people of this village is reflected in their saying that they *het na sai lang pa* ("grow rice on the back of a fish").



***Seasonally flooded forest along the edge of the Xe Bang Fai River, dry land forest, and limestone karst in the background, upstream of Mahaxay district town. Local people refer to the karst mountains as* phou pha, *which have limestone caves in which fish find shelter during the dry season.***

The fermented fish paste known as *pa dek* is the second staple food of the Lao diet, apart from rice, and is especially important for the ethnic *Lao* of the lowlands. Most villagers in the lower and middle parts of the Xe Bang Fai basin gain

much of their dietary protein from *pa dek*. For example, the average family in Ban Na Phoke Tha, Xai Bang Fai district, makes between four and eight jars of *pa dek* each year, with two or three jars consumed per family and the rest being sold. Each jar contains approximately 22 kg of fish.

Fish are not the only aquatic animals that constitute a source of food for the people of the Xe Bang Fai basin. Snails (*hoi*), frogs (*kop, khiat and eung*), crabs (*kapou*), shrimps (*koung*), and aquatic insects (*meng mai nam*) are also important sources of food and income.

***"I collect grasses from the forest to make roofing for my house," said this woman in Ban Pheet Si Khai, Nyommalat district. Non-timber forest products are an essential component of means of livelihood in communities throughout the Xe Bang Fai River Basin.***

## Dry season riverbank vegetable gardens

The cultivation of vegetables and other crops in gardens on the banks of the Xe Bang Fai River and many of its tributaries is, according to villagers, one of the most important sources of food and income for local families. It is particularly important for women, as they do most of the gardening work and then often determine how the produce – and income from its sale – is to be used.

There are two overlapping periods of riverbank gardening, both of which relate directly to the natural rise and fall of rivers. The first is from August or September to December. Crops are planted in the moist, fertile soil of the riverbank as soon as the floodwaters start to recede and water levels in rivers begin to decrease. Gardens include corn, yams, watermelon, cotton, cassava and other tubers, peanuts, long beans, mung beans, a local variety of cucumber, chilies, eggplant, pumpkin, and many other varieties of vegetables.

In December, the second cultivation period begins. Additional crops are planted further down the riverbank as water levels continue to decline in the dry season. At this time, a larger area of land can be cultivated and the river provides a near-by water source. Crops planted tend to be ones with short growing seasons, and most are harvested by March, including lettuce, long beans, garlic, Chinese parsley, cabbage, dill, watermelons, tobacco, and cucumbers.

## Seasonally flooded riverine forests

Large areas of seasonally flooded riverine forests grow along the Xe Bang Fai River, especially the middle and upper parts of the river, as well as along the middle and lower stretches of many of the Xe Bang Fai's tributary rivers and streams. During the rainy season, from around June until November, these forests are flooded as river water levels increase and the waters flood into these adjacent forests. These forests are extremely important for maintaining a vibrant aquatic ecosystem. Apart from being a source of organic nutrients, seasonally flooded forests are the habitat of a wide variety of animals – including many species of birds, mammals, amphibians, reptiles, insects, shrimps and shellfish, and, of course, fish. Fish rely on the forests for food directly, in the form of fruit, seeds, other fish, and aquatic plants and animals, and indirectly, since much of the food eaten by fish and other aquatic animals depends on the food web initiated due to the nutrients contributed to the ecosystem by the forests. Fish use the trees as refuges from predators, and some species use the flooded forest as nursery and breeding grounds.

Compared to other types of forest, seasonally flooded riverine forests are unique in that they have adapted to survive long periods of inundation by rivers that have widely fluctuating water levels over the course of a year. In the tropical monsoon climate of Laos, most plants exhibit their most important periods of growth during the rainy monsoon season. However, the trees and bushes of the seasonally flooded riverine forest are different – they grow in the dry season, when they are not inundated. During the rainy season, when they become flooded, these plants lose their leaves to reduce friction with the strong current of the river. Basically, these perennial plants become dormant until the flood recedes, at which time the new leaves of these plants quickly emerge. Essentially, seasonally flooded riverine forests are highly adapted to the seasonal hydrological cycles of the river – the main plant species in these forests exist as a result of the seasonal rise and fall of the river's waters each year.

Local people collect many perennial and annual plants – used as food and/or medicine – that grow in the seasonally flooded riverine forests. Edible insects, including mole

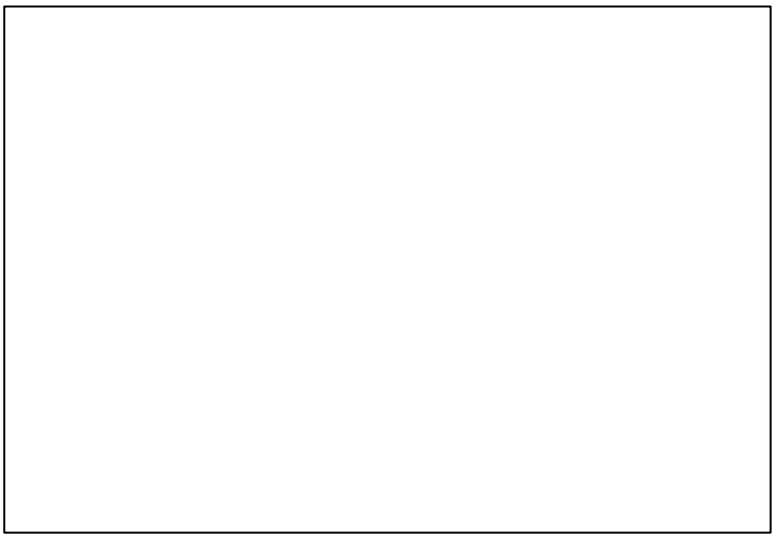
crickets (*meng chi nai* and *meng cha lo*) and *meng khanoun* beetles, that have lifecycles that depend on the seasonally flooded forest habitat are also collected from these forests, as are other aquatic animals such as shrimps (*koung*), frogs (*kop*, *khiat* and *eung*), snails (*hoi sai*, *hoi choup* [*hoi kon lem*], and *pak kouang*) and shellfish (*hoi kheng* [*hoi keng noi*], *ki*, and *kouang*).

## Seasonally flooded wetland forests

Seasonally flooded wetland forests grow in areas adjacent to seasonal and year-round wetlands and oxbow lakes throughout much of the Xe Bang Fai River Basin. While much of the seasonally flooded wetland forest areas in the lower part of the basin have been cut down to make way for rice fields and other forms of agriculture, there are many other areas where these forests remain. For example, the protected *nong* wetland of Nong Boua, adjacent to Ban Beung Boua Thong and Ban Nao Neua in Xaibouli district, is still surrounded by pristine wetland forests. There are also significant amounts of wetland forest adjacent to the Xe Bang Fai tributary, the Nam Pheet, in Nyommalat and Mahaxay districts.

As with seasonally flooded riverine forests, villagers collect edible plants that grow in seasonally flooded wetland forests, including *ne*, *phak kieu feuang* (*phak mai*), *phak pote*, *phak pong*, *phak mak chap*, *phak kaset*, *phak kadon nam*.

Mushrooms are an especially important NTFP in the lower part of the Xe Bang Fai basin. For example, villagers from Ban Tha Phosy, Ban Tha Kham, Ban Keng Veng, Ban Dong Mak Fai and Ban Palay in Xaibouli district, and Ban Tha Kho in Xe Bang Fai district all sell large amounts of wild mushrooms collected in semi-evergreen dipterocarp forests located near their villages. On average, a family from Ban Tha Kho makes about 50,000 kip [US$6] per year from selling mushrooms. In all villages, it is women who collect most of the mushrooms from the forests and sell them either at market or to traders who then sell the mushrooms at market.



***Semi-evergreen forest along the Xe Bang Fai River, between the district towns of Xe Bang Fai and Mahaxay.***

## Dry-land forests

Many of the forests in the Xe Bang Fai basin are tropical evergreen, semi-evergreen mixed deciduous, and dry dipterocarp forests. Generally, these forests are managed as common property resources and as such are considered by villagers as being communally owned by village communities. All villagers can gather non-timber forest products from these forests, but most communities have agreed to some restrictions related to the way the forests are used, especially in relation to cutting down large trees.

Forests provide local people with many livelihood resources, and villagers collect a large number of non-timber forest products (NTFPs) for use and sale. Some make substantial incomes from the gathering and selling of NTFPs, but all local people rely on NTFPs for subsistence. For example, people in the ethnic *Brou* village of Ban Na Kieu, Mahaxay district, told the study team that they sell bamboo shoots (*no mai*) collected from a nearby forest and that this is one of their most important sources of income – although bamboo shoots are also consumed as food by local families.

Many varieties of wild mushrooms (*het*) are collected in forested areas. These include *het pho* (*Astraeus hygrometricus*), *het bot* (*Lentinus kurzianus*), *het phouak* (*Termitocytes* sp.), *het khai*, *het din*, *het khone*, *het khao*, *het nam mak*, *het na sao khao khai*, *het pheung*, and *het la ngok*.

In many places the area of natural forest has declined and the forests that remain are under threat. This is due to several factors. In some areas there has been an on-going expansion of rice fields and grazing areas. Forests have also been extensively logged, mostly by outsiders. Conflicts caused by these logging concessions are ever-present. Villagers are seldom consulted and efforts to gain their voluntary consent to the logging of their forests are essentially unheard of. When their forests are logged, the compensation they receive for their losses is very low and often comprises nothing but unfulfilled promises. For example, Ban Palay in Xaibouli district received just 600,000 kip (US$73) in exchange for the 31 cubic metres of high quality timber that was taken from the community's semi-evergreen forest last year. Other village leaders also reported gaining little or nothing from logging activities in the forests of their communities.

## Local economies in the Xe Bang Fai River Basin

Villages located along the Xe Bang Fai River and villages located a substantial distance from the river or its main tributaries have long-established trading links and interdependent local economies. For example, many villages located away from rivers, particularly in the middle and

lower basin, have rice fields outside of the flood zone while many of the rice fields of villages located near the major rivers are within the flood zone. Of the villages with fields outside of the flood zone, some are able to produce a substantial rice surplus on a regular basis. Ban Kouan Khvai, in Mahaxay district, has almost three hectares (ha) of paddy per family outside of the flood zone, and harvests frequently yield large surpluses of rice. However, villagers catch relatively small amounts of fish from a small tributary stream, the Nam Houng. Therefore these families trade their surplus rice with villages situated closer to the river (and in the flood zone) in exchange for barbecued fish (*pa ping*), smoked dry fish (*pa heng*), fermented fish paste (*pa dek*), betel nut (*mak khieou*), sweet tamarind (*mak kham van*) and various other goods.

There is obviously a large amount of fish traded and marketed in the Xe Bang Fai basin. For example, villagers in Ban Keng Pe sell 50-120 kg of fresh fish per day to traders who come to the village from Tha Khek district town during the dry season. Most carps and catfish sell for about 9,000 kip/kg (US$1.10) at Ban Keng Pe and the catfish *pa kheung* (*Hemibagrus wyckioides*), the most expensive fish, each of a weight usually more than three kg, sells for 20,000 kip/kg (US$2.44). Two fish traders from Khoua Xe also travel to Ban Tha Hat to buy about 20 kg of fish per day, and Ban Tha Kho villagers reported selling a similar amount. In the rainy season, traders travel to these villages by boat. In other areas, like at Ban Na Kieu in Mahaxay district, villagers sell their own fish at the district town market. Marketing patterns and the economic relations between villages, fish buyers/sellers, and markets differ from place to place.

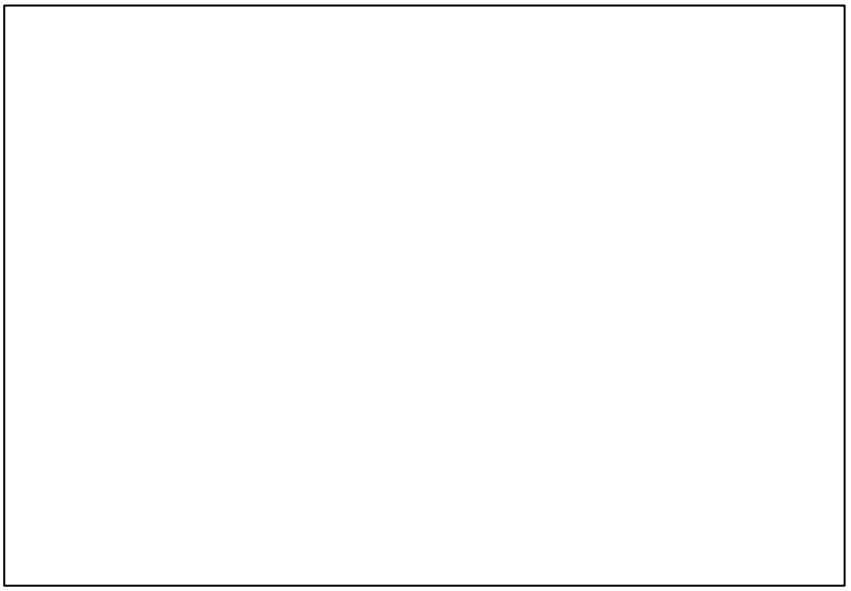
These long-established trade patterns, which are evident throughout the Xe Bang Fai basin, illustrate the interdependence of communities, and clearly indicate that those living in flood-prone areas depend on trade with those communities outside of the flood zone, and vice versa.

## External development interventions

There are a number of small-scale and large-scale development projects that have been implemented or are being implemented or planned with the objective of providing people living in the Xe Bang Fai River Basin with opportunities to increase their incomes, and to diversify their sources of livelihood. While doubtless being planned or implemented with the best intentions, many if not most of these projects have caused, or have the potential to cause, unforeseen hardships for the people (who have been designated as the potential benificiaries by the proponents of these projects) of the Xe Bang Fai basin.

### *Industrial tree plantations*

In some villages, industrial plantation forestry is being promoted. This is mainly through the Asian Development Bank (ADB)-supported Plantation Project. In the most recent form of this project, a private company with majority New Zealand ownership, BGA Lao Plantations, has been granted concessions to develop eucalyptus plantations on 50,000 ha of land in central Lao PDR (of which only a small amount has so far been planted). At Ban Nao Neua, in Xaibouli district, villagers reported that 100 ha of their dry dipterocarp forest area (*pa khok*) was destroyed before being planted with eucalyptus (*mai vik*) in the mid-1990s. The ADB Plantation Project supported the eucalyptus planting.



***Eucalyptus plantation in Xiang Khai sub-district, Xaibouli district. Said the Sub-district Chief, "Eucalyptus plantations are causing forest, soil and water resource degradation. I do not want anyone to grow any more eucalyptus trees in my sub-district."***

Villagers observed that the forest resources that they used to depend upon when the area was covered with natural forest could no longer be found in the eucalyptus plantation. ADB consultants tried to reassure the villagers that their plantation would not cause soil fertility problems, but locals remained skeptical. The foreigners with the project could not speak the Lao language, and the villagers reported that they were not able to clearly express their concerns to them. Finally, when the ADB suggested that villagers convert more of their land into eucalyptus plantations, the villagers refused and they have not planted any additional eucalyptus on common lands since then.

Another concern is that forests managed as commons by communities will be replaced with privately-owned industrial tree farms, thus marginalizing the poor and disadvantaged groups in society who previously relied on these commons resources for their livelihoods. For example, some of the eucalyptus plantations established by Ban Manilat villagers are situated near Ban Palay, a largely ethnic *Brou* village in Xiang Khai sub-district. Wild mushrooms are one of the most important sources of cash income for

## The protected crocodiles, wetlands and forests of Ban Beung Boua Thong and Ban Nao Neua

The ethnic *Lao* communities of Ban Beung Boua Thong and Ban Nao Neua are situated a few kilometres south of the Xe Bang Fai River in Xaibouli district. This community is composed of two villages, which presently have a total population of 250 families, or approximately 1,400 people. The villages are located adjacent to two large, year-round oxbow lakes: Nong Boua (500 metres long and 200 metres wide) and Beung Boua Thong (800 metres long and 800 metres wide), both of which are flooded during the rainy season and the waters of which are fed by an underground spring during the dry season. There is also a third oxbow lake, the largest of the three, called Beung Saiyan (4,000 metres long and 1,000 metres wide), situated within walking distance from the villages. The two villages are exclusively responsible for the first two lakes, while a total of six villages utilize Beung Saiyan for fishing. Fish migrate into Beung Saiyan and other wetlands in the area from the Xe Bang Fai River.

**The crocodiles inhabit the three wetlands of Beung Saiyan, Beung Boua Thong and Nong Boua, moving from one wetland to another according to season. Local people are not afraid of the crocodiles, which have never been known to attack people, and believe that the welfare of their community is closely linked to the welfare of the crocodiles. According to villagers, the spirits protecting the wetlands are closely linked to the crocodiles.**

Villagers in Ban Beung Boua Thong and Ban Nao Neua told the survey team that they have long believed that Nong Boua and Beung Boua Thong are protected by powerful spirits. The village spirit house (*ta ho*) is situated on the edge of Beung Boua Thong but houses the spirit protecting both wetlands. According to villagers, fishing in the wetlands has been prohibited for as long as anyone can remember. Fishing in Nong Boua is now completely prohibited, and is only allowed around the edge of Beung Boua Thong.

The fish in Nong Boua are abundant, but are never harvested. This is because the spirits of the area are believed to be within the crocodiles (*khe*, *Crocodylus siamensis*) that inhabit all three lakes (moving between them according to the season). The fish cannot be caught because they are the food for the crocodiles. Villagers are not certain how many crocodiles remain in the area, but they believe that there may only be two individuals, as they see crocodiles of only two sizes. Crocodiles are extremely rare and endangered wild animals, known to exist in only a few places in Laos.

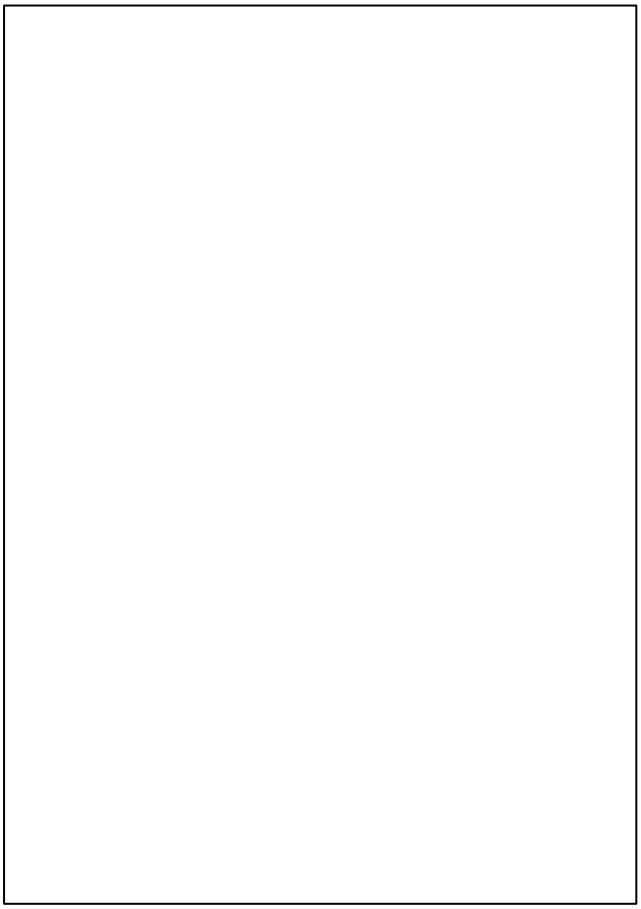
Local people are not afraid of the crocodiles, which have never attacked people (although the crocodiles do occasionally snatch small dogs and pigs that forage near the edge of Nong Boua). Many people believe that their welfare as a community is closely linked to the welfare of the crocodiles. Whenever an animal is killed in the village during a ceremony, some of the meat is brought to the edge of Nong Boua to feed the crocodiles. Even if there are hundreds of people watching, the crocodiles still emerge from Nong Boua to eat the meat.

Apart from protecting the crocodiles, wetland forests and fish in Nong Boua, the villages also prohibit hunting around Nong Boua and Beung Boua Thong. A village headman of Ban Nao Neua explained, “We do not allow the sound of a gun to be heard in this area.” Even slingshots cannot be used within 100 metres of the lakes. As a result, bird life in the area is relatively plentiful, and there is a large flock of maybe more than a thousand lesser whistling ducks (*pet deng*) that move between the lakes. There are also other species of wild ducks (*i.e.*, *pet bong*) in the area, as well as various other species of water birds. Soft-shelled turtles (*pa fa*) and hard-shelled turtles (*tao sam san*, *tao khwai* and *tao na*) are also found in and around these lakes.

villagers in Ban Palay, and the best areas for collecting mushrooms are in the dry dipterocarp forests that are beginning to be converted into eucalyptus plantations.

### *Irrigated dry season rice cultivation*

While the main rice crop is grown in the lowlands of the Xe Bang Fai River Basin during the rainy season, a much smaller second crop is sometimes grown during the dry season. The dry season crop, known as *na seng*, requires irrigation, either through diverting naturally flowing streams into the rice fields or by using water pumps that extract water from rivers or other water bodies. However, the promise of *na seng* has generally not become a reality due to local ecological conditions and national economic circumstances.



***Keng Keo rapids, Xe Bang Fai River. A large dam has been proposed to be built at the Keng Keo rapids as part of a large-scale dry season irrigation project. According to the Deputy Chief of Xieng Khai sub-district, Xaibouli district, "The Keng Keo rapids are the best fishing grounds in the area."***

The Government of Laos, assisted by some international development institutions, is promoting the expansion of *na seng* and dry season rice production throughout the country. In 1997, the government invested US$30 million of its own limited foreign exchange resources to purchase over 7,000 irrigation pumps of various sizes, both diesel- and electricity-powered, from the Indian company, Kirloskar Brothers Ltd. In addition to the purchase of these pumps, investments have been made in the construction of networks of canals and related water control structures to deliver irrigation to the fields during the dry season.

Most villagers view *na seng* as a supplement to – not as a substitute for – the main rice crop grown during the rainy season. They do not see irrigated dry season rice cultivation as either a panacea or replacement for their rainy season rice crop, no matter if that crop is occasionally damaged or completely destroyed by floods. In fact, while *na seng* continues to be promoted heavily by the government and some international development institutions, in reality its expansion and whole economic basis are increasingly problematic.

Having been installed only three or four years ago, during the dry season of 2001 all of the diesel-powered pumps along the Xe Bang Fai had been taken out of operation – most were used for just a single season. Not one of these pumps was reported by villagers interviewed by the survey team to be operational, and the survey team did not see a single diesel-powered pump in operation during the dry season of 2001. Farmers interviewed in Mahaxay district provided a typical scenario that illustrates why people have stopped using these pumps. Last season a farmer spent 800,000 kip (approximately US$100) for basic inputs of diesel fuel and fertilizer for a 0.5 ha plot of *na seng*. However, the market value of the harvested rice was only 490,000 kip. In Ban Tha Kho, villagers used a diesel-powered pump for two years during the dry seasons of 1998-99 and 1999-2000, but their financial losses were so severe that they did not use the pump during the 2000-2001 dry season. Having taken out loans from the Lao Agricultural Promotion Bank (APB) for fuel and fertilizers, the villagers were forced to sell buffaloes and cows to pay back the loans.

The economics for the electric-powered pumps are better than the diesel-powered pumps, but still marginal at best. In Mahaxay district, farmers reported spending 500,000 kip for electricity and fertilizer to cultivate a 0.6 ha plot of *na seng*. The value of the rice harvested, at the quite good yield of 3.3 tonnes/ha, was 560,000 kip. Once the value of labour, and the capital costs of rice seed, and the costs of the pumps and irrigation systems are included, this slim profit also becomes a net loss. A farmer in Tha Khek district in Khammouane province effectively summed up the situation in the following way: "The price of electricity is high, the price of fertilizer is high, the price of rice is low."

The economic realities of pumped irrigation appear to be contributing to a general decrease in the area of *na seng* being cultivated. While many of the electricity-powered pumps were operating during the dry season of 2001, use of the pumps is declining – continued use of these pumps seems to be occurring only because local government officials are encouraging farmers to do so. Nevertheless, at Ban Dong Kasin in Nong Bok district, nearly all villagers told the survey team that they had been involved in *na seng* cultivation during the previous year (1999-2000 dry season), but that only half of their number were doing so during the 2001 dry season. Farmers in villages all along the Xe Bang Fai River recounted similar experiences with dry season pumped irrigation.

Finally, according to villagers, government officials did not tell the villagers that the pumps would have to be paid for, nor did the officials tell villagers how much the pumps cost. In Ban Som Sa-at villagers said that government officials had said that one pump cost 460 million kip and that villagers are expected to pay this amount back to the government over a twenty-year period – each farmer must contribute 150 kg of rice per ha per year for the loan repayment. The economics of dry season pumped irrigation is already marginal and this added expense is further contributing to disillusionment and frustration on the part of many farmers.

## Women, their river, and livelihoods

Women have distinct roles in managing, using and conserving natural resources. Many if not all of the communities living in the lowlands, including the *Lao, Phou Thai* and *Kaleung* ethnic groups, are matrilineal societies, and women have the primary responsibility for managing household financial resources. They also do most of the selling of the marketable goods harvested and collected by family members, are responsible for the purchase of goods that satisfy the needs of their families, and are the managers of the cash reserves and financial expenditures in most families.

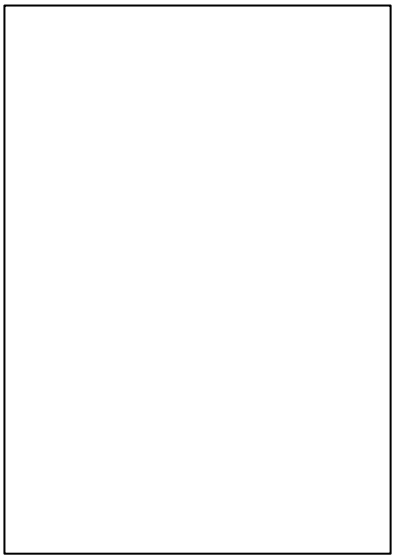
While men plow the rice fields, the women plant the rice seedlings and do most of the rice harvesting. They do much of the watering and tending of riverbank vegetable gardens. Women also take care of and feed domestic animals such as pigs, chickens, and ducks. Women, including young girls, carry water up from the Xe Bang Fai River in places where it is the primary drinking water source, and they use its water for washing dishes, clothes and other items.

Women play a significant role in fishing, often at the beginning and the end of the rainy season, and in the dry season when river flows are not too strong. It is mostly men who fish in perennial water bodies, including oxbow lakes, natural depressions and rivers. Women target smaller fish and primarily catch fish in small water bodies, including seasonal wetlands and small streams. Scoop-nets (*saving*), scoop-baskets (*kheung*), and lift-nets (*kadoung* or *sadoung*) are the main fishing gears used by women.

The fish that women catch are often mixed with various other kinds of aquatic animals. Fish, shrimp, crabs, snails and aquatic insects are often scooped up in rapids or from along the roots of flooded forest trees. The fish and other aquatic animals caught are small, but they provide families with important sources of protein. Women from Ban Thong Kong in Nyommalat district catch more fish by weight over a year than men – the water bodies near this village are far from the Xe Bang Fai or any other major streams or rivers. For most of the year, the men are not interested in fishing in the area, since the gears that they use are not suitable for catching the small fish in the small water bodies that contain water throughout the year. However, for the women, their gears are perfect for catching these small fish, and they regularly do so.

## Natural resource conservation and management

The sophisticated local ecological knowledge systems of the people of the Xe Bang Fai River Basin are the basis for these people's use, management and the conservation of the natural resources of the basin. The survey team documented community management of rivers, wetlands and water bodies in the floodplains, along with forests and other important natural resources. This is not to say that villagers are not also sometimes responsible for the over-exploitation of resources. However, there is certainly much to be learned from the local communities of the Xe Bang Fai basin regarding the management of the natural resources upon which they rely for their food security.



***Using a* kheung *(scoop net) in the Xe Noy River near Ban Keng Veng, Xaibouli district. "I only catch small amounts of small shrimp and fish in the rapids," said this woman, "But I catch them every day and they are enough to feed my family."***

Community natural resource management systems are most clearly illustrated by regulations and restrictions agreed to by communities regarding the use of their natural resources. For example, in Ban Som Sa-at, Xe Bang Fai district, villagers have agreed to prohibit the use of large seine fishing nets of more than 10 metres in length (*kvat nyeng nyai*), while the use of smaller seines is permitted. Villagers also prohibit the poisoning of fish and the use of electricity and explosives to catch fish.

A number of villages in the Xe Bang Fai basin prohibit fishing in the pools of water located in caves (*khoun*) at the base of limestone karst formations. For example, villagers from Ban Pheet Si Khai, Nyommalat district, told the survey team that the origin of the Nam Pheet River, *Khoun Nam Pheet*, is protected by spirits, and that nobody is allowed to catch fish there or even to go inside the cave. Other villagers reported that these cave pools are dry season refuges for fish and therefore fishing is also prohibited.

The sophistication of the natural resource conservation systems of the communities of the Xe Bang Fai River Basin is illustrated by the method employed by many of these communities regarding the harvesting and protection of edible snails in wetlands and rice fields. During the rainy season, groupings of large numbers of two species of snail (*hoi choup* and *hoi khong*) are often seen on the moist soil along the

edge of flooded rice fields. Villagers refrain from harvesting these snails during the rainy season and instead harvest them during the dry season, when the individuals of these snail species have grown to a larger size. As they harvest these snails, villagers leave about five per cent of the snails where they found them, to ensure that the populations are not depleted. The survey team found that this practice is commonly known and adhered to by villagers in many parts of the Xe Bang Fai basin.

A combination of common sense, local ecological knowledge and local belief systems also oblige many villages to protect and conserve all types of forest. For example, villagers in Ban Keng Veng in Xaibouli district reported that their long-established traditions prohibited the cutting of large trees near the house of the village spirit (*ta ho*). Villagers in Ban Thong Kong, in Nyommalat district, told the survey team that they have long protected a forest (*pa khet*) where village spirits prohibit the cutting down of trees. In Ban Pheet Si Khai, also in Nyommalat district, villagers have not permitted any cutting of trees living in the vicinity of the summits of the large steep mountains surrounding their village, as such cutting could result in erosion that could damage the streams and rice fields of the community.

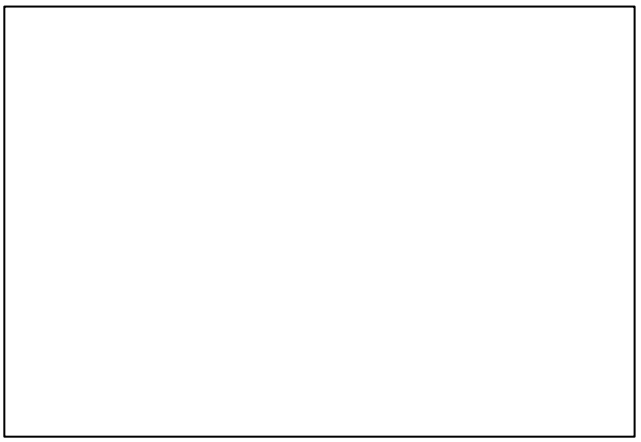
## Livelihoods and knowledge

River-based livelihoods involve a combination of many different linkages and relationships between people and their rivers. While rice fields, fisheries, livestock, and vegetable gardens are the most visible components of local livelihoods and economies, many other resources are perhaps less visible but no less important. Many of these less visible components of local livelihoods can only be appreciated and understood in the light of the knowledge and experiences of local people living along, and with, their rivers. Together, aquatic and forest resources form the foundation of livelihood security for many of the people living in the Xe Bang Fai River Basin.

In the words of a female elder of a village in Mahaxay district: "I was able to raise five grandchildren because I could catch fish, shells, and crabs in the stream during the dry season and find bamboo shoots, rattan shoots, and wild vegetables in the area near the stream. I fished in the rice fields during the rainy season. I haven't had much money but my grandchildren and I have been able to survive."

The fact is, people in the Xe Bang Fai River Basin are not only surviving. They are able to achieve levels of food security and economic self-sufficiency due to the natural wealth of the river basin and people's knowledge – a sophisticated and dynamic knowledge that is the legacy of the observations, inventions and experimentation of many generations of people living in the basin. The Xe Bang Fai River, and the watersheds, tributaries, forests, wetlands and floodplains of the Xe Bang Fai basin, are the foundation of the means of livelihood security of the people living in this river basin. The Xe Bang Fai River is the cornerstone of this foundation.

Some changes – population pressure, forest loss, modernization, and a decline in other natural resources – are already under way. People have had to respond by developing new sources of income, some of which have led to new problems and challenges. Some solutions, such as dry season irrigation, have involved many trade-offs and have been problematic. All along the Xe Bang Fai people express an appreciation of these challenges and an interest in looking at how to better conserve their remaining natural resources and livelihood links to the river for their communities' long-term benefit.



***An ethnic* Brou *family and their house in Ban Palay, Xaibouli district, on the Xe Bang Fai River. People in this family fish in the confluence of the Xe Bang Fai River and its largest tributary, the Xe Noy River. A monofilament gill net and the frog traps made of woven bamboo hang from a pole near the entrance to the house.***

The complexity and breadth of these issues, and the potential vulnerabilities of the more than 120,000 people whose livelihoods are linked to the Xe Bang Fai, deserves more recognition and requires much more in-depth research. This would be of benefit both for decision-makers and NGOs and donor agencies considering involvement in this area and for furthering understanding of river-based livelihood issues throughout Laos. Without understanding and appreciation of these livelihood links, there is the danger that poorly conceived development initiatives, even if well-intentioned, could have many unforeseen results and the potential for doing more harm than good.

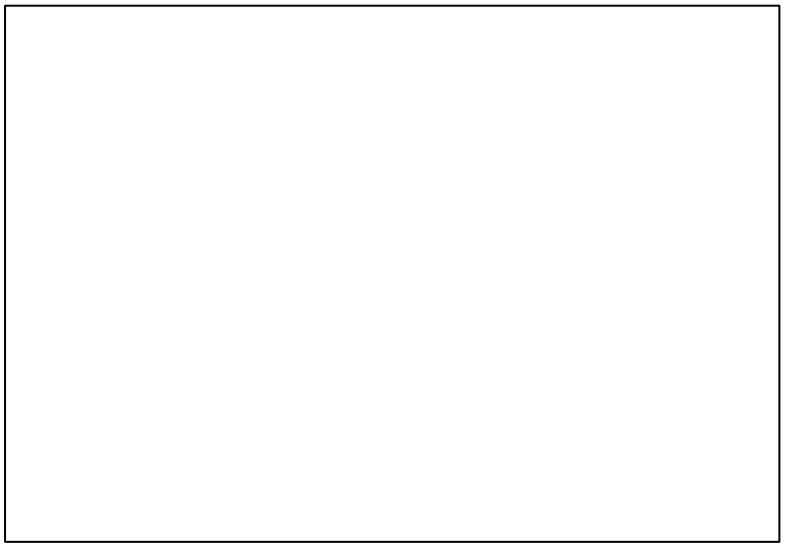
This article is based on the report *The People and Their River*: *A Survey of River-Based Livelihoods in the Xe Bang Fai River Basin in Central Lao PDR*. The research contained in the report was conducted under the auspices of the Canada Fund for Local Initiatives. The Canada Fund is presently supporting a variety of development projects, implemented through nongovernmental organisations and local departments of the Government of Laos, based on local community initiatives in many parts of Laos and is currently supporting projects in the Xe Bang Fai basin. The research was conducted as a component of the Canada Fund's project identification and review activities, as part of a process to monitor development projects already supported by the Canada Fund, as well as to identify projects that could be supported by the Canada Fund in the future. The report is available upon request to Lao PDR/Canada Fund for Local Initiatives, P.O. BOX 5988, Vientiane, Lao PDR.

# "We are proud that we built this micro-hydropower project ourselves"

**Since 1983, the local community of Mae Kham Pong village in Huay Kaew subdistrict, Mae On district, Chiang Mai province has been using three micro-hydro turbines located on the creek that flows through the village to obtain inexpensive and clean electricity. However, Thailand's Provincial Electricity Authority (PEA) has recently connected the national electricity grid to the area raising questions among the village people about the future of their micro-hydropower system. Watershed talks with the village leader Mr. Promin about the micro-hydro project and future of electricity for his village.**

**Could you please describe the micro-hydropower system in Mae Kham Pong village?**

We have three power generation units, the first project of 20 kilowatts (kW) was built in 1983, with an additional 20 kW turbine added in 1988, and another 40 kW turbine added in 1994. Mae Kham Pong village uses only the two 20 kW units, the 40 kW unit provides electricity to about 100 households in the neighbouring Mae Lai and Khan Thong villages.



*Village leader Mr. Promin in front of the micro-hydropower system that was built across the creek at Mae Kham Pong village.*

The second unit has a different valve system that can be opened and closed depending on whether electricity is needed or not. For example, during the day, when village people need more electricity, this valve is opened and then closed at night. So the consumption of electricity is reduced. At any one time, only 20 kW is used for the needs of our village comprising 70 households, a temple and a school.

**Who designed the system?**

Thailand's Department of Energy Development and Promotion (DEDP) brought the system to the village. The department used its budget for the machines and equipment. During the construction process, village people contributed labour (the equivalent of 15 people working year-round for seven days per week), rocks, wooden frames, and poles. The government paid for everything else. But if anything breaks, the village people are responsible for fixing it.

**"Since the beginning, the project has been managed by a village cooperative, governed by people elected from the community."**

At first, the department talked of owning 70 per cent of the unit and giving the local people 30 per cent, but later they transferred the system to us. But if we don't use it, they will take it back.

Since the beginning, the project has been managed by a village cooperative, governed by people elected from the community. We are proud that we built this project ourselves. The micro-hydro power is sold at two baht per unit and the income is collected and kept in a community fund whose current balance is over 600,000 baht [US$13,800]. The fund is used for upgrades and repairs, is loaned to fellow village people at low interest rates, and also provides funds for an ecotourism project.

**Does that mean the income from the micro-hydropower system is also decreasing along with the decrease in usage? Does this create problems in maintaining the system?**
So far there is no problem about the income because we can use the income both from our agriculture as well as from the community revolving fund and interest payments. But in the future, there may be problems.

**"To continue the micro-hydro power system, we know that we are going to need a good watershed and we will need to conserve the forest."**

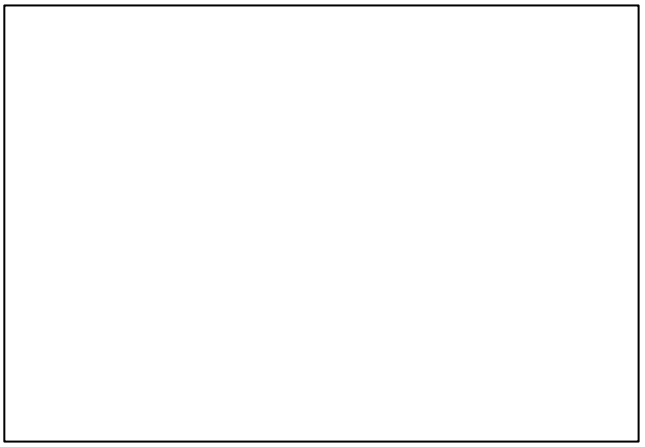
**The PEA is connecting the village to the main electricity grid. Will this mean that the village will stop using the micro-hydropower system?**
When the lines from PEA are energised, we intend to be able to keep the micro-hydropower running and connected to the grid to sell back electricity and get income. At present, the village people are using one or other of the two micro-hydropower units. But once the PEA provides electricity connection, more village people will switch to the PEA. But I have been asking the village people to use electricity from both the micro-hydropower system as well as the PEA.

This is because the PEA electricity line has to come a long distance especially through forests. So the supply could become uncertain during the rainy season. It is therefore better to have both the systems. We need to discuss this in the village committee.

**So the village plans to sell only the surplus power?**
We plan to sell only from the 40 kW third unit. Each house has a transfer switch as well as two electricity metres so we can switch between the micro-hydro and the PEA systems. But we can use only one system at a time. The village plans to sell the power produced from the 40 kW unit but those wanting the micro-hydropower can still use the other two units. This is because the other villages want to switch over from micro-hydropower to the PEA system which means the micro-hydropower is not being used.

We have to discuss with the PEA about how to sell the micro-hydropower to get income for the village. Even if we have to sell the electricity at a lower rate to the PEA, it is still better than throwing it away.

**Why do you want to sell micro-hydropower to PEA at a cheaper rate and then buy PEA electricity at a more expensive rate? Why not just use the cheaper micro-hydropower in the village?**
The village people want convenience. The micro-hydropower sometimes fails and there are also some problems with maintaining the system. Some people in the village committee do not fully understand how they have a duty to maintain the system and to help when there is a problem. We need to first reach understanding and agreement among the local people.



***The weir at Mae Kham Pong built by the local community. "We want to keep the sense of community with the micro-hydropower system", says Mr. Promin.***

With the micro-hydropower plant, the village people have become more interested in conservation and ecotourism. To continue the micro-hydropower system, we know that we are going to need a good watershed and we will need to conserve the forest. We need to keep the community together in Mae Kham Pong to make us feel that we are the owner of the energy. The village can also become a site for tourism, for research or as a showcase for outsiders. So even though economically it may not help, we want to keep the sense of community with the micro-hydropower system. If there is some revenue from the micro-hydropower system, then the sense of community will be maintained. Because once the PEA enters the village, the local system is usually removed. This is not the PEA policy, but in practice, the local people switch to the PEA system and soon no one uses the small-scale system which is then abandoned. But we don't want that to happen here.

**We heard that the village had rules for power consumption such as each household must not use more than three lights and so on. Are these rules still being used?**
We did not have any regulations but only requested the local people to use less electricity. However, now the village committee has rules for outsiders who come to live here in the village. Previously, the outsiders used to be able to set up new connections by buying the rights to use the micro-hydropower system. But now we have stopped selling the rights to the outsiders for new connections.

We also try to get agreement that the village people use rice cookers and other equipment such as clothe irons that uses high electricity only occasionally and also not before nine o'clock in the evening.

# People's perspective: Power for the people?

**For more than 30 years, the Electricity Generating Authority of Thailand (EGAT) has monopolised all aspects of electricity supply in Thailand. Since 1986, EGAT and the National Energy Policy Office (NEPO) have issued warnings of "black-outs" if their plans for electricity-generating projects faced public opposition. *Watershed* reports on two public seminars in which the Thai public outline their demands for EGAT and NEPO to become more accountable for their past mistakes and to change their vision for the future of the Thai electricity system.**

Academics, artists and activists are joining hands with village people in Thailand to question and challenge the conventional wisdom of the policymakers and planners who design and run the Thai electricity system.

Thailand's electricity system has been one of the major causes of social and environmental problems in the country. Thousands of village people have been uprooted or lost their livelihoods to hydroelectric dams, massive coal-fired power plants, pipelines for the transportation of natural gas and other energy-related projects.

Meanwhile, excessive and often unnecessary investment in new power plants is posing a huge economic burden for the Thai government, taxpayers and consumers of electricity.

In the last few years, the Thai public is increasingly raising questions about the decisions made by the Thai government over energy use and demand as well as viable alternatives to conventional energy sources. Every week, newspapers, television and radio cover stories that challenge the status quo: from the resistance of village people to projects; to senate inquiries over the contracts signed in secret between private developers of power plants and government energy agencies; to requests from groups of academics or artists for the government to respect the rights of village people.

In March 2002, the nongovernmental organisation (NGO) Sustainable Energy Network Thailand (SENT) organised the forum Thai Energy System: People's Perspectives for a public debate on electricity. Anan Pongpattanasakun, a local leader opposed to the proposed coal-fired power plant at the village of Bo Nok in the southern Thai province of Prachuab Khiri Khan opened the seminar. Anan stated that the lack of policy on clean energy is "because no politicians are involved in the clean energy industry".

"A Seven-Eleven can pop up anywhere in Thailand but small businesses or communities cannot build small clean energy plants because the government monopolises the energy sector," said Anan.

The seminar this year was a follow-up to the International Conference on Energy Sector in Transition: Asian Perspective for Sustainable Energy Development organised by the Thai-Danish Cooperation on Sustainable Energy Project. Held in Ubon Ratchathani province of northeastern Thailand in October 2000, the conference opened with the warning by Charnchai Limpiyakorn, one of the organisers, that, "Among the prime factors affecting the opening up of the country to the world market and open competition, are energy and natural resources....ignorance on the part of the government results in confrontation and conflict between the government and the people, which is not easy to resolve."

**Excessive and often unnecessary investment in new power plants is posing a huge economic burden for the Thai government, taxpayers and consumers of electricity.**

The analysis at the 2000 conference of Dr. Niran Pitakwatchara, a Senator representing Ubon Ratchathani province, remains as true today as then: "The concept of energy development has evolved to serve capitalism and a materialistic economic system by focusing on technology, industry and urban communities, based in turn on the destruction of natural resources and the environment during periods of both prosperity or recession." According to Senator Niran, out of the centralisation of state power and control over both natural resources and the mediation of conflict there arise "a number of problems regarding private property, the quality of individual life, public property, society, culture, the way of life of the community and, finally, crises for the needy, poor and marginalised communities in society."

## Public electricity but no public power

For more than 30 years, the Electricity Generating Authority of Thailand (EGAT) has monopolised all aspects of electricity supply in Thailand. Until 1986, there was no formal entity to directly regulate EGAT, which had been given significant independence by the government to plan, invest, build and operate power generation facilities. After the National Energy Policy Office (NEPO) was established in 1986, the two agencies have together expanded their control, issuing warnings of "black-outs" if their plans for power projects faced public opposition. The Power Development Plan that "guides" EGAT's investments is based on spurious "forecasting" conducted by a committee comprising EGAT, NEPO and the two agencies responsible for electricity distribution.

EGAT's development of hydroelectric dams in Thailand has caused serious environmental damage in most of Thailand's river basins. According to Detcharat Sukkamnoed, who heads SENT, "about one million *rai* [160,000 hectares] of rain forest has been destroyed by large hydropower plants… almost 20,000 local households have been moved from their homelands."

Detcharat blames the D-A-D (Decide-Announce-Defend) approach of project implementation by EGAT and the Thai government and the absence of effective public participation processes for continuing public opposition to large-scale projects such as the Pak Mun dam and the proposed Thai-Malaysian gas pipeline in southern Thailand and two coal-fired power plants in Prachuab Khiri Khan province.

In June 1991, Chartanga Moreechart, Deputy Governor of Ubon Ratchathani province, told Mun River village people whose lands were to be flooded and whose fisheries were to be destroyed by the Pak Mun dam, "You people should be proud and happy that you have sacrificed your beloved land for the good of the majority." In May 2000, when excess, unused electricity stood at more than 5,000 megawatts (MW) (and total installed capacity was more than 21,000 MW) the Thai government stubbornly denied the request of local people and refused to open the water gates of the Pak Mun dam. The dam's installed capacity was only 136 MW. The local communities hoped that their fisheries might recover if the gates of the dam were opened to allow for the migration of fish during the rainy season. The government finally agreed to open the gates but has not decided the long-term future for the dam and the local communities living along the Mun River.

"NEPO focuses on the peak demand forecast, which NEPO forecasts with reasonable accuracy. But the rest of the year, NEPO's forecasts are way off," says Prasat Meetam, an academic with the Prince of Songkla University. As the annual peak only lasts a few hours in one day in the year, "If we could reduce the annual peak consumption and the daily afternoon peak, then there is no need to build any more power plants."

Senator Sopon Supapong, member of the Government Committee on Public Participation, suggests that for the peak hours each year, "What about the government buying electricity from the private businesses (like hotels) that have their own electricity generators in case of blackouts? Even paying them 5 baht [12 US cents] per kWh [kilowatt hour] the country could save enormous amounts of money as there would be no need for new power plants."

Piyasawasti Amranand, Secretary-General of NEPO and Chairperson of the Programme Steering Committee of the Thai-Danish Cooperation on Sustainable Energy, believes sustainable energy is important for Thailand but that, "Large-scale power plants or EGAT will still be in control." According to Piyasawasti, failure to increase the development of sustainable energy systems is not due to lack of money: "The main reason is that not enough people are interested in making this come true."

Contradictions in the energy policy of Thailand are causing conflict. NEPO urges for increased use of imported coal as a fuel type to reduce the dominance of natural gas, currently accounting for 71 per cent of total capacity. Meanwhile, the Thai government plans to open more domestic coal mines in northern Thailand despite unresolved adverse impacts of the existing Mae Moh mine and power plant in Lampang province, northern Thailand. NEPO is also keen for Thailand to increase purchases of electricity from neighbouring or nearby countries.

While NEPO says new coal-fired power projects are "essential" to maintain a "safe" power reserve (amount of electricity in excess of peak demand), renewable projects have been cancelled due to "over-capacity" and the government has cut the budget for demand-side management.

Senator Sopon warns that "the energy policy influenced by politicians and businessmen have caused huge problems for Thai people. There are alternatives, there is no need to build the coal power plants in Prachuab. No new power plants are needed for another 5 to 10 years. Vested interest is the main problem."

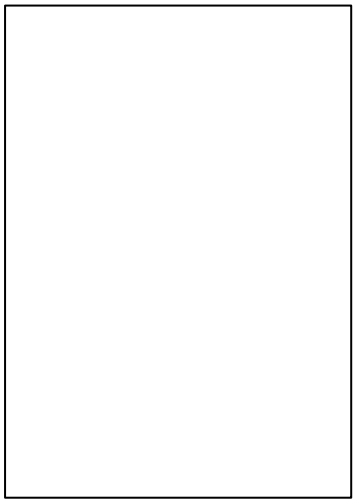
Anan Pongpattanasakun is critical that the government is only interested in the formal sector so that all the government sees for Prachuab Khiri Khan province is large-scale industry fuelled by fossil fuels. "Many households in Prachuab Khiri Khan make enough money from small-scale shrimp paste to send their children to university. But the government is not interested in this as an economy…. The villagers are preparing now to fight to the end. We want to get together a new vision for the energy sector that the government must listen to."

***Anan Pongpattanasakun***

## Privatisation: Will this be the solution?

Since 1992, the Thai government, EGAT and NEPO have initiated a series of policy reforms to restructure the electricity system to open it to private electricity-generation companies.

One such initiative is the 'power pool', designed to encourage competition among private power producers while maximising the benefit to consumers through the model of the 'free market'. The system proposed by NEPO faces opposition from academics, people's organisations and consumer organisations who question whether the new system would really get rid of the monopoly in the system or just replace the state monopoly with new private monopolists. Similar systems in other countries have had mixed results (see box: Privatisation of electricity sector: Experience in the United Kingdom and Canada).



***Detcharat Sukkamnoed***

In this, the new system would be no different to the existing situation in which the Power Development Plan is developed with no public input, being exclusive to the technocrats and unaccountable to the public. According to Detcharat, "The Thai government is keen to speed up the process of privatisation of the power sector due to high external debt and low liquidity in the financial and fiscal systems. The power pool, which would see private power producers compete in a market to sell electricity on a hourly basis, has been developed with no public participation."

"Leading international development agencies, like the World Bank and the Asian Development Bank are still promoting the market mechanism as the main way in allocating resources in the energy sector," says Detcharat, "but they also determine the steps towards privatisation and this limits public participation."

For example, although Denmark is well known for its progressive energy policy and strong civil society, the 1999 government mission team of DANCED, the Danish Cooperation for Environment and Development, to Thailand mainly relied on collaboration with the Thai government agencies rather than with NGOs and local people's organisations.

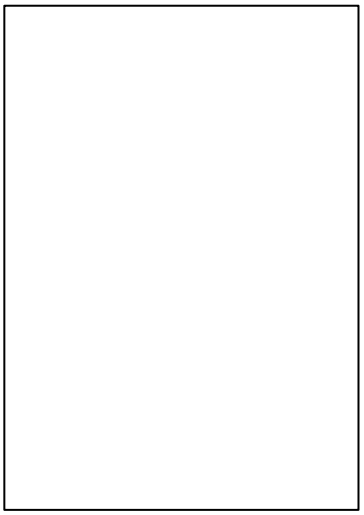
Dr. Wutipong Priabjariyawat of the independent Millenium Institute warns that, "The power pool will not break up the monopolies, that is not its purpose. The power pool is to transfer the monopolistic enterprise to independent power producer (IPP) capitalists. There are seven IPPs, but there are 13 million customers of electricity in Thailand. And yet who has the greater bargaining power with the government? The IPPs exploit consumers."

"In the IPP contracts, the government and public are at a disadvantage. Who should pay for the risks and for the impacts?" asks Witoon Permpongsacharoen, member of the National Economic and Social Advisory Council. "We want change," says Witoon, "but what do we want? The government says that with many producers there will be competition. But if we listen to the experience in the UK, it was not competition that made it succeed, but the government regulations. The key factor is the guarantee of our rights to benefit from privatisation. It is about the strength of civil society, not about technology."

## Public priorities

The energy sector is a threat to human health, especially from pollution from fossil-fuelled power plants. Says Detcharat, "Nobody should have to sacrifice their health for the benefit of another person, for the benefit of economic growth. We need to change the framework of EIAs [environmental impact assessments] as people do not figure in the analysis. Health is life, not illnesses that have to be proven. People can identify what type of health system and society they want. At the moment the system is a risk assessment. For the Thai-Malaysian pipeline the risk assessment says the risk is not much more than driving a car. But what does this mean? This fails to look at and to assess alternatives to the proposed development.

"Where is the room for small projects supervised by a community? Large-scale projects can be attacked on the basis of their negative health impacts as they affect employment and the economy. If you look at the Mae Moh coal-fired power plant, it is a project that generates electricity with the highest impacts on health but the lowest 'traditional' economic cost [price for fuel]."



***Seesakade Saman***

"Mae Moh is possibly the most polluted area in Thailand," says Mr. Seesakade Saman, a local village person from Mae Moh valley, "Thousands of people suffer from respiratory problems. Agriculture is affected with decreased production and it is dangerous to eat vegetables from the valley because of coal dust and acid rain. People are dying. People are stressed. Everyday village people go to the hospital because of problems from the power plant pollution, especially in winter. EGAT advertises that it has a machine to capture sulphur dioxide and they claim they catch about 98 per cent of it. But this is a lie."

## Privatisation of electricity sector: Experience in the United Kingdom and Canada

The experience in privatisation in other countries is relevant to Thailand says Uta Collier from World Wide Fund for Nature (UK) and Grainne Ryder of Canadian nongovernmental organisation (NGO) Probe International, speakers at the 2002 People's Perspectives conference.

According to Uta, privatisation can have positive effects, but it is not just due to the process of privatisation, but also of government regulations: "We had a state-owned system that did not look after the people or the environment. Ninety-two per cent of the UK's electricity used to be fuelled by coal. The new, liberalised system has been a benefit to the environment, but it is not because of liberalisation alone. New regulations from the European Union that set limits for sulphur dioxide and nitrogen oxide emissions, as well as lower gas prices and improved technology, the combined cycle [natural gas-fuelled power plant], all happened at around the same time."

"Under competition," says Uta, "in the free market, companies will operate with whatever fuel and technology is cheapest. It is up to society to decide on the rules for pollution, what is acceptable. In the UK, the government introduced legislation that obligated generators to produce electricity from non-fossil fuels, initially to protect the nuclear industry, but this also benefited renewables and generation from renewable fuels has increased. And competition cannot solve the problem of energy efficiency, again, this needs specific government legislation."

According to Uta, "The lessons from the UK experience are that the system today is better than before but this is not just because of liberalisation. Government regulation, influenced by NGOs, worked hard to get the right system. It takes time. Liberalisation doesn't just happen once and that's the end of it. It needs regular review."

Grainne Ryder of Probe International explains that "the experience in Canada with liberalisation is very different to that in the UK. The Canadian government does not respect the rights of consumers as opposed to the rights of private producers."

"If privatisation does not lower prices for consumers, then what is it for?" she asks, "In Canada, as in Thailand, there is a lack of public power – it is the government that has to approve projects rather than local communities. In Canada, the government is still not clear whose rights they're supposed to be protecting. But we have to recognise that electricity is not a good like all other goods, it is a necessity. The government has to recognise its own responsibility in guaranteeing access to electricity. The question of community rights is crucial to outlining the path for the government to take in liberalisation."

The experience in Canada so far has been one of regulatory failure. According to Grainne, none of the promises made by government have eventuated (see Table: Canadian electricity reform gone wrong).

**Canadian electricity reform gone wrong**

| Promise of Privatisation | Short-Term Results |
|---|---|
| Competition | Monopolies |
| Privatisation | Private profit, public risk |
| Regulation | Secret deal-making, no accountability |
| Cheap, clean power | Dirty, unsafe, high-cost mega-projects |
| Consumer choice | Little or no access for green power producers |

What is needed instead, asserts Grainne, is an electricity system that is based on people's rights and this will need strong legislation (see Table: Towards a rights-based electricity system).

**Towards a rights-based electricity system**

Government legislation is required that recognises the people's rights to:

- Know
- Participate
- Decide
- Clean air, water, etc
- Equitable, reliable service
- Generate power
- Appeal regulatory decisions
- Sue power producers [instigate legal proceedings against power producers for redress as remedy or reparation]

## Public hearings and participation

The Thai constitution of 1997 calls for public hearings to be held for state projects that affect local people. While public hearings have taken place for the two coal-fired power plants proposed for Prachuab Khiri Khan province and for the Thai-Malaysian gas pipeline, there has been little to show that the formal hearings effectively increase public participation. Local people have boycotted the hearings since they were held after the government had approved the projects.

Local people also question the accuracy of EIAs, which are conducted by consultant firms hired by project developers. Conflict has been increased by the lack of local consultation and participation. The public has never had an

opportunity to comment on energy policies and plans, initiation, assessment and implementation of projects, and decisions on the amount charged for electricity.

Ittaboon Onwongsa, of the Foundation for Consumers, an NGO that monitors the cost of electricity for consumers asserts that, "The smallest of consumers together consume the most electricity in Thailand and are most affected by the cost of electricity. There are 12 million households and 1 million sites in the industrial sector. The government thinks that small consumers do not understand the difficulties in electricity pricing. But the information and decisions belong to the people."

In finding solutions to the problems created by the Thai energy system, Senator Niran proposes that policies need to be developed that "offer a wider range of alternatives for the people, rather than restricting choices, and which emphasise greater stability in the community, which should not be sacrificed to the stability given to investors, electricity systems or even the economy."

According to a 1993 World Bank report, *Thailand Fuel Option Study*, Thailand can potentially save 2,000 to 3,000 MW from the implementation of a demand-side management program. Combined with the installation of new renewable energy power plants and the decommissioning of the power plants with high environmental and social impacts, Detcharat sees demand-side management assisting to build a future with less pollution and less social unrest.

"The technical potential of biomass in agro-industrial factories is as high as 7,000 MW," says Detcharat. According to a 1998 report for NEPO and DANCED on pricing incentives for renewable energy, 3,000 MW of this is economically feasible. However today only about 400 MW (as of 2000, this includes small private power plants not connected to the central grid) is generated from biomass "due to the unsuitable pricing system". According to Detcharat, biogas technology is also "highly possible" in Thailand. Not only does it result in the production of electricity but it can reduce pollution from pig farms and agro-industrial factories. Detcharat estimates the potential for biogas to be 500 gigawatt (1,000 million) hours (GWh) of electricity every year (approximately 0.5 per cent of total electricity volume in 2001).

But, says Detcharat, "leading international development agencies have much more influence in policy formulation than Thai civil society." International collaboration in the energy system in Thailand has been based on relationships between governments and the private sector, with no public input. Detcharat asserts that international collaboration has paid attention to the economic aspects of the system while ignoring environmental and social issues; focused on directions set by the heavily-industrialised countries; and promoted fossil fuel technologies, which are often considered to be obsolete by societies in the heavily-industrialised countries.

## Power for the people

Much of the environmental and social problems caused by the Thai electricity system come from the undemocratic and nontransparent energy forecasting system used by NEPO and EGAT. Although NEPO publicly admits its forecasting is often inaccurate, the government continues to approve new electricity-generating projects based on NEPO's guesswork.

"It is possible to do a back-casting rather than a forecasting," Detcharat says, "What this involves is that we look at what we want in 20 years time for health and energy and other social systems and then we look back to today to see how we can get there."

**Rather than focussing solely on technical "solutions" to the technical question of future electricity demand and supply, back-casting requires democratic processes that incorporate the social perspective of electricity.**

Rather than focussing solely on technical "solutions" to the technical question of future electricity demand and supply, back-casting requires democratic processes that incorporate the social perspective of electricity.

Rather than domination by government and private companies, the diversity of voices that make up Thai civil society should ultimately decide on the future of power projects. As a starting point, the government, at all levels, could properly implement the 1997 constitution and accept that community-based decision-making must guide government decisions. Choice of technology could be based on local resources and knowledge as well as an assessment of the effects on social, economic and environmental aspects of the project. International collaboration could assist with equitable assessments of environmental and social issues.

The future does not have to be more large-scale coal-fired power plants and hydroelectric dams. The future does not have to be one in which the government locks itself into a Decide-Announce-Defend strategy that provokes opposition by local communities to large, dirty, unnecessary electricity-generating projects. Thai society, village people and city-dwellers, cannot allow the future to be more of the same.

**Sources:**
Thai-Danish Cooperation on Sustainable Energy, *The International Conference on Energy Sector in Transition: Asian Perspective for Sustainable Energy Development*, 25-27 October 2000, Ubon Ratchathanee, Thailand.
Proceedings (unpublished) from Thai Energy System: People's Perspectives, Sustainable Energy Network Thailand (SENT), March 2002.

# The spirit of Nang Tsao Mawnla and the Yeywa Dam

**By Muay Sai Leng**

**Like violations of human rights, large dams are most easily imposed on societies to which democratic decision-making processes have been denied. Little wonder that the military dictatorship in Burma is building many dams, including the massive Yeywa dam on the Doukhtawaddy River in central Burma.**

Since 1988, when the military dictatorship now calling itself the SPDC (State Peace and Development Council, formerly known as the State Law and Order Restoration Council) came into power in Burma, many dams, canals and weirs have been built, and there has been much talk about irrigation and electricity generation. However, in many areas where large infrastructure projects have been carried out the lives and livelihoods of many local people have been disrupted, yet no SPDC official or statement has acknowledged these negative impacts. In their indifference to environmental damage and the violation of human rights, the SPDC has completed over 100 projects in dam-building and irrigation altogether costing 26,633 million kyats (approximately US$4 billion, at the SPDC's present official rate of exchange).

**In their indifference to environmental damage and the violation of human rights, the SPDC has completed over 100 projects in dam-building and irrigation.**

In December 2001 at a meeting of senior SPDC military and civilian officials, the SPDC Chairman General Than Shwe announced that three specific dams will be targeted in the development of hydropower for Burma's industrial expansion during the third 5-year development programme from 2002 to 2006. Of these three dams, one will be built on each of the Bilin and Paunglaung rivers. A third dam, the Yeywa dam, will be built in Kyauk Se township in Mandalay division, on the Doukhtawaddy River, also known to the Shan people as the Namtu and the Burmese as the Myitnge River.

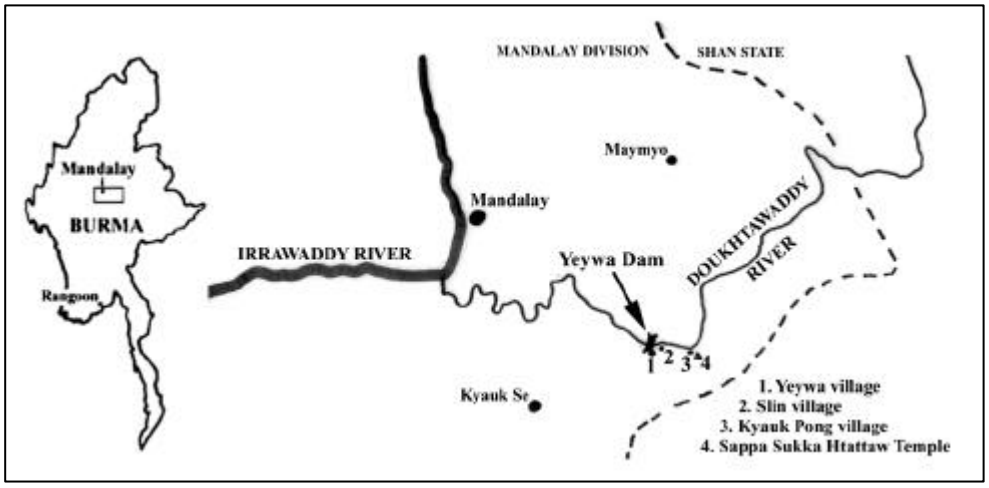
In order to learn more about the Yeywa hypropower project, I travelled from the city of Mandalay to the site of the proposed dam in the hot dry season of 2001. I estimated the Yeywa hydropower project to be about 80 kilometres east from Mandalay. The road to the site is not tar-sealed, and stretched out alongside it are many small villages, the living quarters of the workers working on road construction, small clumps of trees and vegetation, and barren hills. There are also many road signs bearing the logo of the Myanmar Electric Power Enterprise (MEPE), the state-owned company in charge of the generation and distribution of electricity in Burma.

***The Doukhtawaddy, seen from Slin village. The Yeywa dam construction site is at the foothills on the other side of the river, centre-left of photo.***

Because this area is in the plains with a hot climate, there are few green forests. A range of bare mountains stands out clearly on the landscape. I saw road construction workers renovating an existing road which runs parallel to the Doukhtawaddy River. I also saw trucks carrying sand and stones to build the road and small bridges. This road would be used for transporting construction materials to the dam site. I paid 500 kyat for my bus fare, and at five o'clock in the evening I arrived at Yeywa village, the final stop on the bus route. Located beside the river, the village is small, with about 30 households. Because the electricity project is carried out by the MEPE with its office based in Yeywa village, the project has been named the Yeywa Electricity Project.

Muay Sai Leng is the pseudonym of an activist working in Burma.

The Yeywa dam is designed to produce 600 megawatts of electricity. One of the engineers at Kyauk Se Township remarked to me that the dam would rank as one of the largest dams in Southeast Asia. However, whether the electricity is used within the country or exported to other countries, it would not contribute to the welfare of the people from Shan State. It would only enrich the minority and the SPDC.




Costing US$700 million, Yeywa is not a small project. The SPDC has to attract the involvement of foreign companies to its project, and Japanese companies appear to be very keen to accept any offers if the projects in question concern dams and hydropower. Local people report that the military government has already been thinking about building the dam for the past 20 years. Three years ago, some geologists from Japan came to join local engineers and members of Rangoon University's Geology and Zoology departments in surveying the area for its suitability for dam construction. They also studied the river's flow, the height the water level would reach behind the dam, the flood area, the villages and farmland that would be submerged, the area's ancient culture, the aquatic life in the river, and other topics. After these studies the SPDC decided to commence building the Yeywa dam in the year 2000. Once the dam is in operation, the water level in the reservoir will rise about 180 metres above the present level of the Doukhtawaddy, and land lying below that level will be submerged. There are now signboards erected on the mountains on either side of the river showing the height that the water will eventually reach. A big signboard, with the words "DAM CREST" painted on it, is placed where some drilling work has been done on one of the two mountains. This is the exact spot at which the dam will be built.

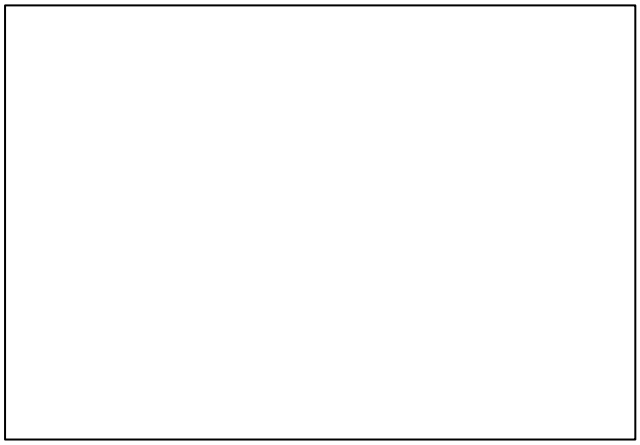
Though there are many small villages within the dam's flood area they are not classified by the government as villages, and so the village people will not receive any compensation from the government for the loss of their homes and lands. The SPDC's Department of Electric Power has issued orders to the villages to vacate the area. However, there are some communities within the flood area that have not yet left, such as the villages of Nga Yu Chaung, Kyauk Pong, Thayi, Tan, Myit Pauk, Lema village, and others, located beside the river.

The villagers living along the river make a living by fishing, logging, farming and other activities. They depend on the Doukhtawaddy, which is home to many kinds of aquatic animals including the fishes *nga balu*, *nga yway*, and *nga zinyaing*. One very large species of fish, the *nga chaung*, grows to the size of human. Soldiers are present at every boat landing along the Doukhtawaddy, and provide security along the river. They are on the lookout to arrest village people who transport logs along the river without authorisation. However, loggers who can afford to pay them bribes in secret are able to carry on their businesses. Under SPDC rule it is common for SPDC soldiers to receive income from the local businesses.

As I talked with the local people, I gained a deeper understanding about their livelihood. I sympathise with them, because under SPDC rule and with high inflation rates, they face much economic hardship trying to support themselves and their families. When the dam-building has finished they and their families would have to rebuild their homes in another place. However, wherever they resettle, their future is bleak under the rule of the SPDC.

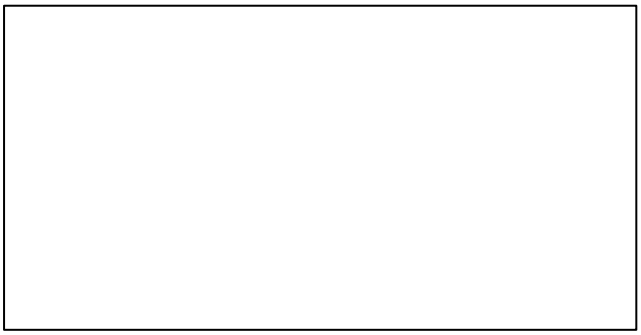
***Houses of village people still remaining at the partially-relocated Slin village. Slin village is immediately upstream of the Yeywa dam and will be submerged when the dam is completed.***

Slin village is one of the villages that the SPDC wants to relocate to make way for the dam. Three years ago the people of Slin were ordered by the MEPE to move (from their original location upstream of the dam) to Aw Bar Chouk, a newly established village downstream of the dam where the other displaced villages also are resettled. However, the old Slin village has not yet disappeared, and some of the Slin villagers have not yet left.



***Buddha statues at the Sappa Sukha Htattaw Chedi in Kyauk Pong village. This Chedi was commissioned by the Shan princess Nang Tsao Mawnla and built more than 900 years ago.***

There is a monastery school at the old Slin village which is still in operation. This school has been registered with Burma's Ministry of Education, but it does not receive any financial support from the government and has to raise its own funds. It is run and managed by the Abbot of the monastery. Despite the Electricity Department's relocation orders, the school has not yet left the old village. Indeed it continues to expand, recently adding on middle school classes to its existing primary school level classes. It has benefited many children living in this rural area, and has even been attended by children of the MEPE staff. The teachers at the school, most of whom are monks, are from Slin village. If Yeywa dam is completed this monastery school will also be submerged by the dam.



***Around seven kilometres from the Yeywa dam area. Logs cut from the forests between Slin and Kyauk Pong villages and brought to the bank of the Doukhtawaddy, waiting to be transported down the river. The road stops at the river bank. The signboard reads: Myanmar Timber Project, Pyin U Lwin logging area, Yeyaman region, Kyauk Pong timber river***

If the Yeywa dam is completed, the Sappa Sukha Htattaw Temple is one of the ancient temples that will disappear under the water of the dam's reservoir. The Sappa Sukha Htattaw Temple was commissioned by the Shan princess Nang Tsao Mawnla, daughter of the king of the Tse Lant Dynasty who ruled the ancient Shan kingdom nearly 1,000 years ago. Nang Tsao Mawnla was not an ordinary princess. An exceptionally devout Buddhist, her ear-rings were said to contain sacred Buddhist relics from which rays of multicoloured light radiated in the dark. After being married to Anawyahta, the Burman king of Pagan, and becoming one of the queens in his court, she was misunderstood by the other queens who thought she had devils in her ear-rings. Because the king listened to and believed their accusations against her, he eventually exiled her from Pagan. Sorrowful and still longing for her husband, she commissioned the building of many temples along the Doukhtawaddy with the sacred relics she had in her possession, in remembrance of him. These temples include the Sappa Sukha Htattaw Chedi, the chedis of Yay Chan, Shwe Zar Yan Phaya, Myay Pong Phaya, and others. Another famous temple built by Nang Tsao Mawnla is the Tsao Mawnla Htattaw Chedi in Hsipaw township, northern Shan state.

Local people described to me a religious festival held every year in March at the Shwe Zar Yan Phaya temple. Very strangely, as the time of the festival draws near, the Doukhtawaddy starts to swell, and the water level rises until it reaches the temple. During the festival, three to four giant fishes (the species known as *nga yway* in Burmese) swim up to apparently worship at the temple. According to local people, *nga yway* are known to be human-eating fishes. However, at the festival they are neither dangerous nor feared by people who come to Shwe Zar Yan Phaya for the celebrations. The worshippers feed the fishes and stroke them, and some people attach gold leaf onto the backs of the fish. After the festival is over the river subsides again, and the fishes return to where they came from. There was once a selfish man who threw explosives at the fishes during the festival. One of the fishes was killed, and local officials arrested the man and jailed him for 10 years.

At the Sappa Sukha Htattaw Chedi, there is a monastery located nearby with five resident monks, and the Abbot of the monastery related to me the history of the temple. He told me that the spirit of Nang Tsao Mawnla has appeared to him in his dreams and when he was meditating in the temple.

The Sappa Sukha Htataw Temple is located in Kyauk Pong village and is therefore within the flood area of the Yeywa dam's reservoir. There are four ceramic Buddha images in this ancient temple. At the entrance to the temple are two stone plaques providing a description of the history of the temple in classical Burmese poetry, as well as the background of Nang Tsao Mawnla who commissioned the building of the pagoda.

With the completion of the Yeywa dam this temple will disappear under water, never to be seen again, as will the opportunity to study and learn about the temple, for those interested in ancient cultures and history. I drank in the sight of the temple as much as I could, until I was finally sated with the view that I knew I would never have the chance to see again. I believe the sorrow I feel for the temple echoes that of its guardian spirit, the spirit of Nang Tsao Mawnla, and of the people of the Doukhtawaddy River.

# Let's integrate the planning

**By Dr. Peter du Pont**

**Although Thailand is a leader in energy efficiency in Asia, energy efficiency and the use of sustainable energy sources have remained in the margins of state planning. Dr. Peter du Pont proposes an integrated approach to energy planning, to incorporate all "stakeholders", the best technology and at the cheapest cost.**

The newspaper headlines on energy in Thailand right now seem to be primarily concerned with disputes over proposals for new energy supplies, such as the Thai-Malaysian gas pipeline, or the proposed coal-fired power plants at Bo Nok and Hin Krut in Prachuab Khiri Khan province. These are serious issues and deserve to be vigorously debated. At the same time, more attention needs to be paid to sustainable alternatives such as energy efficiency and renewable energy.

Probably few are aware of it, but Thailand is a leader in energy efficiency in Asia. It is the first Asian country to implement a comprehensive demand-side management (DSM) programme, operated by the electric utilities and paid for largely by rate-payers. By convincing people (manufacturers and consumers) to produce and purchase more energy-efficient products, the programme eliminated (or postponed) the need for one large coal-fired power plant in Thailand. The DSM programmes operated by the Electricity Generating Authority of Thailand (EGAT) have achieved 680 peak megawatts (MW) [1] saved at a total cost of 2.2 billion baht, or around 3,200 baht per kilowatt (kW). Building a new power plant currently costs 20,000 to 30,000 baht per kW (natural gas combined cycle to coal fired power plants). [2]

These investments make sense. Fundamentally, the energy efficiency programmes provide energy services for Thai businesses and consumers for less cost than building new energy supplies. In addition, energy efficiency is a key component of economic efficiency. Thai businesses that make themselves more energy efficient help improve Thailand's economic competitiveness.

But the most remarkable part of Thailand's initiative for energy efficiency and renewable energy is that the funds don't come from donors; they don't come from the International Monetary Fund (IMF); they don't come from outside interests. The funds come from within Thailand; and they work because the purpose of the funding is aligned with Thailand's energy needs.

A recent report sponsored by the Danish government found that there were a total of 129 energy-efficiency programmes implemented in Thailand during the past five years. Most of these programmes were funded through Thailand's unique resource, the Energy Conservation Promotion Fund (ENCON Fund). The programmes range widely in character. On the small end, there are research programmes like the development of biogas fuel from cassava roots or efficient techniques for agri-product development (for example, rubber smoking). On the larger side, there is the government's programme to regulate and provide incentives for large buildings and factories to perform energy audits and develop and implement energy-saving plans. Renewable energy sources have also been featured in a number of projects sponsored by the Thai Royal Family.

**"How much does it cost to provide new energy resources, whether it is building a new power plant that burns fossil fuels, implementing a renewable energy project, or promoting energy efficiency?"**

There are now thousands of Thai professionals working to provide products, equipment, and services that help save energy, or produce it renewably. A sign of the market development is the recent formation of a new, professional association of energy-efficiency businesses called the Energy-Efficiency Development Association (EEDA). EEDA is made of companies working in the field who volunteer to spend their time discussing, promoting, and advising the government on how to design and implement effective programmes that help stimulate the market (also called "market transformation").

Although Thailand still can vastly improve its energy efficiency, it is clear that the country has set a high standard for achievement in the past decade. The Divide by Two (*Han Song*) campaign is known by more than 90 per cent of Thai people for its creative message that reducing resource use and saving energy go hand in hand. And millions of consumers save 10 per cent every time they turn on their fluorescent lamps, because of EGAT's *voluntary* DSM programme (the *lort phom*, or thin-tube program) with the

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manufacturers that avoided the need to build one medium-size power plant (more than 400 MW).

And nearly all Thai people know about the *Chalaak Ber Haar* (Energy-Saving Number 5 Label) programme to promote energy-efficient refrigerators and air conditioners. In fact, the United States is now considering revising the design of its appliance energy label (to make it more interesting and understandable) in part because it was shown that the Thai label was more effective (than the US label) at influencing consumers to purchase energy-saving models.

***A battery re-charging station in Thailand powered by solar photovoltaic panels.***

I now have the privilege of assisting Thailand's Department of Energy Development and Promotion (DEDP) to design and implement some new programmes that are voluntary, will help save money and reduce pollution, and will pay for themselves many times over. One of these programmes is an energy-efficiency revolving fund, which will be administered by commercial banks, and lent out to businesses at no more than four per cent interest. Two other programmes will provide a subsidy to reduce the cost of energy-saving equipment. The subsidy will help make the projects more attractive to the businesses and therefore stimulate investment in energy-saving projects.

There are many other new programmes in the pipeline. EGAT estimates that it can reduce the need for *another* large power plant (632 MW) through its five-year DSM plan. DEDP in its Five-Year Master Plan [3] sets a goal of supplying more than 1,000 MW of new energy resources by *saving* energy (using it more efficiently). The savings will be provided through a range of DEDP programmes in factories, buildings and houses, and to support the production and sale of energy-efficient equipment.

In Thailand's national energy strategy [4], the National Energy Policy Office (NEPO) estimates that a third (33%) of all energy needs at the end of the decade (2011) will be met through saving energy (energy efficiency) and renewable energy resources. [5] This is a remarkable fact. Currently, more than half (54%) of the country's energy supplies come from oil, and one-fifth (19%) is classified as "renewable" (this includes hydropower and fuel wood, which some might dispute as being renewable.)

Last month, the Thai government signed contracts with small power producers to provide 300 MW of power through sustainable biomass resources. These include sugar cane residue (bagasse), rice husks, and other crop and plant residue. And a new company has been established, Thai Photovoltaics Ltd., that will have an annual production of 20 MW of photovoltaic modules (that convert sunlight into electricity). This will be nearly two per cent of total annual *global* photovoltaic (PV) production, putting Thailand on the global map for this technology.

It would be useful to have a more open discussion about the alternative ways that Thai people can prepare for their energy future. And energy conservation is by far the cheapest form of providing new energy for Thailand. A unit of electricity (kilowatt-hour, kWh) today costs the consumer about two to three baht. A unit of energy saved by EGAT through its DSM programmes, for example, costs less than 0.5 baht per kWh. So why not invest as much as possible in the lowest cost way of meeting demand? It does not appear that the potential for sustainable energy reflected in the Thai agency plans is incorporated into the final assumptions for investment in the energy sector.

My suggestion is rather simple. Why doesn't the government take a truly integrated approach to energy planning, starting with the power sector? The formation of the new Ministry of Energy later this year provides a good opportunity to pull together an "Integrated Resource Plan" for the power sector. For sure, demand will vary, and one can never predict with precision. But experience over the past couple of years shows that actual demand for power has tended to be at the lower end of forecasts made by the Thailand Load Forecast Subcommittee. The government should take the lead on this planning function, but include significant input from representatives of all stakeholders, including the private sector, other government agencies, academics, and nongovernmental organisations (NGOs).

The question is: "How much does it cost to provide new energy resources, whether it is building a new power plant that burns fossil fuels, implementing a renewable energy project, or promoting energy efficiency?" All three of these methods will be needed for future energy supplies. But doesn't it make sense to invest as much as possible where the energy sources are the cheapest?

**Endnotes:**

**1.** Amount as of 28 February 2002.

**2.** EGAT invested much time and money in its DSM programmes for two main reasons: (1) it was required to do so by the government and (2) it was able to pass most of its programme costs through to the ratepayers. And the ratepayers generally got a good deal, since it costs much less to save (avoid the need to provide) electricity than it does to build new power plants.

**3.** *Five-Year Master Plan for Energy Conservation (2002 – 2006),* Department of Energy Development and Promotion, Ministry of Science, Technology, and Environment, 28 March 2002.

**4.** *Strategic Plan for Energy Conservation in the Period 2002-2011*, National Energy Policy Office, March 2002.

**5.** Out of a total demand of 79,000 kilotonne-oil-equivalent (KTOE), NEPO projects that 11% (8,900 KTOE) will be provided by using energy more efficiently and 22% (17,000 KTOE) through production of renewable energy.