

Report on the Mekong River Basin  
Environmental and Social Issues  
Survey Project for MeREM

# **Report of Community Workshop for Ecosystem Monitoring in the Se San & Sre Pok Rivers in Ratanakiri Province of Cambodia**



**March 2006**  
Written by Mekong Watch

## **Forward**

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## **Background**

The following report is the proceeding of a community-based workshop on ecosystem monitoring in the Se San and Sre Pok Rivers, which was held in February 2006 in Banlung, Ratanakiri Province, Cambodia. Mekong Watch organized this workshop in collaboration with local NGOs, villagers, a scientist from the MeREM research team, and provincial officials.

The Mekong River Ecosystem Monitoring or MeREM is an international natural science project to conduct long-term ecosystem monitoring along the Mekong River. The project began in December 2003 when MeREM held its first workshop in Bangkok, Thailand. The National Institute for Environmental Studies (NIES), Tohoku University, and Yamanashi University are the core organizations of this project, and other members include researchers from five riparian countries, namely China, Thailand, Vietnam, Laos, and Cambodia, but not Burma. MeREM's areas of monitoring include water quality, hydrology and biodiversity. Fiscal year (FY) 2004 to 2006 is positioned as a pilot period during which more specific monitoring items, monitoring sites and monitoring frequency will be decided.

Mekong Watch has cooperated with MeREM since October 2004 for the purpose of proposing to the MeREM researchers ways to make the project more useful for people in the whole basin or in the communities. Mekong Watch is a Japanese environmental NGO which has worked to prevent negative social and environmental impacts caused by development projects on local communities in the Mekong region since 1993. Mekong Watch welcomes the MeREM project to the extent that its activities contribute to solving the problems caused by the changes in the ecosystems of the Mekong River that local people face.

During FY2004, Mekong Watch reviewed civil society activities and surveys regarding environmental issues in the basin related to the changes in water quality, hydrology and biodiversity of the river, so that the views of civil society were reflected in the framework of MeREM. Mekong Watch also conducted interviews of NGOs and social scientists that are dealing with impacts of development projects on riparian communities, and conveyed their findings or lessons learned to the MeREM research team by submitting a report and attending a meeting in Tokyo in March 2005. These activities were intended to assist MeREM in incorporating into its work the realities of environmental and social struggles that people in the Mekong region are experiencing.

From its work for MeREM in 2004, Mekong Watch found four focal areas considered to be significant among the members of civil society contacted: 1) upstream development on the mainstream

Lancang-Mekong; 2) international tributaries to the Mekong River and transboundary issues in the Se San river basin, the second largest tributary to the Mekong; 3) domestic tributaries in Thailand; and 4) the Tonle Sap Lake in Cambodia. Mekong Watch clarified the issues in each of these regions and advised MeREM on specific points that Mekong Watch felt MeREM should take into consideration when monitoring the three areas such as hydrology, water quality and biodiversity in the Mekong River.

As to FY2005, considering the significance in terms of the changes in the ecosystem and transboundary issues, Mekong Watch chose two of the four areas mentioned above: Upstream development of the mainstream Lancang-Mekong ranging from Yunnan Province, China to northern Thailand, and the Se San river basin ranging from Vietnam to north-eastern Cambodia. Based on a contract with NIES of Japan, Mekong Watch decided to organize a community workshop on ecosystem monitoring of the Se San River in Ratanakiri Province, Cambodia during FY2005. The workshop was held in Ratanakiri because Mekong Watch could confirm the interests of NGOs and villagers there to collaborate with scientists to conduct ecosystem monitoring in order to solve their problems related to water fluctuation, deteriorated water quality and decline in the amount of fish. Mekong Watch will consider similar activities in the upper Mekong River next year. To seek possibilities of pursuing similar activities in the upper Mekong in the following year, an NGO working on environmental issues in Jinghong in Yunnan Province, China, was invited to the workshop.

Mekong Watch organized the community workshop in February 2006 in Banlung, the provincial capital of Ratanakiri, in collaboration with a local NGO called the Se Kong/Se San/Sre Pok Rivers Protection Network (3SPN) and villagers living with Se San River ecosystem. Since environmental and social problems similar to those in Se San are found along the Sre Pok River, a major tributary of the Mekong River which joins the Se San and which flows also from the Central Highland of Vietnam to northeastern Cambodia, concerned villagers along the Sre Pok River also participated in the workshop. Dr. Watanabe, a leading member of the MeREM project, was invited to explore possible future collaboration with villagers and NGOs for the purpose of problem-solving. This report was prepared and submitted by Mekong Watch for MeREM in order to record the series of presentations which are key in identifying the local context of ecosystem changes and propose future monitoring to be done with the collaboration of villagers, NGOs and natural scientists.

## Introduction to Se San Issues

Se San and Sre Pok Rivers are the second largest tributaries of the Mekong River, which flow across border between Vietnam and Cambodia. The sources of the Se San and Sre Pok Rivers are located in the Central Highlands of Vietnam, and the two rivers converge at a point about 50km east of the town of Stung Treng in Cambodia, and then are joined by the Se Kong River, which originates in the southern part of Laos. These three rivers join to flow into the Mekong River, and contribute 16.7 percent of the Mekong's flow at the town of Stung Treng (Kawai, 1993 in Hori, 1996).

These rivers had never received much international attention until one survey report was published in May 2000. This survey report, "A Study of the Downstream Impacts of the Yali Falls Dam in the Se San River basin in Ratanakiri Province, Northeast Cambodia", was prepared by The Fisheries Office of Ratanakiri Province and a local NGO called The Non-Timber Forest Products Project (The Fisheries Office, 2000). The report revealed the unprecedented tragedy in Northeast Cambodia caused by the Yali Falls Dam, a dam project upstream on the Vietnam-side of the Se San River, one of these international Mekong tributaries.

The 720MW Yali Falls Dam was constructed on a tributary of the Se San River in Vietnam—the Krong Poko—approximately 70km from the border with Cambodia (CRES, 2001). The construction work started in 1993 with loans from the Ukraine and Russian governments, and financial aid from the Swedish aid agency SIDA. The Dam was completed in 2001. According to the Ratanakiri Report, irregular water fluctuation had begun to be observed by Cambodian downstream communities since the dam gates were closed in order to begin filling the reservoir in 1996.

The survey by the fisheries office and NTFP found that at least 32 people had drowned in Ratanakiri Province of northeastern Cambodia due to irregular fluctuation of water levels, including unusual dry season flooding, incurred by water released from Yali Falls Dam. They also identified water quality issues and impacts on fisheries. The interviewed villagers claimed serious health problems including itchiness, rashes and eye irritation after bathing in the river, and decline of amount of fish catches in the Se San River. This incident triggered many activities and consecutive surveys by NGOs and social scientists.

The another report published in the end of 2005, "Down River, The consequences of Vietnam's Se San River Dams on Life In Cambodia and Their meaning in International Law" (NGO Forum Cambodia 2005), analyzed this issues from the perspectives of international law and at the same time, it revealed various problems identified in 2000 in local communities keep on continuing even after five years later.

## **Community Workshop for Ecosystem Monitoring in the Se San & Sre Pok Rivers**

### Objectives (Expected Outcomes)

1. MeREM scientists, who are concerned about ecological changes in the Mekong River, will understand the seriousness of social impacts related to water flow and water quality in the two rivers.
2. Both Japanese scientists and local people living along the two rivers will recognize the importance of cooperation and seek concrete ways to monitor ecological changes of the two rivers.
3. Mekong Watch and Se Kong/Se San/Sre Pok Rivers (3S) Protection Network will collaborate with local people and Japanese scientists to facilitate the above outcomes.

### Date

14-17 February, 2006 (4 days)

### Venue

Ratanak Lyna, Banlung, Ratanakiri Province, Cambodia

### Schedule

13 Feb	Arrival in Ratanakiri Meeting with Provincial officials including vice governors
14 Feb	Session 1 Introduction <ul style="list-style-type: none"><li>- Self Introduction</li><li>- Objectives and expected outcomes</li></ul> Session 2 Social and Environmental Problems in Se San & Sre Pok Rivers <ul style="list-style-type: none"><li>- Livelihoods of people along the two rivers</li><li>- Impacts of upstream dams (water flow, water quality...)</li></ul> Session 3 Past & Current Monitoring Activities by Villagers and NGOs <ul style="list-style-type: none"><li>- Activities of NGOs and/or villagers in the two rivers basins</li></ul> Session 4 Mechanisms and Realities of Reflection of Collected Information <ul style="list-style-type: none"><li>- Se San Committee</li><li>- Notification mechanism</li></ul>
15 Feb	Field Trip to the Se San River and meetings with villagers in Pau village and Piyang Krawn village in Ta Veng District
16 Feb	Field Trip to the Sre Pok River and meeting with villagers in Nong Bua village in Lumphat District <ul style="list-style-type: none"><li>- Understand the villagers' livelihoods and problems</li><li>- Consider practical and appropriate monitoring methods</li></ul>
17 Feb	Session 5 Feedback from Dr. Makoto Watanabe (leading scientist of MeREM) <ul style="list-style-type: none"><li>- Possible monitoring methods</li><li>- Collaboration plan</li><li>- Discussion</li></ul>

## List of participants

Dr. Makoto M. Watanabe (National Institute for Environmental Studies of Japan)  
Mr. Bonlamb(Local villager from Andong Meas district, Se San River)  
Mrs. Liam (Local villager from Andong Meas district, Se San River)  
Mrs. Panlee (Local villager from Ta Veng district, Se San River)  
Mr. Bunson (Local villager from Ta Veng district, Se San River)  
Mrs. Mun (Local villager from Vuen Sai district, Se San River)  
Mr. Tonlian (Local villager from Vinla Village, Vuen Sai district, Se San River)  
Mrs. Lao (Local villager from Lumphat district, Sre Pok River)  
Mr. Bun Hean, (Local villager from Lumphat district, Sre Pok River)  
Ms. Minguo Li (Mekong Mothers Union from Yunnan Province, China)  
Dr. Josef Margraf, (Mekong Mothers Union from Yunnan Province, China)  
Mr. Pouy Savuth (Journalist, Vice Chairman, CPEHO)  
Mr. Kim Sangha (Coordinator, 3S Protection Network)  
Mr. Mien (3S Protection Network)  
Mr. Heang Sarem (3S Protection Network)  
Ms. Noi (3S Protection Network)  
Ms. Ame Trandem (3S Protection Network)  
Mr. Satoru Matsumoto (Representative Director, Mekong Watch )  
Ms. Ayumi Goto (Cambodia program, Mekong Watch,)  
Ms. Kaori Ohsawa (China program, Mekong Watch)





## **Day 1 Presentation from Local Groups ( Tuesday, 14 February 2006 )**

### **Session 1 Introduction (Self Introduction, Objectives and Expected Outcomes) (8:20 - 9:40)**

In session 1, the Se Kong/Se San/Sre Pok Rivers Protection Network (3SPN), a local NGO, introduced the objectives of the workshop so that the participating villagers understood the background and purpose of the workshop. During the questions and answers session, several villagers talked about how they suffered from the changes of Sesan and Srepok rivers.

#### Introduction of the objectives of the workshop (Mr. Kim)

Mr. Kim Sangha from 3 SPN introduced the objectives of the workshop in Khmer.

#### Self-introduction (All participants)

All participants introduced themselves both in Khmer and in English.

#### Questions & Answers (All participants)

Dr. Watanabe: Who are the representative villagers? How were they chosen?

Mr. Bonlamb: Let me talk about who we are. We were chosen as representatives of our villages. We are all volunteers who work without payment, and recognize the problems faced by the people in Se San River as our own problems. That is why we do it voluntarily. Focal people or representatives have meetings with other villagers and convey or exchange information. We are representatives from villages along Se San and Sre Pok Rivers, and 3 SPN provides financial, technical support for us.

Dr. Watanabe: What are the main problems for the villagers at present?

Mr. Bonlamb: Serious problems have occurred along the Se San River. There were floods, and people and animals died. I would like to add other impacts that occurred along the Se San River. The impacts on fish habitat, decline in the number of fish. It affects the food for fish: normally fish eat algae but they are lost from the river, so it affects the ecosystem of the river. Many parts of the riverbank are eroded. Many people moved from the riverbank.

Dr. Watanabe: How did the frequency of flood change before and after the Yali Falls dam construction in Vietnam?

Ms. Noi: I want to add to the problems before answering Dr. Watanabe's question. I will add my observation. Our economic income has decreased a lot because, before, villagers' income all relied on the river, vegetable, fish, small-scale farming, and home gardening. Now this cannot continue because of

water fluctuation. Villagers cannot keep domestic animals now. I assume economic income has decreased.

Mrs. Panlee: We think that the reason why domestic animals die is that during the rainy season, because of lack of water, most of animal including cows, pigs and buffalos drank water from river and died. But we do not know the real reason why they died.

Dr. Watanabe: Did the water quality of the river get better or worse?

Mrs. Panlee: I live near the river, and water quality became much worse, and the water level and water quality all changed. During the night, water rises about one meter, and in the morning it lowers a lot. The water is unclear and muddy.

Dr. Watanabe: Muddy water is bad or good?

Mr. Tonlian: Sometimes the color is red, like orange. In some places near the Vietnamese border, we cannot swim in the river as the color of the water is very strange. I assume that it is the water from the dam. It must be dangerous.

Dr. Margraf: Did fish in the river die, too? Or only buffaloes died?

Mr. Mien: In this area, last month villagers went fishing, they drank water from wells, when one villager drank the water from the river, he got a stomachache. They saw the decline of fish catch. There is no fish any more.

Mr. Margraf: Are there any problems in eating shellfish from the river?

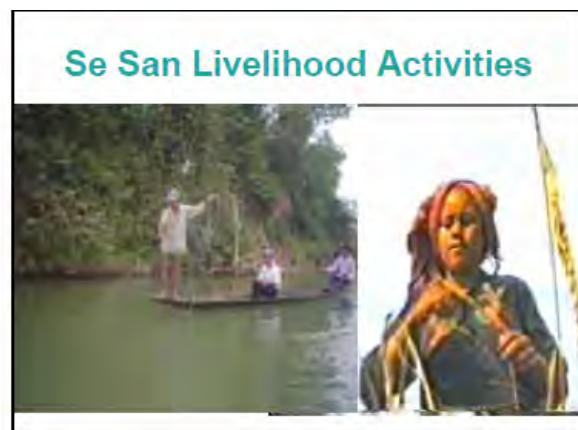
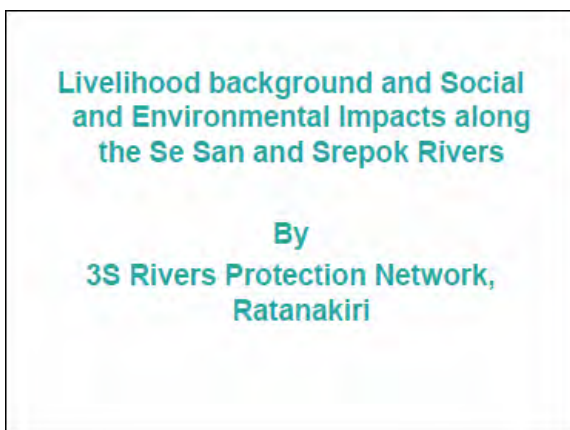
Mrs. Panlee: In the past, before the dam, there were a lot of fish and shellfish, but after that, many fish, many shellfish died and now there are less fish, less shellfish.

## Session 2 Social and Environmental Problems in the Se San & Sre Pok Rivers (9:40-11:00)

Session 2 aimed to deepen the participants' understanding of the general situation of villagers' livelihoods along the Se San and Sre Pok Rivers, including social and environmental problems caused by changes in the river ecosystem and current and future dam plans upstream. PowerPoint presentations were made by 3SPN, a local NGO. After the presentations, participants discussed dam construction and its impacts on river ecosystems both generally and specifically in the 3S region. Although there were differences in the opinions of participants on the mitigation of those impacts, all the participants came to a basic agreement that ecosystem changes in the river and dam construction were related.

### Presentation on villagers' livelihood (3 SPN, Mr. Kim)

Mr. Kim Sangha from 3SPN introduced the general situation of villagers' livelihood along the Se San and Sre Pok Rivers and the social and environmental problems caused by the changes in the river ecosystem.



Mostly people rely on fishing and rice production. In addition, they manage small-scale vegetable gardens.



What happened during and after dam construction? There were several floods. This is a private school

(photo, below right). This school was flooded for 15 days. During the floods, cattle die, fish species die, and shellfish also die. Some days in the year the river is dried up. Serious impacts occurred.



We found many animals including buffaloes dead in the river after flooding. Those buffalo must have drowned in the water released from the dam upstream. The Se San River dried up during the Yali Falls dam construction. Last year, the water level went up and down quickly. In the morning it rises and goes down very quickly.

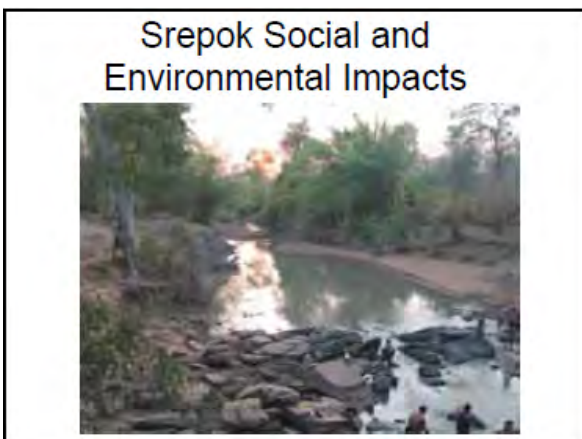


Erosion is seen everywhere in the region. This also has affected households of villagers along the river. This is the picture of Se San river during the dry season (photo, above left). Villagers also mention that they decided to move as they could not live because of the water fluctuation. They are no longer able to

rely on the river.



People abandoned their village as they no longer are able to live there (photo, above left). An ethnic minority, the Kachok, is facing this situation. This area is a potentially rich fish habitat. A Fisheries Department officer said it was a very important place for fish to spawn and live. The villagers' income all came from fish. Now they import fish from outside. Even if they do fish, they cannot catch a lot, so fishing activity has become dormant. Now they cannot use fishing gear. Villagers still grow vegetables along the river.



Recently, because of water fluctuation, sometimes villagers cannot bathe.

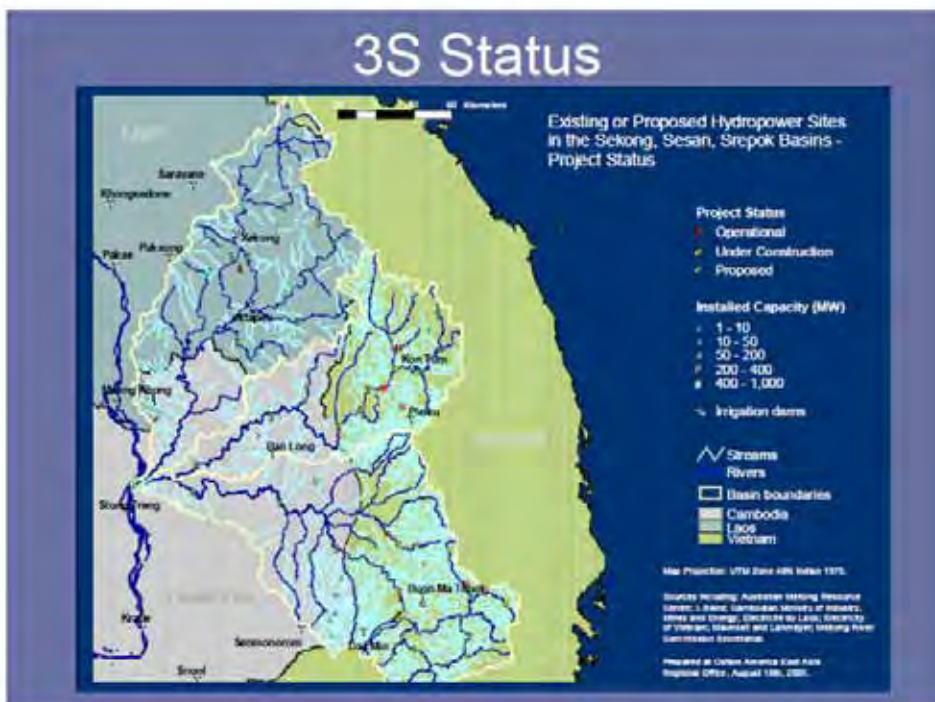


Ms. Li: How many households are there along the river?

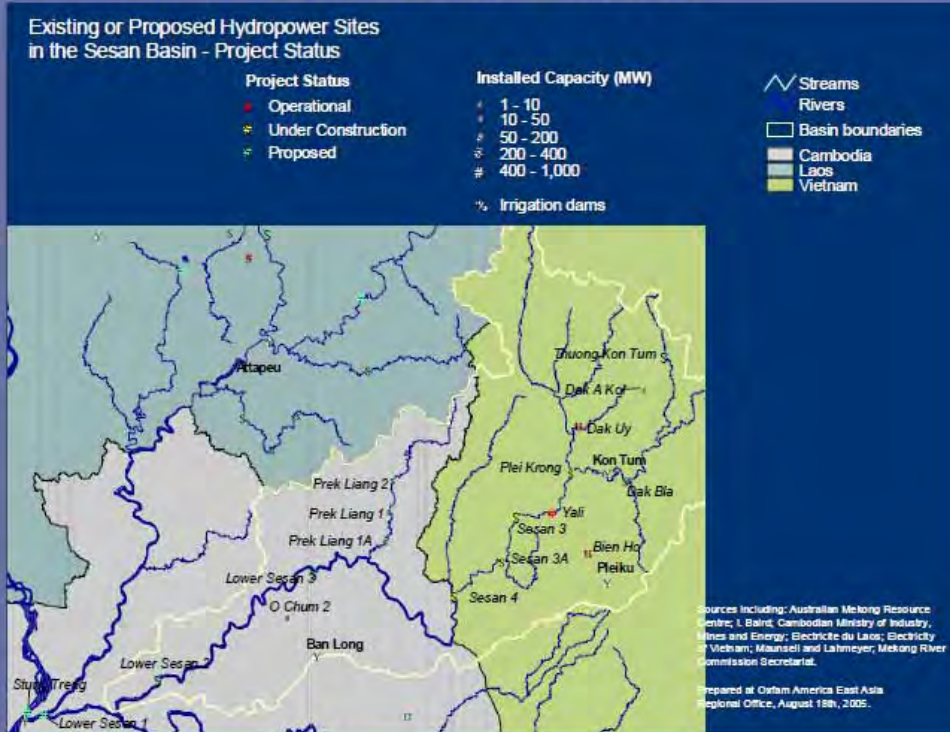
Mr. Kim: Along the Se San River, there are 60 villages in Ratanakiri Province. Fifty thousand people in 30 villages are affected. They are mostly ethnic minority. There is no dam on the Sre Pok River in Cambodia.

Presentation about Dam projects on Se San and Sre Pok Rivers ( 3 SPN, Ms. Tresdem )

Ms. Tresden from 3 SPN introduced current situation of the dam projects on the Se Kong, Se San and Sre Pok Rivers.



# Se San Dams



The two pictures above are a map of existing dams in the whole 3S region and a map of the Se San River. Red marks show dam projects which are in operation at the moment. The Yali Falls Dam was constructed by Vietnam in the upper Se San River (below left). At the moment, four more dams are under construction on the Se San River: Se San 3, Se San 3A, Pleikrong and Se San 4 (below right).

## 720 MW Yali Falls Dam

Impacts begin mid 1996, Operational in 2001

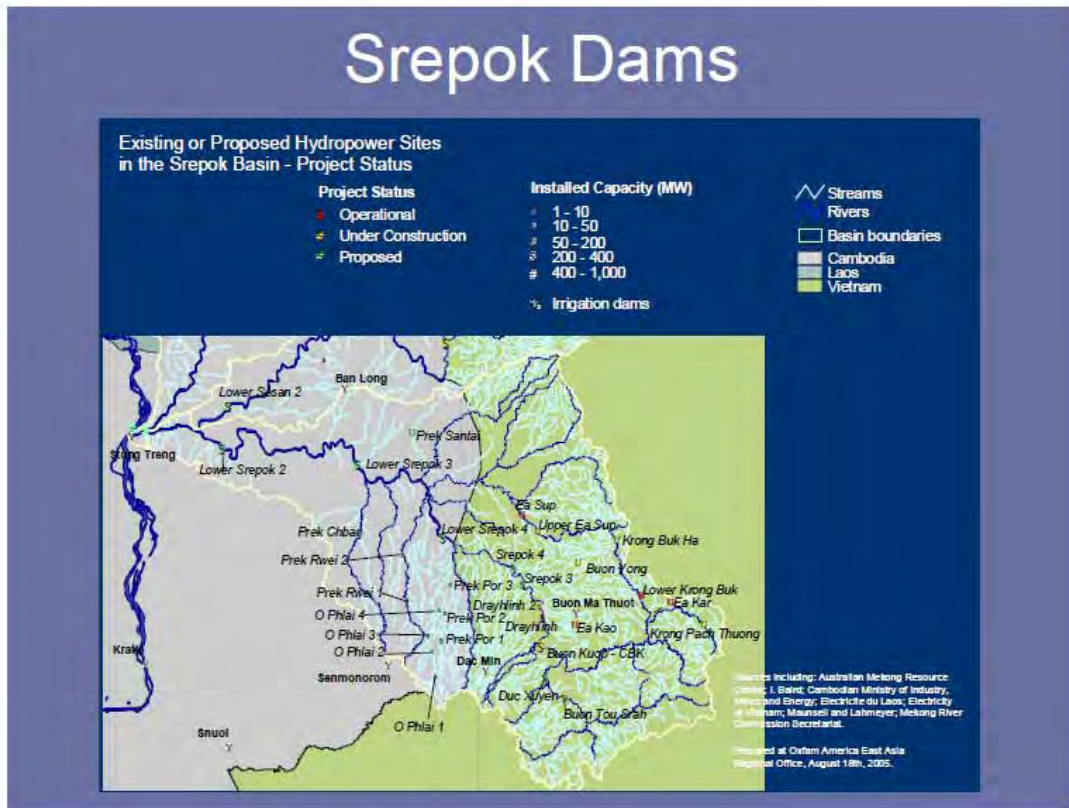
## Damming the Sesan River

Dams Under Construction:

- 270 MW Sesan 3 Dam (2002-Soon)
- 96 MW Sesan 3A Dam (2003-2007)
- 110 MW Pleikrong Dam (2003-2007)
- 330 MW Sesan 4 Dam (2005-2010)

Below is a map of dams on the Sre Pok River. There is a dam that has already been constructed but has not begun operating yet.

# Srepok Dams



(Map prepared at OXFAM America East Asia Regional Office)

There are also three dams under construction: Dray H'Linh2, Boun Khoub, which is supported by the Japanese government, and Boun Tua Sarha. There are many more plans for dam construction, such as Sre Pok 3 and a dam at Stung Treng on the Sre Pok River.

## Damming the Srepok River

Completed:  
Dray H'Linh 1 (1990) No longer operational

Under Construction:

- 16 MW Dray H'Linh 2
- 280 MW Boun Khoub Dam (2003-2008)
- 85 MW Boun Tua Srah Dam (2004-2008)

Soon to be Built:

- 137 MW Srepok 3 Dam (Dec. 2005- ?)
- 200 MW Dam in Stung Treng (feasibility study underway)

## More dams despite....

- Yali impacts ignored by stakeholders
- No people participation
- Incomplete Environmental/Social Impact Assessments
- No Compensation

Dr. Watanabe: From the presentation, we can see that on the Sre Pok River, one dam has been constructed, but it has yet to begin operating. Considering the future dam plans on the river, I think



that before the dam construction, it is important to collect some baseline data for this river.

Mrs. Panlee: Before dams are built, environmental impact assessments (EIAs) are not formally conducted.

Ms. Tandrem: The EIA for the Se San 4 dam was not submitted to Cambodia until November last year.

Mr. Matsumoto: Along the Sre Pok River, are there problems similar to those in the Se San River? Because at the moment, we know that the Buon Khoub dam is already more than 50% completed and has a spillway, and this may stop the river flow in Vietnam. There is a possibility that there are similar problems on the Sre Pok River. Do you see any changes on the Sre Pok River?

Mrs. Lao: The water regime of the Sre Pok River changed slightly. Before, Sre Pok River flows fitted to a seasonal flow, but now I notice a lot of change of water flow and water quality. Some of villagers find it difficult to grow vegetables because of the water fluctuation. This affects fish migration.

Mr. Kim: Fish cannot migrate because there is not enough water.

Ms. Trandem: In 2003, there was serious flooding. We assume it is because of the water release from the dam. The other possible reason is that Mekong River was also flooded, so the water of the Mekong River backed up. We wrote a letter about this issue to the Electricity of Vietnam (EVN), but they gave us no reply on this matter.

Mr. Bonlamb: I have two questions. How do dam promoters or dam constructors calculate the water flow downstream? My second question is that if it rains upstream, is there any possibility of a flood downstream? Can it be a serious one?

Mr. Matsumoto: There is an idea of ecological flow or environmental flow, but it is still under discussion, so here I would like to explain about minimum flow. In the case of a diversion dam, which takes water from one river and channels it to another river for electricity generation, some dams are designed to release water of five cubic meters per seconds, others ten cubic meters. Since it really affects the volume of water to be diverted for electricity, the volume of water to be released downstream is always impacted. But the Yali Falls Dam is not a diversion dam, so the volume of water released downstream depends on how much electricity they want to produce and whether they want to protect the dam from the overflow of the reservoir. In case of multipurpose dams, before the rainy season, for the purpose of flood control they release most of the water from the reservoir to

prepare for storing water during the rainy season. In the case of irrigation dams, they sometimes don't release any water downstream because water is taken to irrigate lands.

Mrs. Lao: I want to know about their reservoir management.

Mr. Matsumoto: I read many EIA documents about dam projects in the Mekong region. Roughly speaking, they generally ignore two major issues: Fish migration and downstream impacts. These two points are completely ignored or undermined in most EIA documents. It seems that they do not want to recognize the importance of fish migration. Their only concern is rare species which are recognized internationally. They recognize only such kinds of fish but rarely consider other fish which are locally important for villagers.

Dr. Watanabe: They have clear evidence of the relationship between dam construction and impacts on biomass in Japan. Dams definitely affect downstream ecology.

Mr. Mien: I would like to mention, for us, we don't know clearly the perspectives of dam builders. But from the local people's perspective, we think that the dam really affects fish. On the Se San River upstream of the dam, there are a lot of fish.

Ms. Trandem: There is a recent study by the fisheries office on the dam.

Mr. Matsumoto: They say it's very difficult to assess the impacts on fish migration. That's why, once they recognize the negative impacts on fish catches, it is easier for developers to compensate for them rather than to conduct expensive comprehensive fish migration studies before the project.

Mr. Kim: It's a problem of trans-boundary impacts of the dam.

Mr. Matsumoto: Yes, of course. But the fish in the Mekong migrated between upstream and downstream of the dam. So, the study should be done on each dam about the impacts on fish migration.

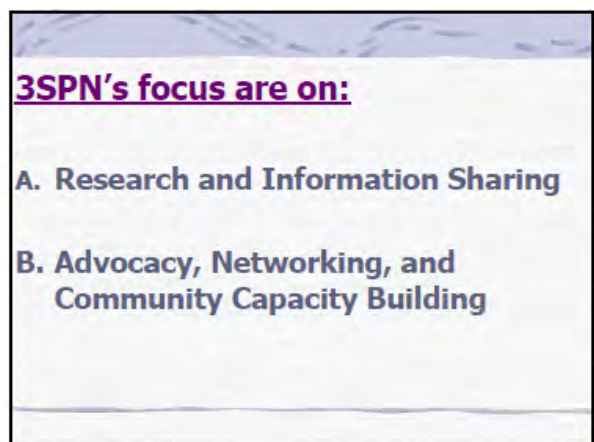
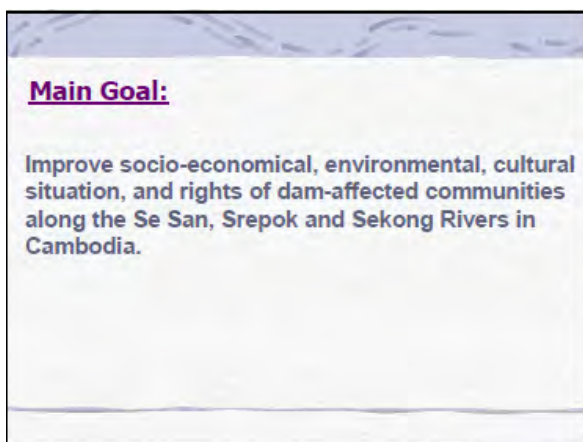
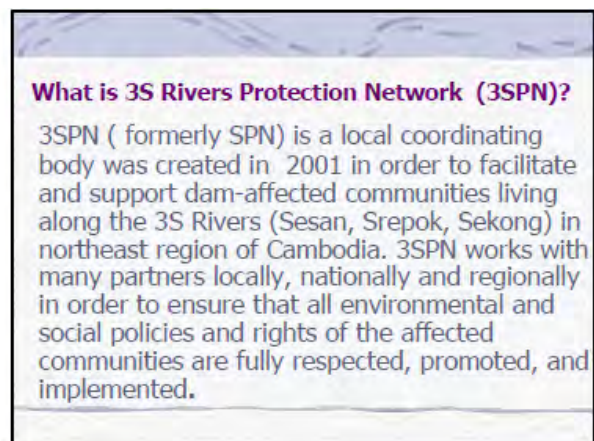
Mr. Kim: I think the reason why the fish catch decreased is because fish are confused by the dam. So the dam should release the same amount of water downstream as is released by the natural flow of the river. Then the impacts on migratory fish would be reduced.

### **Session 3 Past & Current Monitoring Activities by Villagers and NGOs (11:00- 13:00)**

In Session 3, participants examined the past and current monitoring activities related to river ecosystem changes and discussed why those activities have not led to effective problem-solving. Through this session, a scientist from NIES and participants came to a general understanding of the achievements of past monitoring activities and possible flaws in those activities.

#### Presentation about Activities and Experience of 3SPN ( 3SPN, Mr. Kim Sangha )

First, Mr. Kim from 3S Rivers Protection Network (3SPN) presented the activities and experiences of 3SPN. The presentation included an overview of 3SPN, its history, main goal, focus areas, partners, and how it cooperates with partners at various levels from local, regional, national to international. The presentation also introduced what 3SPN has done in the area of advocacy, networking and community capacity building and its future activity plans.



**A. Researches Conducted in Cooperating with Partners:**

- Impacts of the Yali dam, 2000-2001,
- Se San Bird study, 2003
- Se San Legal and Human Right Situation Study, 2003
- Down River-(consequences of Vietnam's Se San dam on Life in Cambodia and Their Meaning in International Law)
- Fish Monitoring Study, 2004-2005
- Srepok Baseline Study, 2005

**B. Advocacy, Networking, and Community Capacity Building**

**Commune Level workshops**



**District network meetings**



**Exchange visit CEPA-3SPN**



**Training on Networking**



## National Sesan Workshop



## 1<sup>st</sup> Annual SeSan Network Celebration



## 2<sup>nd</sup> Annual SeSan Network Celebration



## 3<sup>rd</sup> SPN Annual Celebration



## Meetings with key stakeholders

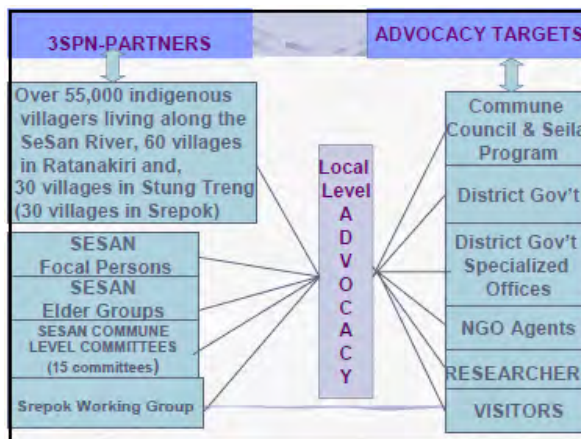
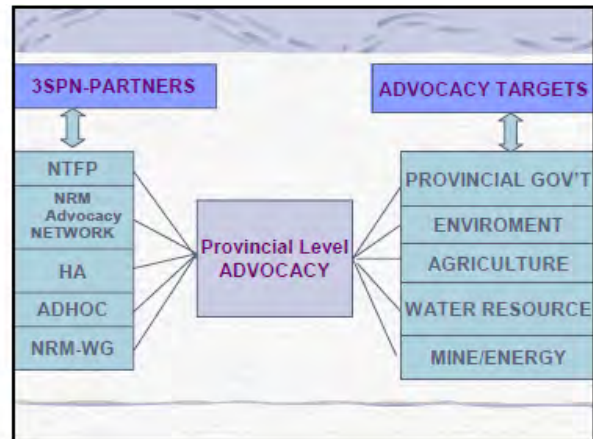
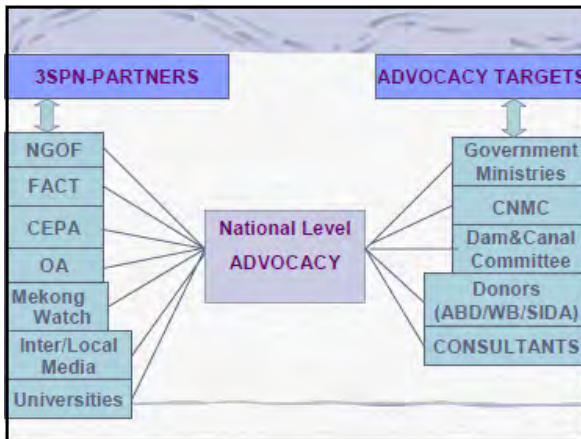
- ☞ Mekong River Commission
- ☞ Cambodian National Mekong Committee
- ☞ National Sesan Committee, Dam & Canal Committee
- ☞ World Bank, ADB, SIDA,
- ☞ Minister of Environment of Cambodia
- ☞ Council of Minister of Cambodia,
- ☞ National Assembly of Cambodia,
- ☞ Vietnam Technical Institutions,
- ☞ And attended many related forums nationally, regionally, and internationally

## Recent Local Activities

- ☞ Assisting the development of a Community Resource Center
- ☞ Beginning trainings and scoping visit to Stung Treng on Community Based Research
- ☞ 24 Commune Workshops

### Recent National and International Activities

- Working towards establishing an arbitration council and notification system
- Pushing for an international workshop on recent EIA and feasibilities carried out by the Nordic Consultants
- Petitions sent to Hun Sen, JBIC-NEXI, the Japanese Ministry of Finance



### Next steps...

- Strengthening local network,
- Expanding network to Srepok and Sekong areas,
- Boosting national and international advocacy work,
- Strengthening advocacy coalition at all levels,

### Questions and Answers

Dr. Watanabe: What was the 2003-2004 fish study shown in the slide of “Researches Conducted in Cooperation with Partners”?

Mr. Kim: It was about the impact of the dam on fish species, fish catch or amounts of fish catch.

Dr. Watanabe: What parameter does the Sre Pok baseline study, indicated in the same slide, use?

Mr. Heang: Livelihood of villagers. Non Timber Forest Products, fish, water, river bank gardening. We would like to collect data on water-related resources that villagers were using before dam construction and how much research has been done. That is the main focus. The report is nearly completed.

Dr. Watanabe: Baseline data is very important for monitoring the change before and after dam construction.

Mr. Kim: We monitored water quality in five villages (Phum Phi, Phum Taveng, Phum Kok, Phum Rieng, Phum Kor) in 2002-03. This chart shows parameters used by the study.

PHUM KOK									
Water data									
Date 2002/2003	Time of Day	Parameter Unit	Dissolved Oxygen mg/l	Temperature C	Conductivity µm/cm	pH	Turbidity NTU	Water Level cm	Water Speed m/s
APR 1	7:00 AM								
	12:00 PM								
	5:00 PM								
APR 2	7:00 AM								
	12:00 PM								
	5:00 PM								
APR 3	7:00 AM								
	12:00 PM								
	5:00 PM								
APR 4	7:00 AM								
	12:00 PM								
	5:00 PM								
APR 5	7:00 AM								
	12:00 PM								
	5:00 PM								
APR 6	7:00 AM								
	12:00 PM								
	5:00 PM								
APR 7	7:00 AM								
	12:00 PM								
	5:00 PM								
APR 8	7:00 AM								
	12:00 PM								
	5:00 PM								
APR 9	7:00 AM								
	12:00 PM								
	5:00 PM								
APR 10	7:00 AM								
	12:00 PM								

Phnom Kok

Mr. Kim: In this monitoring project, villagers monitored three times daily, at 7:00am, 12:00am, and

5:00pm. As the chart shows, the following items were monitored: Dissolved oxygen, temperature, conductivity, PH, turbidity, water level, water speed, rainfall amount (every day), rain, fish caught, area of flooded rice paddies, nets lost, boats lost, cattle or buffaloes lost, pigs and chickens lost, men sick, women sick, men drowned, women drowned... The monitoring activity lasted 8 months but after that it did not work.

Mr. Kim: From our experience, we concluded as follows.

#### Problems with the Environmental Impacts Monitoring

1. Very technical for villagers (both in terms of equipment and language used)
2. Training period too short (villagers could not absorb the information provided)
3. No technical person available to follow up on the activities
4. Time required of villagers (impact on the time needed for their cultivation)
5. No per-diem or other support for the villagers' work
6. No person that could perform data entry

Mr. Kim: This is our past experience. Each monitoring session took one hour, so it took a total of three hours a day. We have now sufficient experience from the past



#### Session 4 Mechanisms and Realities of Reflection of Collected Information ( 14:00 ~ 17:00 )

Session 4 aimed to deepen the participants' understanding of further efforts by a local NGO to connect local realities and the decisions made at various levels. Through this session, the shortcomings of past activities and possible points for future contribution by NIES became clearer.

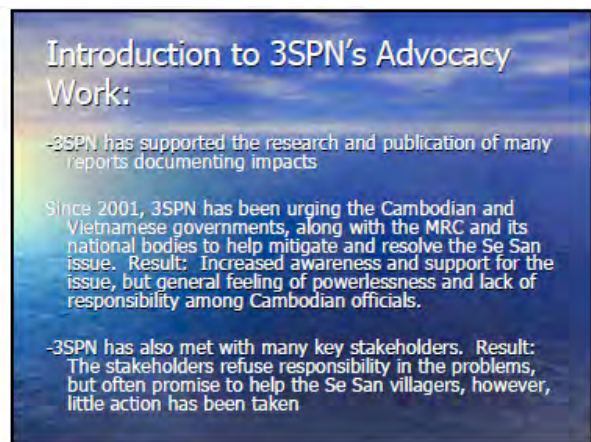
Presentation: Mechanisms and Realities of 3SPN Advocacy at the National and International Levels, (by Ms.Trandem, 3SPN)



Mechanisms and Realities of  
3SPN Advocacy at the National  
and International Levels



Presented by Arne Trandem, 3SPN



Introduction to 3SPN's Advocacy  
Work:

- 3SPN has supported the research and publication of many reports documenting impacts
- Since 2001, 3SPN has been urging the Cambodian and Vietnamese governments, along with the MRC and its national bodies to help mitigate and resolve the Se San issue. Result: Increased awareness and support for the issue, but general feeling of powerlessness and lack of responsibility among Cambodian officials.
- 3SPN has also met with many key stakeholders. Result: The stakeholders refuse responsibility in the problems, but often promise to help the Se San villagers, however, little action has been taken



Response to 3SPN's Reports

- 3SPN has used numerous social and economic reports for the use of evidence and increased awareness
- Cambodian government officials often claim the reports are not credible or "scientific enough"
- There are no scientific reports on health issues for people and animals, water quality testing done by MRC is not disclosed to 3SPN.



History of the Se San Committee

- Established in July 2001 by Cambodia to create dialogue with Viet Nam and try to find a solution to deal with Se San issue
- Directed under the CNMC, the Standing Committee met with Viet Nam in 2001, 2002, and 2003
- The only agreement that was reached occurred in 2003 when EVN gave Cambodia "Five Solutions"

## The Reality of the Current Notification System:

- Viet Nam has improved in giving advanced notification
- However, Cambodia lacks technology to distribute the information in a timely manner
- The Se San villagers receive the information late or not at all

## Transfer of Power to the Standing Committee on Border Dams and Canals

In 2004, CNMC transferred responsibility of the Se San Committee to the Ministry of Water Resource's Standing Committee on Border, Dams and Canals

### The Current Situation:

- Unclear about TOR and its authority on the issue
- No budget
- The June 2005 meeting that was to be held in Cambodia was canceled
- Both countries agreed to have SWECO-Groner conduct an EIA and hydrodynamic modeling study for the Se San and Sre Pok Rivers. This will be completed in April 2006.

## Latest Advocacy Work on the Se San Issue

- Harvard's Arbitration Council Mechanism
- Possible Workshop with Nordic Consultants on Se San and Sre Pok feasibility studies and Sesan 4 EIA with Nordic Consultants

## Harvard's Arbitration Council Mechanism:

1. In 2005, Harvard Law School students wrote a legal analysis of the Sesan issue.
2. Harvard then developed the framework for an Arbitration Council that would help Se San villagers to seek compensation.

## Current Situation of Arbitration Council Mechanism:

3. Harvard and 3 S Working Group has met with various government officials and stakeholders in Cambodia in attempt to gain support for the council.

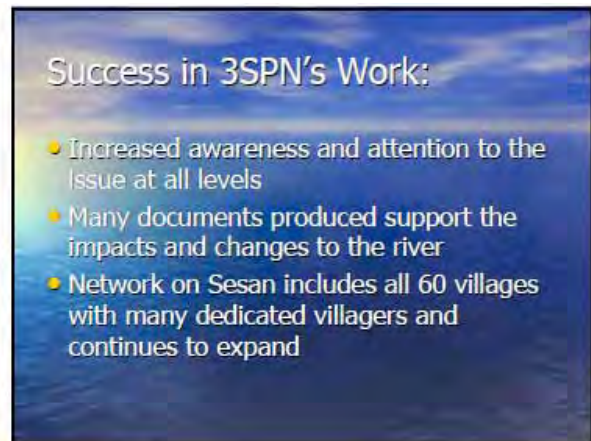
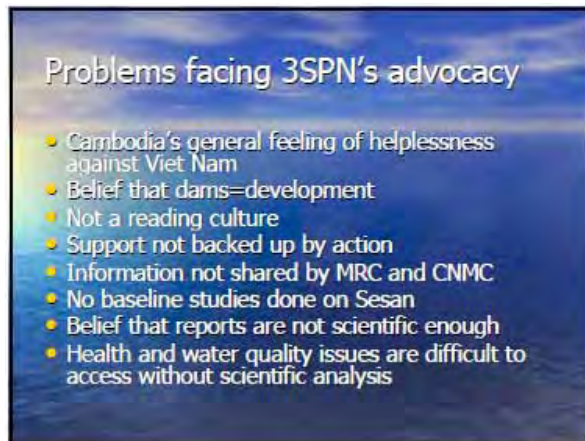
Response: Little positive response. Report not read. Most government officials claim to lack authority to solve the matter and do not think Viet Nam will cooperate

## • Possible Workshop with Nordic Consultants on Se San and Sre Pok Feasibility Studies:

-In November 2005, four Nordic Consultants from SWECO-Groner met with 3SPN while conducting SIDA funded Se San and Sre Pok feasibility studies for EVN.

-In January 2006, 3 S Working Group sent request to Nordic Consultants to hold workshop in Cambodia to discuss the results of their findings before finalizing their work

Response: Positive. Nordic Consultants will ask EVN for permission and seek funding for workshop



Mr. Matsumoto: Is there any reason why there is no study on health issues?

Mr. Bonlamb: At meetings and conferences, villagers always raise health issues. They are really interested but they have never conducted research on health issues here.

Dr. Watanabe: Research on animal health has been done but not on people's health. Why?

Mr. Mien: The Minister of Health was interested in the issue of people's health and looked at the problem. Officials were interested in Se San issues when they read the report on skin disease among villagers. The minister had never heard about the issues before. He thought that conducting research on the issue would be very sensitive because it is a trans-boundary issue with Vietnam. In the end, they took no action.

Dr. Watanabe: MRC doesn't disclose the information. So the issues cannot be noted.

Dr. Margraf: I have two suggestions. The first suggestion is that I think monitoring by villagers is a good project because through it villagers can take responsibility and ownership over their natural resources. But in addition, it is necessary to conduct specific scientific research that can immediately address a problem when it occurs (for example, death of fishermen). My second suggestion is that considering there has been no actual change in how dams are constructed, and they keep on building dams and there are more dam plans on the river, it is necessary to deal with the problems in a proactive manner. This may include suggesting to the villagers alternative livelihoods. I suggest it is important to show people other directions they can take that can help them directly.

Mrs. Lao: I want to ask how the impacts can be managed. For example, in villages along the Sre Pok River they produce rice. Every year they cultivate the rice fields and they don't have any other rice

paddy, so they continue to use that rice field.

Mr. Matsumoto: It's very difficult to change the ways of livelihood in rural areas in the Mekong region.

Dr. Margraf: That's why I suggest some other way of living. Nothing happens even though villagers keep on blaming the dam.

Mr. Mien: I cannot ignore the responsibility of dam builders. They are supposed to, or they have to conduct impact assessments to make sure the dam does not affect the downstream communities. If severe damage is inflicted on the downstream communities, the dam builders have to take responsibility.

Mr. Mien: We don't have scientific data, and that is why research activities by villagers are not very effective. The government tries not to inform people or report to people.

Ms. Goto: Do you think no more research should be done by NGOs because it is not effective?

Mr. Mien: Actually, they want to continue the monitoring project if it is possible but I want to discuss what necessary strategy is in order to complete the research.

Mr. Bonlamb: I want to think about what Mr. Margraf mentioned: alternative livelihoods for villagers. I want to know the policies of donors. They support dams while they also support natural resource management, development of health centers, and mitigation of negative impacts. I wonder why donors do such a thing. While they destroy the nature which is important for villagers, they also protect natural resources.

Mr. Matsumoto: That is why we at Mekong Watch have been working on JBIC's social and environmental guidelines and participating in the JICA's Advisory Council on Environmental and Social Considerations Review as a committee member. But in the case of Se San and Sre Pok it's not the same, because Yali Falls Dam is funded by Ukraine and Russia which are not OECD countries. While JBIC took serious steps to study the negative impacts of one dam in Vietnam, namely the Ta Trach dam, the Vietnamese government decided to cancel the support from Japan and fund it from their own sources. The common argument is that it is better for JICA or JBIC to fund projects as JICA and JBIC at least have environmental and social guidelines but, for example, Vietnamese or Chinese institutions have nothing.

Mr. Kim: The Swedish government also says things like that.

Mr. Matsumoto: That is why we need more Chinese friends.

Ms. Goto: As to the second point that Margraf mentioned. I do not think we can accept problematic development projects as they are implemented. Alternative livelihoods can be a supplement for the villagers but they should not be the substitute.

Dr. Margraf: Ownership of paddy fields could be established.

Mr. Bonlamb: I need to understand the MeREM study and a scientist, Dr. Watanabe better. I want to understand the perspective of the research in more depth. Some researchers visited us, and they told us they were completely independent consultants, but in fact they had come to do hydro modeling, and their research was used for an EIA for dam planning. We do not want to be used like that.

Dr. Watanabe: Please do not be afraid. I am completely independent from those dam builders. I am a scientist, not a politician. I want to explain why I am here now. If MRC disclosed the information they get, there would be no need to do other monitoring projects. But MRC does not disclose necessary data. That is why you have to do your own monitoring for your economic situation and health.

Dr. Watanabe: About the issue of fish production, you need to monitor it but I think research on fish migration should be done internationally. And research on health issues should be done pathologically. If an NGO is monitoring the human illnesses and animal deaths, villagers have to convey the situation clearly in detail to researchers who are totally neutral.

Dr. Margraf: The report might be independent but the report can be bought by somebody in the industrial sector, for example. Researchers come and ask thousands of questions but the report is not open to all the people. It is never disclosed. So please promise that you will never jump out after your research but that you will make the report available.

Mr. Bonlamb: I believe that you are an independent researcher and welcome you.

Mrs. Lao: As to the Sre Pok villagers, they do not have any idea of how to document environmental changes in the Sre Pok River. They do not have experience in collecting information or planning. The capacity of the villagers is very limited in documenting the changes in the river. I would like assistance from outsiders.

Dr. Watanabe: As a scientist, my philosophy is that science must meet people's needs. Now I know the problems villagers face, so I am thinking of ways to do something effective.

Mr. Matsumoto: I want to clarify the difference between NGOs, villagers and scientists. I want to clarify the different role of each stakeholder.

Ms. Goto: I want to ask 3SPN to consider whether independent monitoring should be done or not.

Ms. Noi: My answer is taking on our experience the government always to do new research, but it never used for villagers. It's important for 3SPN to do independent research.

Mr. Mien: As for me, I support the idea of independent study. What we need is to explain clearly for ourselves and communities the independence of the study, and the flexibility and level of local study.

Ms. Tandrem: I think monitoring is important when we consider compensation for the dam. Also as to Sre Pok, so many dams will be built so it is important to collect data through independent monitoring. But we have to analyze the study comprehensively.

Mr. Heang: I agree with Ms. Tandrem. In past years we conducted several research projects, but now we propose that a more scientific monitoring is necessary. I think Mekong Watch and Japanese researchers can conduct community-based monitoring studies. Such activities will be good for future studies. It can be capacity building for villagers.

Mr. Kim: I completely support my colleague. But we need to discuss methodology further.

Dr. Watanabe: You need to describe clearly the situation. Then the scientists will conduct research.

Ms.Goto: For example, if villagers say that the water is red, scientists may think of something that might be causing the water to be red. If villagers say that the water is green, scientist may identify the situation of the water.

## Day 2 Field Trip to Se San River (Wednesday, 15, February)

All the participants went on a field trip to two villages in the Ta Veng District along the Se San River. Arriving at this district town, we observed water conditions of the river. Accompanying villagers pointed out that there were many bubbles on the surface and that their color was orange. We got on boats to observe the river conditions including surface water, river beds, flow speed, vegetation and erosion of river banks.

### 1. Pau Village (ethnic Brao community)



Nearly a hundred villagers including village committee members, women and elders gathered at the village school to discuss water-related issues with us. The following is the minutes of the discussion.

Dr. Watanabe: Are there any problems with water such as illness or death because of water from the Se San River?

Villager: Problem is water of the Se San River, but children do not like the water from the well. People do not know about water quality of the river.

Mr. Matsumoto: Are there any problems which did not exist before?

Villager: Skin rash. But not so serious. It used to happen only during the rainy season, but now it happens even during the dry season.

Mr. Matsumoto: Has the color of water changed to blue or green ?

Villager: Before it never changed. It was always clean. But now it is greenish.

Dr. Watanabe: When the water comes up, what is the color of the water?

Villager: Not so clear, but not so brown, either. Brownish.

Mr. Matsumoto: Have animals died recently?

Villager: Last year, many buffalos died. About 20 buffalos died. We don't know why those animals died. Some buffalos died along the river, some died in the village, so nothing can be said clearly about causal relation, but villagers assume that buffalos died from drinking water from the Se San river as it is the only water they drink.

Mr. Matsumoto: In which season did they die?

Villager: From May to June.

Mr. Matsumoto: That is the beginning of the rainy season.

Villager: Some villagers say they died during the dry season.

Mr. Matsumoto: Is there any disease?

Villager: Pigs and chickens die during the dry season.

Mr. Matsumoto: Is that normal?

Villager: These kinds of things happened before, too. But it did not happen so often. Now it happens very often.

Dr. Watanabe: What is the relationship between the deaths of animals and the water level?

Villagers: Buffalos die during the rainy season, sometimes at the end of the dry season. There is no clear relation.

Villager: Recently, we asked to dig a well as we feel sick when we drink water from the river.

Mr. Matsumoto: Does anyone have skin rash from the water now?

[Villagers showed some cases of rash (photo, below)]





Two or three days ago, the water level rose and they got the rashes.

Villager [bringing a young boy to show us his skin]: When he came back from the river, he kept on his clothes, and it began to itch. It was about a month ago ( photo, below ) .



Mr. Matsumoto: Was the skin disease very common in this village even 10 years ago?

Villagers: Before, people never got rashes like this. Only when they went into the forest, they got itches because of insects or trees. But once they washed, it was no problem.

Mr. Kim: I think it is a mixed causal relation. I suppose there was a skin problem from the forest and

then the skin was washed in unclean water.

Mr. Matsumoto: Usually, they have fishing gear. Do they have a lot now?

Villager: Nowadays it is difficult to set the fish net. My fish net became very muddy. In the morning it becomes muddy.

Dr. Margraf: There is a possibility of water parasite.

## **2. Piyang Krawn Village (ethnic Brao community)**

This village is a “development village” where international aid programs are implemented such as a rice bank. There are 32 families living in this village, down from 52 families a few years ago. Many villagers moved upstream because they could not live here any more due to river water-related problems.



Mr. Matsumoto: Do you have any problems related to water?

Villager: Before the Yali Falls dam, everyone lived along the river and it was very easy to fish and grow vegetables. But now, it has become more difficult to grow vegetables and to fish. After the dam construction, we cannot grow corn, lemongrass, eggplant or chili any more. Many villagers now moved on to the top of the mountain, which is 4 kilometers from the village, as they fear that the Yali Falls Dam will collapse. Now the water quality is bad, so their health is also bad.

Villager: If the dam gate is opened, fishing gear, boats, and fishing nets are all easily washed away by the river. And the fishing net is also easily broken.

Villager: Mud fills the deep pools and fish cannot live in the river anymore. Fish cannot catch their food now.

Villager: The other day, there was a wedding. At that time, there was not enough water from the well, so some villagers used water from the Se San River. And they got diarrhea.



A villager pointing out the water level of last night



Sandy riverbeds along the Se San River

### Day 3 Field Trip to the Sre Pok River (Thursday, 16 February)

All the participants took a field trip to the village along the Sre Pok River. We stopped at the district town of Lumphat District and divided into two groups, one going by boat and the by car. There is a monitoring station of the Mekong River Commission in the town. It is equipped with solar panels to generate necessary electricity (photo, below left) and the gauge appeared to be installed along the steps leading down to the ferry( photo, below right ). Then, the boat group traveled on the Sre Pok River observing surface water, river beds and river banks as they did on the Se San River.



#### Nong Bua village (ethnic Lao community)

About 20 villagers, mostly elders and women, gathered for a meeting with us.



Mr. Kim: Mekong Watch is a NGO monitoring the environment in the Mekong river basin and Dr. Watanabe is a scientist from Japan. Mekong Watch came here to ask villagers about what kinds of problems they are facing related to the water in the Sre Pok River. So please tell us what kinds of impacts there have been related to agriculture, fishing and water supposedly caused by the dam construction in Vietnam.

Villager: There were two serious flooding in the rainy season. There is very little rice production and water levels change erratically. Long time ago, there were floods around here, but it was at most once in two or three years. But now, there are floods almost every year. Before, a flood only lasted 2-3 days, but now it lasts more than 7 days at one time. The river cannot be stable.

Villager: Before, villagers lived along the river to fish. But now, because of water fluctuation, our fishing net and boats are washed away and we cannot find any fish. Before Vietnam built the dam, there were many fish in the river, but after Vietnam built the dam, there are only a few fish in the river.

Villager: Before the dam construction, during the dry season, the water level was always low, but now, even during the dry season, the water level occasionally rises. We could get 15 kilograms of fish a day. But now it is reduced to no more than one kilogram a day. This year and last year, we almost cannot find any fish.

Villager: Most of the villagers have small gardens along the riverbank, but because the water level rose, many of those gardens were destroyed. During the night, water destroyed everything. This month, the water level fluctuated erratically, too. Vietnam does not know about our river gardens. Everyone tried to restore the gardens after the water rose.

Mr. Kim: When the water rises, where does it come from?

Villager: It is from the dam upstream in Vietnam. We know it because the temperature of the water was very low and not natural at all. And if we swim in this water, we get rashes on our skin. Some people even get diarrhea. Before the dam, villagers brought water from the river when it rose, but now, we do not use water from the river anymore.

Villager: Now, many cows and buffalos get ill. Some buffalos have skin disease and cannot

walk. Buffalos and cows became ill in December of last year and are still ill now. Before, cows and buffalos died from snake bites, for example, but now, they die not from poison but from water of the river. This year, everything is too bad for people and animals. Before Vietnam built the dam, there were no such problems.

Mr. Matsumoto: Where did all the fishing nets go? We see very few of them.

Villager: Fishing nets were installed everywhere before, not only near the river bank. Now people cannot find many fish, it is not enough for the whole family.

Dr. Watanabe: How is the color of the water of the river?

Villager: Normally, during dry season, the water of the river is very clear and we could see the sand or rock of the riverbed. But now we cannot see the riverbed any more as the water is unclear. Before, we could see the riverbed even when the water rose and the depth was about two meters. But now we cannot see any.

Mr. Matsumoto: Is there any request from the villagers to us?

Villager: We cannot talk to Cambodian or Vietnamese government as we do not have any channels. But we want to ask governments about the dam - what do they think about the situation in the villages? So far, no one has visited here to ask people about this matter.

Villagers: Before, during dry season, there was no rain and the water level was low. Now, during the dry season, there is no rain but the water level becomes high. Why is that? Please tell us. I want to know the reason.

Mr. Kim: There is a possibility that it only rains upstream of the region.

Villager: I don't believe that.

Mr. Matsumoto: It is a very good opportunity to convey your requests to the visitors from Japan. Please tell us what you want.

Villager: We want to request the Cambodian and Vietnamese governments not to build any more dams. It has already harmed our life so much. Before they open the gate, please at least

notify us 3-4 days in advance so that we may prepare ourselves for the water rising. In 3-4 days we can prepare so as not to lose our fishing nets or boats. Let us also talk to the Japanese prime minister, Junichiro Koizumi, not to let the Vietnamese government to do such a thing.

Villager: Before, we used water from the river for drinking. We want to restore such a river. Everyone is afraid that the Vietnamese will kill the Cambodians without using any gun.

Dr. Watanabe: According to the report by a local NGO presented on the first day of this workshop, there is no operating dam on upstream of the Sre Pok River in Vietnam. However, testimonies of villagers imply that some operation has already begun.

**Day 4 Feedback from a MeREM scientist (Friday, 17 February)**

Based on his observation of the rivers and the information provided by villagers and local NGOs during the three days of presentations and field trips to the rivers, Dr. Makoto M. Watanabe from the Mekong River Ecosystem Monitoring Project (MeREM) presented his findings and proposed monitoring activities in front of all the participants. His presentation consisted of four parts: What MeREM is; Observation and testimony of villagers along the Se San and Sre Pok Rivers; and his proposal for future monitoring work. Details of his presentation follow.

**1. About Mekong River Ecosystem Monitoring (MeREM)**

**Ecosystem research on  
Se San and Srepok Rivers**

Makoto M. Watanabe

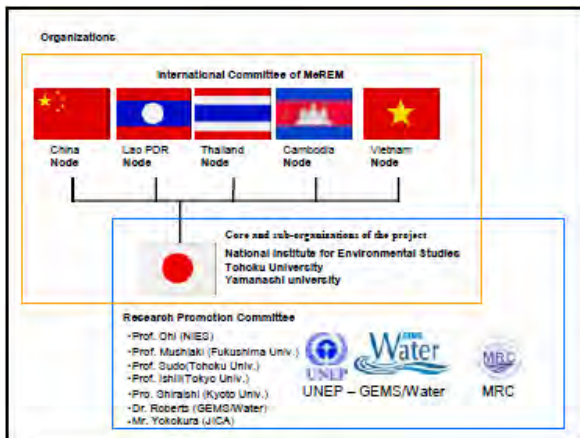
**1<sup>st</sup> Workshop in Bangkok  
15-16 Dec. 2003**



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**Mekong River Ecosystem Monitoring:  
3 year's pilot project**

First, I will introduce Mekong River Ecosystem Monitoring (MeREM). MeREM was established on December 15-16, 2003, after its inception workshop in Bangkok. In April 2004 we obtained research budget from the Ministry of Education, Culture and Sport to monitor the ecosystem of the Mekong River.



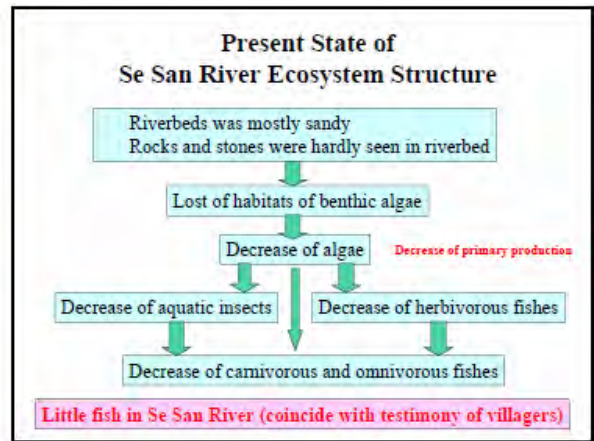
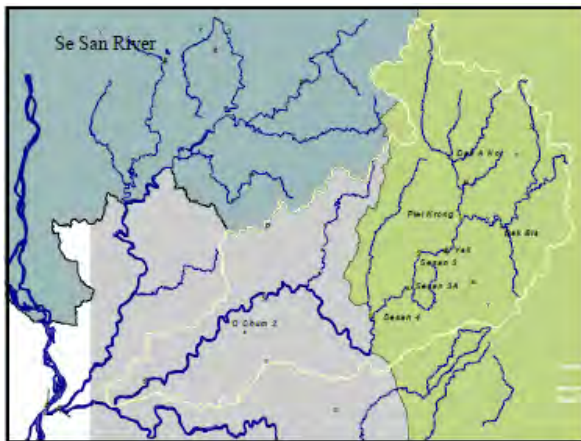
**Objectives of Pilot Project of MeREM**

- To survey appropriate monitoring sites, frequency of monitoring requirements and parameters to be measured,
- To build up the international collaboration system including national nodes,
- To standardize methodologies and construct a quality control and assessment system,
- To survey the capacity of member countries to undertake hydrology, water quality and biodiversity studies in each country,
- To identify capacity building requirements in participating countries,
- To develop a database and information sharing system.



The organization of MeREM is shown on the screen. The National Institute for Environmental Studies (NIES) is at its core, and Tohoku and Yamanashi Universities are responsible for the MeREM project. MeREM researchers include those from China, Lao PDR, Thailand, Cambodia and Vietnam.

## 2. Observation of the Se San River and testimonies of riparian villagers



This is the Se San River. We went to the Se San River basin. In my observation, I think that the present state of the Se San River ecosystem is as follows. As you know, the riverbed is mostly sand. Rocks and stones are hardly seen in the riverbed. This kind of environment is called, lost of habitats, lost of benthic algae. This, in turn, leads to the decrease of algae or the decrease of primary production. The decrease of algae leads to the decrease of aquatic insects, herbivorous fish, carnivorous fish and omnivorous fish. This seems to be the mechanism of the drastic decline of fish catches along Se San River.

**Sandiness of Riverbed**

Before dam operation: River beds were sandy and rocky, being different from the present state of sandy beds at whole regions. (According to testimony of many participants)

- Usually surface water is released from dam reservoir but also bottom water may be released to reduce sedimentation in dam reservoir.
- In the former case, increased downstream soil erosion due to the large size of water surges is responsible for sandiness of river bed
- In the latter case, highly turbid water with huge amounts of sediments is released, resulting in the sandiness

**Present State of Water Quality of Se San River Ecosystem**

According to testimony of villagers and report of fisheries office, RP in 2000

- Human and domestic animal death by drinking river water
- Skin rash and eye irritation of some villagers bathing and swimming in the river (most common)
- These symptoms never occurred before the dam construction.
- The health problems occur particularly after water level rising due to water release from dam reservoir

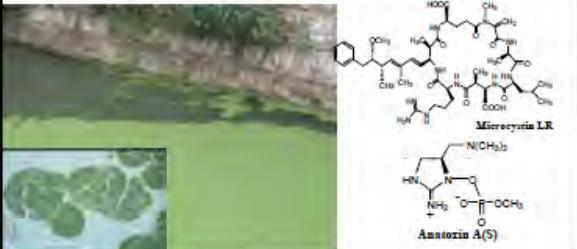
So, what caused the sandiness of the riverbed? The sandiness of the riverbed was caused by dam operation. According to the testimony of many villagers, the riverbeds were sandy and rocky, which is different from the present riverbeds which are sandy throughout the region. Usually surface water is released from the dam reservoir but bottom water also may be released to reduce sedimentation in the dam reservoir. When surface water is released, the large water surges cause an increase in soil erosion downstream, which in turn is responsible for the sandiness of the riverbed. When bottom water is released, highly turbid water with huge amounts of sediment is released, resulting in sandiness. I think that the sandiness of the riverbed is caused by dam operation. This is the present situation of the Se San.

According to the testimony of villagers and the report published by the fisheries office in 2000, villagers and domestic animals died from drinking water from the river. Skin rashes and eye irritation are most commonly found among villagers who bathe and swim in the river.

**What causes health problems for human and domestic animals?**

Toxic blue-green algae: water-borne and water-contact diseases  
Are they developing in Yali reservoir?

Their presence was not recognized in this field survey



**Other possible causes**

- **Nitrate poisoning:** causing cyanosis, respiratory problem, diarrhea, stomach aches, dizziness, vomiting, coma, etc
- **Parasite infections**
- **Harmful chemicals**

What causes health problems for humans and domestic animals? I suspect that toxic blue-green algae cause water-borne and water-contacted diseases. Are they developing in the Yali Falls Dam reservoir? Their presence was not recognized in this field survey. Toxic blue-green algae look like this (above left). In small dams, there are many toxic blue-green algae in the reservoir. They grow very fast. It is still found in Cambodia. It produces very toxic things. It is very dangerous.

Villagers: Some villagers recognized such algae in some places along the river and in the lake.

Dr. Watanabe: It blooms like this. Other possible causes are: **Nitrate poisoning** causing cyanosis respiratory problem, diarrhea, stomachaches, dizziness, vomiting, coma, etc; **parasite infections**; and **harmful chemicals**. I think that toxic blue algae are the most possible cause.

The symptoms never occurred before the dam construction. The health problems occur particularly after a rise in the water level due to released water from the dam reservoir.

### 3. Observation of the Sre Pok River and testimonies of riparian villagers



**Present state of Sre Pok River Ecosystem**

Riverbed: sandy and rocky  
Benthic algae and aquatic insects were observed

According to testimony of villagers

- Flooding: 3 times in 2005-2006: two (big) at rainy season and one at the beginning of dry season.
- Staying duration of Flooding: over one week, being longer than usual (a few days)
- Climate: cool and little rain in 2005-2006 Why does flooding occur two times within this year?
- Water level sometimes changes and fish catch declined
- Water was clear at dry season but not clear this year
- Skin rash and diarrhea after swimming in and drinking river water

**As doubted by villagers, dam may be operated on trial**

Yesterday, we went to this place on the map. From my observation, the Sre Pok riverbed is sandy and rocky, and I saw benthic algae and aquatic insects, so it is in a very sound situation. Testimonies of villagers are as shown on the slide (above right).

### 4. Necessary actions, proposed monitoring parameters and methods

**What researches are urgently needed?**

1. Water quality including toxic blue-green algae and parasites
2. Monitoring water level
3. Both should be conducted in Se San and Sre Pok Rivers
4. Ecosystem restoration of Se San River

These have been monitored by MRC, Local government, etc, but data obtained were never open to the public. Environmental researchers have never concerned about the Se San River Issues. Why? On behalf of environmental scientists, I apologize to all of you and villagers for our negligence.

Pretreatment methods for checking water quality parameters

Parameter to be checked

- Total phosphorus [TP],
- Total dissolved phosphorus [TDP],
- Ortho-phosphate [PO4-P],
- Total nitrogen [TN],
- Total dissolved nitrogen [TDN],
- Ammonium nitrogen [NH4-N],
- Nitrite-nitrogen [NO2-N],
- Nitrate-nitrogen [NO3-N],
- Total organic carbon [TOC],
- Particulate organic carbon [POC],
- Particulate organic nitrogen [PON],
- Dissolved organic carbon [DOC]
- Ultraviolet absorbance at 260 nm [UV260]
- Dissolved Metals by ICP

The slide (above left) shows urgently needed research actions. The reason I say “urgent” is that the problems are related to the health of villagers and domestic animals. As shown in the

slide, monitoring should aim to identify possible causes of the health problems as well as the correlation with water fluctuation along both Se San and Sre Pok Rivers. Identifying the causes of fish decline, human health problems and deaths of animals will give us an idea of how to restore the ecosystem of the Se San River and the livelihoods of villagers.

The slide (above right) indicates important parameters to help identify the causes. Since it is too technical, I will not go into details. But please understand the reasons why I selected such parameters.

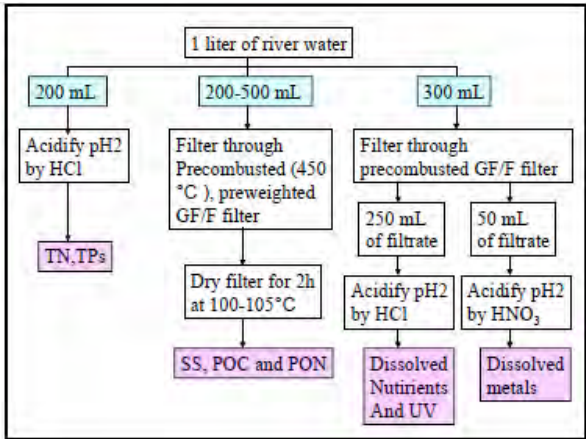
The next six slides indicate concrete methods of sampling and pretreatment, which we asked villagers and the local NGO to use. We need collaboration with villagers in two procedures. The first is to collect one liter of water from the riverbeds as described in the slide. The second is to conduct the pretreatment, which looks complicated but is not so difficult. If you can cook, you can do it after a short-term training. All the necessary devices should be provided by MeREM. Then, please send those samples to the core laboratory of MeREM at Kasetsart University in Bangkok. Scientists will analyze the water quality and send back the results to villagers. This monitoring will result in detecting total nitrogen, total phosphorous, dissolved nutrients and UV, and dissolved metals.

### Pretreatment Procedure

1. Collect about **1 liter of sample** in a plastic bottle at each sampling site.
2. Shake vigorously the bottle and transfer **about 200 mL** to a plastic bottle **for TP and TN determinations.**
3. Acidify the sample to about pH 2 with HCl.

4. Filter **an appropriate amount of the sample** (100-500 mL) through a precombusted (450°C for 4 h) and preweighted Whatman GF/F filter (47mm in diameter, nominal pore size 0.7 mm) **for suspended solids (SS), POC, and PON determinations.** A suitable amount of SS remaining on the filter is around 10 mg.
5. Dry the filter for 2 h at 105-100°C in an oven, cool in a desiccator to balance temperature, and weight. Do SS determination twice for each sample for preparing duplicate samples for POC and PON determination.
6. Fold the weighted filter in two, making the side with SS face inside. Wrap the filter with a sheet of aluminum foil and fold it tightly. The weighted filter is to be used for the determination of POC and PON.

7. Filter the rest of the sample through a precombusted Whatman GF/F filter.
8. Transfer **250 mL of the filtrate** to a plastic bottle for the **determination of dissolved nutrients, DOC, and UV260.**
9. Acidify the filtrate to about pH 2 with HCl.
10. Transfer **30 to 50 mL of the filtrate** to a plastic bottle for the **determination of dissolved metals.**
11. Acidify the filtrate with concentrated HNO<sub>3</sub> to be 1 % HNO<sub>3</sub> (v/v) or pH less than 2.



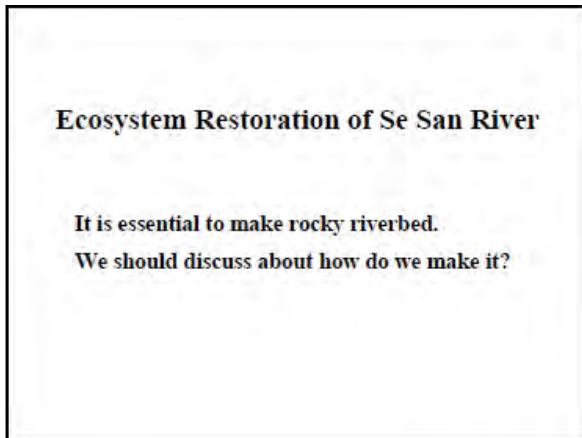
- Things prepared for each sample
- 1. one 200 mL bottle of unfiltered sample acidified to about pH 2 with HCl
  - I 2. two Whatman GF/F filters having SS wrapped with aluminum foil
  - I 3. one 250 mL bottle of sample filtrate acidified to about pH 2 with HCl
  - I 4. one 30-50 mL bottle of sample filtrate acidified to be 1% HNO<sub>3</sub>(v/v) with concentrated HNO<sub>3</sub>

- Blank check
- one 250 mL bottle of Milli-Q water (or equivalent such as deionized distilled water or distilled water) acidified to about pH 2 with HCl
- How to send samples
- Sample bottles are better to be sent frozen if possible. Otherwise, just send them as they are.
- Things needed to make sample pretreatment
- filtration apparatus, glass or plastic
  - Combusted, preweighted GF/F filter (47mm in diameter)
  - desiccator and balance
  - HCl and HNO<sub>3</sub>
  - plastic bottles
  - Milli-Q water or equivalent
  - pH meter or equivalent such as pH indicator paper
  - plastic bottles

- Pretreatment methods for checking toxic cyanobacteria and their toxins**
- Parameter to be checked  
Microcystins (WHO guideline value=1 µg/L)
- Toxic cyanobacteria
1. Pretreatment Procedure for toxin analysis
    - Collect about 100 mL of sample in a 250 mL plastic bottle at each sampling site. Add 100 mL methanol into the sample and keep it in refrigerator.
  2. Pretreatment Procedure for estimation of abundance of toxic cyanobacteria
    - Collect about 100 mL of sample from water surface at each sampling site. Add 2mL of glutaraldehyde and mixed gently and well. Keep it in refrigerator.

- How to set auto-monitor of water level**
- Auto-monitors of water level will be set each of Se San and Srepok Rivers for watching water release from dam reservoir.**
- The expenses will be covered by MeREM. It is needed to:**
1. Estimate the cost for setting the two auto-monitors
  2. Get permission from local government
  3. Maintain monitors

The slide (above left) explains how additional sampling and pretreatment can be done to check if the collected water includes toxic blue-green algae or not. The slide (above right) explains the necessary process to install the equipment to monitor the water level automatically.



In order to restore the ecosystem of the Se San River (above left), it is essential to recover rocky riverbeds where fish can feed and survive. I would like to encourage participants to discuss how to make it possible.

### **Questions & Answers, Discussion**

Mr. Matsumoto: One way to restore the rocky riverbed is to take the sand out. And the sand can be used to construct roads.

Villager: I am worried about the impacts of this restoration project if the dams continue to be built in Vietnam.

Dr. Watanabe: Of course, if the dams operate in the same way, the river won't be recovered. Even if we take the sand out, if dams continue to operate in the same way, the results will be the same. So we need to change the way the dam is operated, too. It is necessary to operate dams in harmony with the river ecology.

Villager: The method is very complicated. I am wondering how the project can be made more realistic.

Dr. Watanabe: Before June this year, we will come here again and hold a small training session or demonstration about how to do this.

Mr. Matsumoto: It is important to confirm whether villagers think Dr. Watanabe's observation is correct. If there are any points that villagers need to challenge, it is better to identify them now.

Mr. Bonlamb: I feel that Dr. Watanabe's observation is very important for the people along the Se San and Sre Pok Rivers. However, villagers need training to understand the monitoring work.

Dr. Watanabe: We have organized several training sessions in the framework of MeREM. However, we have not had one in Cambodia. So now, I have decided to hold a training session in Cambodia.

Mr. Bun Hean: It is a very important research project and it is significant that Dr. Watanabe is working to help villagers because we need more scientific information to present to the governments and to develop a plan in Sre Pok River for the future to solve the problems. Actually, the capacity for understanding this research is very limited, so we hope Dr. Watanabe and MeREM will cooperate with us.

Mr. Mien: I want to discuss further the resource persons who work with villagers and help collect data and monitor them in the field.

Mr. Kim: It should be discussed more in detail in June or May when Dr. Watanabe comes back.

Dr. Watanabe: The frequency of water collection is about once a week. It should be done in one site on the Se San River and one on the Sre Pok River.

Dr. Watanabe: The samples have to be kept in a refrigerator or an ice box but they should NOT be frozen.

Mr. Matsumoto: Once a week is reasonable in a way. Since there is no electricity in the potential monitoring sites along the Se San and Sre Pok Rivers, 3SPN staff may be able to collect samples from villages once every week or two and keep them in a refrigerator in Banlung. After collecting about 15 bottles, 3SPN should send them to the core laboratory in Bangkok or another possible facility in Phnom Penh.

Mr. Matsumoto: It's important to estimate the cost of installing the water level monitoring equipment in the two rivers and to get permission from relevant authorities to install it. Monitoring the water level is important in finding the correlation between changes in the water level and water quality.

## Conclusion

We set up three key objectives of the 4-day workshop in Ratanakiri Province of Cambodia. The first is for MeREM scientist(s) to recognize the severity of social impacts caused by the changes in the water level and quality in major international Mekong tributaries such as the Se San and Sre Pok Rivers. The second is to build trust between MeREM scientist(s) and local people for possible future collaboration in community-based ecosystem monitoring along the two rivers. The third is for Japanese and Cambodian NGOs to agree to collaborate in facilitating community-based ecosystem monitoring with MeREM scientist(s). All the objectives were achieved. It is especially remarkable that villagers and the local NGO in Cambodia expressed very positive impressions of the contribution from MeREM and strong hopes for future collaboration. The concrete outcomes of the workshop are as follows;

- (1) Villagers, NGOs (in Cambodia and Japan) and MeREM scientist will continue to work on this issue.
- (2) Training or demonstration for sampling and pretreatment for water quality monitoring will be held in Ratanakiri in the middle of 2006. Based on the training or demonstration, villagers will decide if they will start a community-based ecosystem monitoring project.
- (3) MeREM will help to finance the establishment of water level monitoring points along the two rivers if they can get official approval.

On the other hand, there are several issues to be settled or discussed in the next few months.

- (1) How to keep samples collected in the villages in given conditions
- (2) How to send treated waters to the core laboratory in Bangkok
- (3) How to get official approval to install monitoring equipment along the two rivers
- (4) Where water level monitoring equipment should be installed in order to avoid river bank erosion or flooding

Despite these unsettled issues, the workshop produced very positive outcomes in the collaboration between civil society in the Mekong region and MeREM scientists. Since one of the key challenges for MeREM is to make natural science data or the project itself contribute to society or people, this workshop provided very good lessons for future actions.



## APPENDIX 1

Following list is existing researches on Se San and Sre Pok Rivers Environmental Change:

Baird, Ian (2005) Major Fish Migration in the Lao-Cambodia Mekong Area, presentation for the Northeast Cambodia Fishery Forum, SPN / GAPE / TERRA / NGO Forum on Cambodia / CEPA / FACT, Stung Treng, Cambodia

Baird, Ian et al. (2002) *A Community-based Study of the Downstream Impacts of the Yali Falls Dam Along the Se San, Sre Pok and Se Kong Rivers in Stung Treng Province, Northeast Cambodia*, March 2002

Baird, Ian (2001) *An Update on the Situation in Communities Located Along the Se San River Impacted by the Yali Falls Dam in Northwest Cambodia, and Consultations with Local People Regarding Establishing a Network of Se San Communities*, NTFP Project, July 2001.

Classen, Andrea H (2004) *Abundance, Distribution and Reproductive Success of Sandbar Nesting birds below the Yali Falls Hydropower Dam on the Se San River, Northeastern Cambodia*, March 2004

CRES (2001) *Study into Impact of Yali Falls Dam on Resettled and Downstream Communities*, Center for Natural Resources & Environmental Studies, Vietnam National University

Kawai, Hisashi (1993) Mekong-gawa Sougou Kaihatsu no Doukou (in Japanese, Trends of the Mekong River Comprehensive Development), *Kokusai Nouringyou Kyouryoku* Vol15 No.4, Kokusai Nouringyou Kyouryoku Kyokai, in Hori, Hiroshi (1996) *Mekong-gawa* (in Japanese, Mekong River), Kokin-shoin

Matsumoto, Satoru (2003) Mekong-chiiki: Chiiki Zentai no Shiminshakai no Koe wo Hanheisuru Shikumi wo (Mekong region: Establish mechanisms to reflect voices of civil societies in the whole region), Nihon Kankyou Kaigi ed. *Ajia Kankyou Hakusho* 2003/04 (in Japanese, Asian Environment White Paper)

NGO Forum on Cambodia (2005), *Down River, The Consequences of Vietnam's Se San River Dams on Life in Cambodia and Their Meaning in International Law*, December 2005

NGO Forum on Cambodia, SPN, GAPE, TERRA, CEPA, FACT (2005) Declaration of the Northeastern Cambodia Fishery Forum, prepared during the Northeast Cambodia Fishery Forum, Stung Treng, Cambodia, February 2005

The Fisheries Office, Ratanakiri Province (2000), *A Study of the Downstream Impacts of the Yali Falls Dam in the Se San River Basin in Ratanakiri Province, Northeast Cambodia*, May 2000

Ojendal, Joakim, Mathur, Vikrom and Mak Sithirith (2002) *Environmental Governance in the Mekong Hydropower Site Selection Processes in the Se San and Sre Pok Basins*, SEI/REPSI Report Series No.4, Stockholm Environment Institute

TERRA (2000) *Impacts of Vietnam's Yali Falls Dam reported in Ratanakiri, Watershed Vol5 No.3* March-June 2000

## APPENDIX 2

Following article was written by a Cambodian journalist who participated this workshop.

### Villagers Count Costs of Dam in Vietnam (by Mr. POUV SAVUTH)

More than six years after flash floods first hit this and other villages in north-eastern Cambodia, drowning people and sweeping away homes and livelihoods, families living along the Sesan river live in fear of the ill effects flowing from a dam across the border in Vietnam.

But unlike in 1996 when they were caught unawares, villagers in Ratanakiri province are more vigilant in facing the troubles they attribute to the Yali Falls dam in Vietnam -- erratic releases of water that caused flash floods when the dam was being built, followed by fluctuations in the river's flow after it became fully operational in 2001.

This time, they are holding community meetings and joining protests to speak out against plans by Vietnam to build more dams on the Sesan river, one of the largest tributaries of the Mekong river that reaches Cambodia after flowing through Vietnam.

After completing the Yali Falls dam, located 70 kilometres upstream from the Cambodia-Vietnam border, Vietnam reportedly started work in June 2002 on the 273 million dollar 273-mw Sesan 3 dam project, 20 km downstream from Yali Falls. It has plans to construct the 320-mw Sesan 4 dam in 2004.

"All river users in this region have rights, not just hydro developers, argues Kim Sangha, coordinator of the Sesan River Protection Network. "Those rights must be enshrined in a clear set of rules and procedures for dam building which take local people into account."

The roots of the villagers' anger run deep.

Villagers in Ratanakiri, like those in neighbouring Stung Treng province to the west, recall how in 1996 an elderly woman was swept away by gushing water from the Sesan. Later that year, a three-year-old girl drowned when the river suddenly swelled.

Villagers and activists blame those flash floods on the large amounts of water discharged during the construction of the Yali Falls' 720 mw hydroelectric dam in Vietnam, and also from its 64-km reservoir.

"My two hectares of rice paddies were rotten, fishing nets, over ten chickens, one boat and vegetables were ruined by irregular water levels caused by the dam releases," 52-year-old Ha Si Nan from Kachhorn village says of her experience in 2001.

Reports from local and international NGOs say at least 36 people have drowned due to erratic releases of water from the Yali dam, and some 50,000 Cambodian villagers affected.

Higher-than-normal floods and lower-than-normal dry season flows have confused and worried locals and disrupted the river's ecology.

Villagers like Thorng Penh are surprised that flooding occurs during the dry and rainy seasons. "I was born here and have lived here for over 50 years but I have never seen such strange flooding like this," she says. "(In 2001), four Kheng minorities tried to cross the river, but their boat overturned and all of them died as water rose quickly."

One villager recalls that the Sesan used to be a source of drinking water, but now the water is murky. Drinking it causes pains in the throat, chest and stomach. Bathing in the river causes skin rashes and sores.

Some Cambodian authorities appear to downplay the dam's impact. As Muong Poy, Ratanakiri's co-governor, puts it, "The situation (involving) water releases from the Yali Falls dam is better (now) than in 1996 and 1997 and the problem it causes among the people downstream in Cambodia is not as serious now."

Chan Bun Thoeun, deputy director of Ratanakiri Service for Water Resources and Meteorology, adds: "Flooding disasters don't occur any more and water quality is not also bad. The Vietnamese use proper technical equipment at the time of releasing water."

But these do little to reassure angry Cambodian villagers, especially with plans for other Vietnamese dams along the Sesan. "One dam has caused enough problems. I have lost my rice fields, animals and there are less fish to catch in the river. Do they want us all to die?" news reports quote one villager from Stung Treng as saying.

Together with activists, villagers want a stop to dam-building in Vietnam until a public hearing is held to discuss the impacts of these projects. Foreign aid watchdog Probe International, along with the U.S.-based International Rivers Network (IRN) and other activists, brought its case against Electricite de Vietnam (EVN) to the World Bank, asking it to investigate the company for its failure to mitigate and compensate for damages the Yali dam has caused.

"As a major donor to EVN, the World Bank has a responsibility to ensure that its client-utility is held accountable for the environmental damages and economic losses incurred by downstream communities," they said in a letter to World Bank president James Wolfensohn dated October 10, 2002.

Critics also say the Phnom-Penh based MRC, composed of the lower Mekong countries of Cambodia, Thailand, Laos and Vietnam, failed to coordinate members' actions that could have prevented destruction and death in north-eastern Cambodia.

Among others, MRC maintains that at the time of the environmental impact assessment (EIA) of the Yali project in the early nineties, Cambodia was still embroiled in internal conflict and was unsafe to visit. The EIA for the Yali Falls dam was conducted by the Swiss company Electrowatt Engineering.

MRC chief Joern Kristensen has said that the commission helped steer the creation of a Vietnam-Cambodia panel to discuss "the environment impact, management, adverse effects, the (Yali) dam's water release and future construction".

"MRC cannot dictate the direction or decisions that the committee makes. That is the responsibility of the two governments concerned," he wrote to a Cambodian newspaper last year.

Villagers on the Vietnamese side have not been spared the effects of the Yali Falls dam project—and most probably future projects too. Vietnamese affected by flooding have been resettled, says the Centre for Natural Resources and Environment Studies, a Vietnamese research organisation.

But it said the resettlement and compensation varied, with ethnic minorities receiving less assistance than Kinh (Vietnamese) people. About 40 percent of the 6,800 people relocated because of the dam were Kinh.

Uneven distribution of cash and other provisions were reported, but as one ethnic villager told the centre: "We take what they give us."

"We like the new house, although it is small. But we are all hungry because there is no land left for us to cultivate to feed the family," another Vietnamese villager was quoted as saying.

Pouv Savuth of 'Reach Theany' newspaper in Phnom Penh wrote this story under the IPS-Rockefeller media fellowship programme 'Our Mekong: A Vision amid Globalisation'