No.6
November 2012

6

Equatorial Biomass Society

Reports from Project Members

Grant-in-Aid for Scientific Research (S)

Planted Forests in Equatorial Southeast Asia:

Human-nature Interactions in High Biomass Society

Reports from Project Members

Bank Erosion along the Rajang River and Its Social Impacts

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Introduction

The district of Sarawak, Malaysia is stretched in the tropical forest and the residents of this area are facing a drastic environment change ever since the logging operation began. One example is the Rajang river basin (Fig. 1) where people witness serious riverbank erosion. According to the residents, the problem began to surface from the end of 1960s or 70s which coincide with the transition period of social economy in this area when logging operations in the forests and the service of express boats (speed passenger boats connecting towns along with the river) started. In this period, various high power vessels began their services and many people believe ship-generated-wave caused by those large vessels gradually but surely eroded the riverbank. But if we see the event from fluvial landscape perspective, maybe we should understand the situation is a part of long-term river channel process.

The riverbank erosion is easily to see in the middle and lower part of Rajang river (photo 1) where population density is relatively higher. While in some areas, riverbank protection is underway but the cause investigation of the erosion is not. This makes all measures ad hoc and their effectiveness is highly doubtful. Without sufficient knowledge of geomorphology regarding river channel form and its changing process and the assessment of the damage caused by the erosion, an effective measure is difficult to plan.

Rajang river is more than 700 km and it shows many faces fluvial landscapes along its flow river channel. The river channel form path and flow regime must be taken into account for evaluation of riverbank erosion. We examined the topographical and hydrological characteristic of Rajang river, especially in the regions crucially

Photo1: A typical riverbank erosion site in Rajang river
The playground of riverside primary school is deeply-eroded and children are no longer able to play football in the field. Along the river there are several schools facing the same situation.

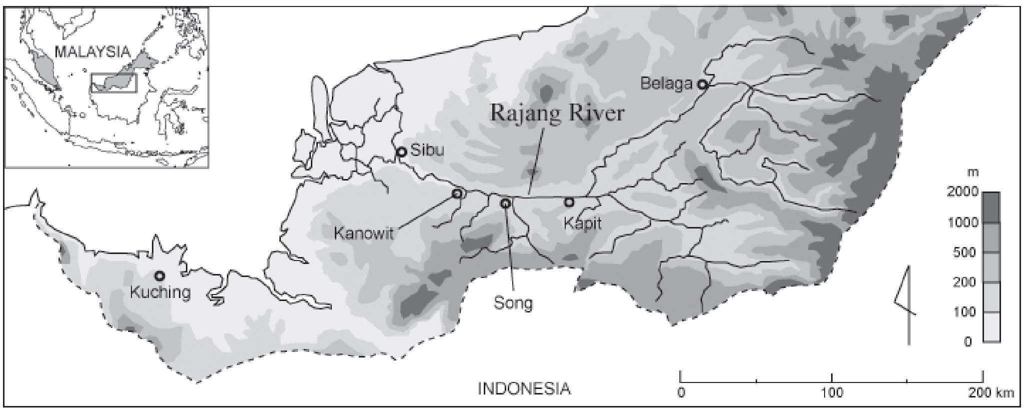

Fig.1: Study area

damaged by riverbank erosion. As the river runs tropical area, it is different from Japanese rivers in many ways. As the amount of precipitation in this Rajang river area is almost doubles that of Japanese annual mean precipitation, the river flow volume of the Rajang is far larger than Japanese rivers. Furthermore, the weathering rate of rock is quite rapid, because this area has humid tropical climate. To understand the changing process of fluvial landscape in this area will be significant as an assignment of geomorphology. As mentioned before, this low-lying area is the center of the local communities. How local people cope with the environmental transformation symbolized by the riverbank erosion gives us an intriguing research topic.

Here is a tentative report of our research, based on field study in March and August of 2010 on the situation of riverbank erosion and its influence on the local communities.

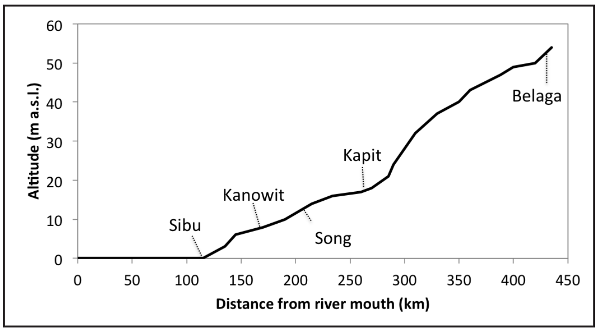

Fig.2: Longitudinal profile of Rajang river

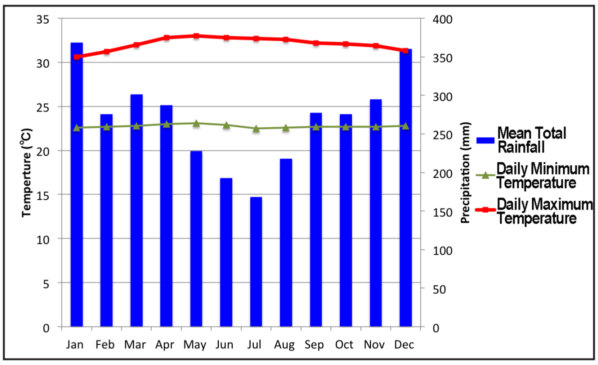

Fig.3: Monthly mean precipitation in Sibu (1971-2000)
(Based on World Weather Information Service).

Study area

Rajang river runs through in the middle of the state of Sarawak. The river is the longest and the largest in Malaysia; it is 760 km in length and has a drainage area of 50,000 km^2. The headstream is located in Iran Mountains that divides the state of Sarawak and Indonesia. The river runs into the center part of the state and reaches the South China Sea. The study area is covered by Paleogene mudstone. The main ridge along with the strike of bed stretches in the east-west by the pressure from north-south direction of the Indo-Australian Plate movement. Thus, Rajang river runs along the subsequent valley.

Fig. 2 illustrates the river's longitudinal profile. The stream gradient is considerably lower than Japanese rivers: the elevation of the river is merely 55 m at the town of Belaga, approximately 435 km away from the mouth of the river. The river runs through mountain area till it reaches Kanowit and from there, the landscape changes into alluvial plain. The river channel meanders through delta plain beyond Sibu. This delta plain of peat layer was formed in the Holocene epoch (Gastald, 2010). The area lies in tropical rainforest climate. Precipitation during June to August is relatively low while it rains a lot in December and January (Fig. 3). This makes the flow of the river show considerable seasonal changes through the year.

Methods

We observed the landform, the flow and the bank erosion of the river, taking a boat from the river mouth to the town of Belaga. We classified the patterns of channel form based on our observation results, topographical maps, geological maps, aerial photos and satellite image. In order to confirm the distribution of riverbank erosion (its scale and range) we recorded the erosion sites on the topographical maps with a scale of 1 / 50,000 and made a distribution map of riverbank erosion along the river using GIS (Geographic Information System).

At the sites where severe erosions were observed or showed characteristic landforms, we conducted in depth observation by chartering a longboat (a small vessel for daily use for local residents). In some erosion sites, we paid visits to longhouses and primary schools along the river to conduct interviews with the residents and teachers.

The conditions of riverbank erosion

From Kanowit to Belaga, we observed many erosion sites and we described their distribution and characteristics. As a result of our field research, we found 225 sites of erosion along a-265 km section between Kanowit and Belaga. Fig. 4 illustrates the distribution of erosion sites near Kanowit, approximately 165 km from the mouth of the river. The direction of river channel is displaying geological strike. While the zone indicated in Fig. 4 is less than 20 km of distance of approx. 265 km of our research area, there are 35 sites of erosion.

Based on geomorphological characteristics and distribution pattern of erosion sites obtained from our field work, we grouped landforms of riverbank erosion of this area. The erosion types of this area are divided into following patterns. Type I: slope failure, type II: erosion in slip-off slopes and linear channel, type III: erosion in undercut slopes.

Type I (Slope failure) shows shallow landslide on riverbank slope. In any sites this failure can be observed gravels from collapsed ground were piled up upon sediments such as sand and mud. This heap of gravel was quite unstable and it was difficult to climb up (Photo 3). Those sites were, however, covered with trees and weeds before. Type II can be found in erosion sites in the inner side of a curve of the river and in the linear part of the river where the influence of stream of river flow is relatively small. A riverbank with gentle slope has been eroded and turned into a sudden vertical drop (Photo 4, 5). The cycle of dry and rainy seasons and a drastic fluctuation of water level of the river are major causes of the erosion. The residents in this area pointed out the influence of the waves generated by large vessels such as express boats. Looking closely at the sediments piled up under the vertical drops, in some spots, we found different kinds of wastes: grass shards, wood chips, and concrete pieces. In such spots, those rubbles might erode the bank of the river especially during flooded season with the help of the ship waves. Many residents are forced to

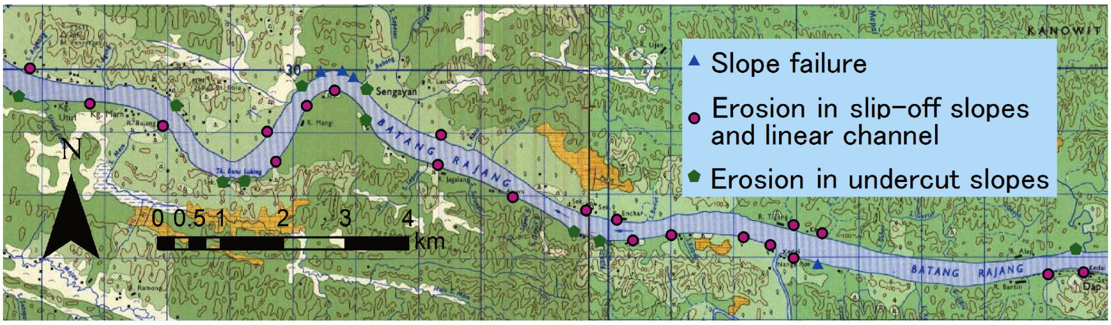

Fig.4: Distribution of erosion sites upstream of Kanowit

Photo2: Riverbank erosion by slope failure (Type I)
The ridge of the hill protrudes to the river.

Photo3: The deposits by slope failure
The ground is very unstable. The gravels are piling up on sand and mud.

dwell in narrow flat areas upper part of the riverbank. Type III can be found in water colliding fronts where a river meanders and water stream concentrates on the curve. Major factor of this area's erosion could be attributed to the flow of the river.

Social Impacts

In the middle and lower part of Rajang river we witnessed many longhouses, schools and even towns (shop houses) were in jeopardy because of riverbank erosion (Photo 6). In fact, according to the residents, many longhouses have been lost due to the erosion. Landing bridges, installed in the riverbank are needed to be fixed or rebuild in every few years because of the erosion (Photo 7). Fortunately the speed of erosion is not so fast; the river eats away its bank a few meters each year. This allows the residents to disassemble their longhouses for relocation in the back of flat area. This may seem the solution for the problem but the cost issue is no small matter for them. The forest surrounding their residential area is no longer rich enough to fulfill their needs, so they have to purchase building materials in town. Most good flat areas to build new longhouse (river terraces) have been bought up by the ethnic Chinese farmers for over the century. As a result, not a few residents have trouble to find the new place to settle down. Some residents go so far as to say, "Our lives at stake because of those greedy Chinese." This clearly indicates the problem of riverbank erosion in Rajang river is no longer a simple natural disaster but a social issue that includes the potential crisis of ethnic problem as well as land issues.

Photo4: Riverbank erosion in slip-off slopes (Type II)
According to the residents the riverbank collapsed during the period of flood when express boat generated waves hit the bank.

Photo6: A longhouse near the scarp of collapse

Photo5: The same spot of Photo4 after water receded
Debris of collapsed riverbank, clay-like soils can be seen.

Photo7: Old short stakes can be seen on the flame of boarding bridge
In this photo, shorter stakes can be seen in encircled areas. Those stakes were in use before as the slope of the riverbank was far gentler but because of the erosion the slope of the bank became much lower than before. The interview with the residents confirmed the fact.

Conclusion

In order to get the gist of the erosion issue of Rajang river and its impacts on the local communities, we made a distribution map of the erosion sites and sorted them into some categories. In addition, we conducted interviews to the local residents. Based on the geomorphic characteristics and distribution patterns, the erosion pattern in this area can be divided into the following categories. Type I: slope failure, type II: erosion in slip-off slopes and linear channel, and type III: erosion in undercut slopes. The issue significantly affects the daily lives of the local residents and it has a potential impact to bring on ethnic problems in the local society.

Further data accumulation and its analysis are needed to speculate on the cause of the erosion on the bank of Rajang river. It is premature to pin down the cause of landform change to hot and humid tropical environment of this area and its high weathering rate or this is the product of social change as many local residents believe that it is a disaster resulting from acts of human beings. We need to carry on further research from the viewpoint of river geomorphology. We also need to pay attention to see what does landform changes along Rajang river area bring along to the society of its riverine society.

References

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This article is reprinted from the 6th issue of Japanese newsletter of this project

River Water Quality and Landscape in the Kumena and Tatau Basins, Sarawak, Malaysia

Keitaro Fukushima
(Field Science Education and Research Center, Kyoto University)

River water quality is a very useful indicator of upstream terrestrial environment including land use, geology, lifestyle, development of infrastructure, and so forth. For example, the concentrations of calcium (Ca^{2+}), magnesium (Mg^{2+}) ions and dissolved silica (Si) are mainly controlled by underlying bedrock geology; nitrogen (N) and phosphorus (P) concentrations reflect land use such as agriculture and urbanization; and chloride ion (Cl^-) concentration is likely proportional to the distance from the sea. Mines, factories, and livestock facilities can discharge high concentrations of N, P, certain metals, and other pollutants into rivers as the point source. Forest clear-cutting and land use changes, such as forest to agricultural or residential areas and natural to plantation forests, alter river water quality including N on a time scale of years to decades. Plant growth in forests, fertilization in agricultural lands and people's daily lives affect river water quality on a time scale of days to a year. Therefore, in order to comprehend the relationship between land use and river water quality, not only spatial distributions over a basin, but also temporal patterns of water quality at the same point are required.

People living in the basin use river water as a source of drinking water and for agricultural and industrial water. Productivity and survival of riverine and marine biology highly depend on water quality, and consequently it makes or breaks a fishery's success. Because we can speculate about the reason for the changes in river water quality and its influences on human life, it is necessary to conserve and monitor river water quality to secure a foundation for people's lives, similar to conducting urine and blood tests to evaluate our health. That's why water quality surveys are compared to medical checkups.

In Sarawak, Malaysia, tropical natural forests and rubber and timber cultivation areas have been converted into magnificent acacia and oil palm plantations over the past few decades. In order to elucidate the influences of this landscape shift on river water quality, we will analyze (1) the relationship between each land use and water quality, and (2) the changes in water quality downstream in the Kemena and the Tatau basins. In our research, nitrate nitrogen (NO_3^-), dissolved organic carbon (DOC) and suspended sediments (SS) in river water are significant substances for meeting our objectives. The characteristics of these substances are introduced below.

1) NO_3^-

In many tropical and temperate forests, plants' growth (or net primary production) is limited by N, because of small storages and low supply rates of available plant N (i.e., NO_3^- and ammonium [NH_4^+] N) in soil. Plant uptake of NO_3^- largely minimizes its leaching from the

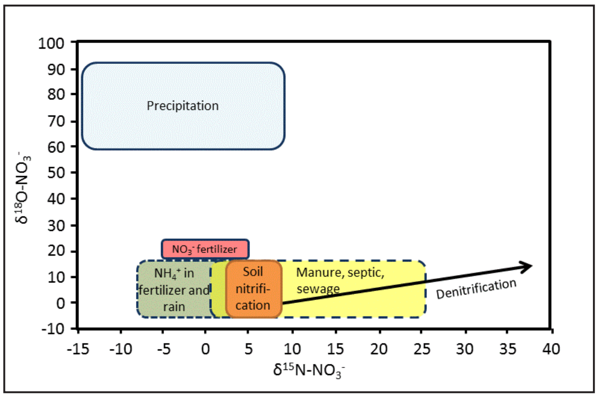


Fig.1(a): Isotopic signatures for different NO_3^- sources

From Kendall (1998).

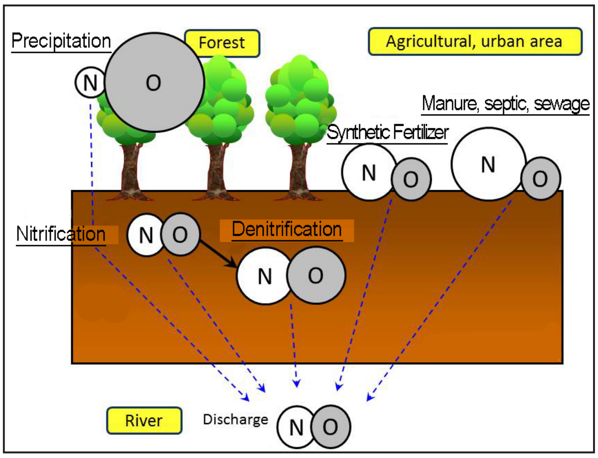


Fig.1(b): Schematic diagram of the qualitative relationship between $\delta^{15}N$ and $\delta^{18}O$ of NO_3^- in different sources based on (a)

We analyze the source of NO_3^- in river water using $\delta^{15}N$ and $\delta^{18}O$ of atmospheric and overland NO_3^-.

forest ecosystem to rivers and balances its input from the atmosphere with its leaching, which is supported by some evidence that a large amount of NO_3^- discharges when a forest is clear-cut. This phenomenon is temporal and recovers gradually with re-establishment of the forest, but in the case of intensive and destructive disturbances including forest clear-cutting and harvesting with soil tillage, as well as drastic changes in vegetation from natural forests to monocultural plantations, it takes a long time to recover, or to move to another equilibrium state.

Nitrate discharge is also affected by N fertilization in agricultural areas and plantations and sewage in residential areas. In most cases in Japan, the concentration of NO_3^- increases with an increases in farm lands and urban areas from forested headwater downriver. In contrast, in Sarawak, because even headwaters are covered with acacia and oil palm plantations, the spatial distribution of NO_3^- concentration over the basin may be different from the Japanese case. However, examining the NO_3^- concentration in order to understand the relationship with land use and identifying the source of NO_3^- is ineffective. To specify the origins of NO_3^-, the isotopic compositions[Note1] of nitrogen ($\delta^{15}N$) and oxygen ($\delta^{18}O$) of NO_3^- (hereafter denoted as $\delta^{15}N\text{-}NO_3^-$ and $\delta^{18}O\text{-}NO_3^-$, respectively) are very effective (Figure 1). The sources of NO_3^- in river water include microbial nitrification in soils (low $\delta^{15}N\text{-}NO_3^-$ value), synthetic fertilizers (low $\delta^{15}N\text{-}NO_3^-$ value but high concentration), sewage and manure (high $\delta^{15}N\text{-}NO_3^-$ value and high concentration), and atmospheric deposition (high $\delta^{18}O\text{-}NO_3^-$ value but low concentration). In addition, under the reductive and anaerobic condition, some bacteria in soil and water denitrify the NO_3^- to N_2O and N_2 gas. This process enriches both δ15N-NO_3^- and $\delta^{18}O\text{-}NO_3^-$. The combination of the concentration and the isotopic composition of NO_3^- enables us to elucidate the factors determining NO_3^-discharges in this region.

In our research, the spatial distribution of NO_3^- concentration and $\delta^{15}N\text{-}NO_3^-$ and $\delta^{18}O\text{-}NO_3^-$ values are investigated, and the relationship with the land use characteristics such as natural forest, secondary forest, acacia plantation, oil palm plantation, peat swamp forest, agricultural land, and urban area, are analyzed. In addition, the relationship between NO_3^- discharge and tree ages of plantations or land use history are examined to evaluate the impacts of plantation and forest management on river water quality.

2) DOC

Organic matter dissolved in water (DOM; dissolved organic matter) plays a key role in terrestrial and aquatic ecosystems, because the flux of DOC and DON (dissolved organic nitrogen) from land to the sea accounts for a considerable proportion of global C and N cycling. In addition, iron (Fe) is easily deposited and biologically inactivated in aquatic ecosystems, but humic substances, which are a part of DOM, can chelate iron (Fe). This stabilized iron-DOM complex functions as an essential nutrient for algae. The main source of DOM seems to be humic substances in soils. River water discharged from peat swamp forests, which contain a large amount of organic matter subterraneously, has a high DOM concentration. Recent reports, however, suggest that the contribution of autochthonous DOM (derived from plankton) is also important for understanding DOM dynamics in aquatic ecosystems. Therefore, in our research, we will examine not only the concentrations of DOC and DON quantitatively, but also the characterization of DOM qualitatively in the Kemena and Tatau basins. One of the best ways to obtain DOM characterization is three-dimensional excitation and emission matrix (EEM) fluorescence spectroscopy (Figure 2). The concentration and fluorescence of DOM are expected to reveal factors controlling DOM concentration and the transformation processes of DOM in the context of landscape changes and forest management.

3) SS

A large part of water turbidity is SS, which inhibits photosynthesis by phytoplankton. When we measure some ions and DOM, collected river water is filtrated by a filter with a pore size of 0.45 µm. SS is that which remains on the filter and contains coarse particulate organic matter, clay minerals, and so forth. SS in river water consists of

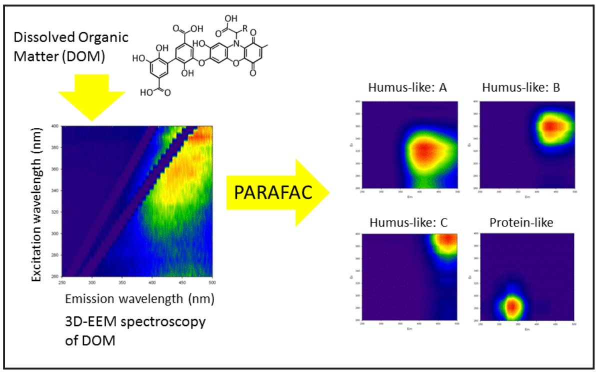


Fig.2: Three-dimensional fluorescence excitation-emission matrix (3D-EEM) of DOM in river water, and parallel factor analysis (PARAFAC)
The combination of 3D-EEM spectroscopy and PARAFAC as well as the concentrations of DOM allows both quantitative and qualitative evaluations of DOM.

various sources: direct input of plants, litter and animal dung, algae, soils derived by bank erosion, disturbances and forest cutting, and chemically aggregated matter in water. In the Kemena and Tatau Rivers, we investigate the spatial distributions of SS concentration as well as the ratio of minerals to organic matter, and the isotopic composition of C ($\delta^{13}C$) and N ($\delta^{15}N$). The results are expected to elucidate the compositions of SS and the sources of river water turbidity in the Kemena and Tatau basins.

The Kemena and Tatau basins have various landscapes including natural tropical forests, secondary forests, peat swamp forests, acacia and oil palm plantations, heath forests, agricultural lands, and urban areas, and these landscapes are now converting. Ongoing land use changes result in an alteration in river water quality. If the results of river water quality surveys suggest some problems in a certain landscape or land use change, possible reasons for the water quality should be considered and solutions prescribed. Otherwise as the myth of sustainable development predominates for people living in the basin, river water quality may threaten their health as some Japanese rivers used to do, and it may never recover with further land use changes. It is an urgent task that factors determining river water quality and the changing processes of water quality along with land use changes are elucidated by analyzing the spatial distributions of water quality and the relationship with the landscape.

Reports of survey trip in Aug 2011.

Our surveys were conducted in August 2010 and 2011. In 2010, I had just joined a meeting in Kuching, so this was my first overseas research trip in 2011. In the Japanese fieldwork, we often collected water samples, filtrated them, and measured pH and Electric Conductivity (EC), but in Malaysia, I was very surprised to see brown water that resembled "Kopi", or black water drained from swamp forests that resembled "soy sauce", and it was extremely difficult to filtrate some samples because brown samples had a very high SS content. For sample collection, sometimes I would take a boat ride under the burning sun, sometimes I drove a car through endless acacia plantations with flying clouds of dust, and sometimes I hitched a ride in the back of a Landcruiser at high speed, which was just like being on a roller coaster without the safety belt. All of these journeys were extremely inspiring. Sampling water was a very thrilling experience, and although filtration was very difficult every night, we managed to get our samples. After arrival in Japan, they are analyzed by temperamental analytical instruments. In other words, it takes a lot of time, money and energy to obtain water quality data.

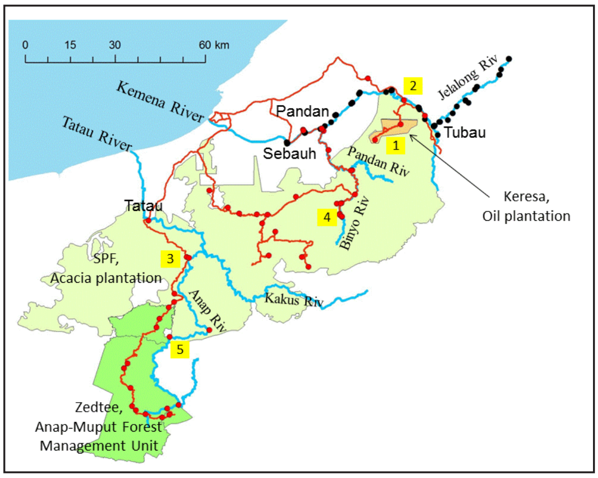


Fig.3: Sampling points in August 2010 (black), and August 2011 (red)
Red lines represent truck of the survey in 2011. Yellow numbers denote photograph numbers.

Photo1: River running through the oil palm plantation

Photo2: River flowing right by Mr. Lahap's house

In August 2010, water samples from the Jelalong River, which is located upstream of the Kemena River, were collected, and in August 2011, we surveyed more tributaries as well as main streams of the Kemena and Tatau Rivers. We collected many samples including tributary river water draining from the Pandan and Binyo areas covered with peat swamp forests, acacia plantations and conservation natural forests held by Sarawak Planted Forest (SPF) Sdn Bhd, and oil palm plantations held by Keresa Plantations Sdn Bhd, in the Kemena basin. We also collected main river water near Tubau, Pandan, Sebauh and so forth, to understand changes in water quality from upriver to downriver. In the Tatau basin, we collected water samples from the Anap River and its tributaries within forests in the Anap-Muput Forest Management Unit managed by Zedtee Sdn Bhd, and Tatau River water near Sangan.

In addition, we requested people living by the river, SPF and Zedtee to collect river water bimonthly to elucidate time series variation of water quality. Aside from some misgivings about handling vast amounts of collected samples, they had to clarify spatio-temporal distributions of water quality in the Kemena and Tatau basins, and have given us a new insight into factors determining water

Photo3: River flowing through the acacia plantation

Photo5: River on peat swamp forest

Photo6: River running through the forest in Anap-Muput Forest Management Unit

quality. The results from the past several months' research are introduced in this newsletter.

Acknowledgment

I would like to thank Dr. Hiromitsu Samejima, Dr. Naoko Tokuchi, and Mr. Jason Hon for their help in arranging all surveys, contacting the institutions and persons concerned, and collecting water samples. I also thank Dr. Osamu Kozan, Dr. Yucho Sadamichi, and Mr. Logie Seman for supporting our field survey. Thanks to them, I had a wonderful time. Finally, I am grateful to Dr. Noboru Ishikawa and Dr. Ryoji Soda for their useful advice on my research.

Note1: Isotopes

Atoms of the same element can have different numbers of neutrons (i.e., the different atomic weights). These are called isotopes. Some isotopes are naturally stable, but others are unstable, which undergo radioactive decay (alpha decay, in which an atomic nucleus emits an alpha particle (^{4}He), and thereby transforms into another atom; or beta decay, in which a beta particle (an electron) is emitted from an atom). Here, I introduce stable isotopes.

Stable isotopes have been used in ecological and biological studies (mostly carbon (C), nitrogen (N) and oxygen (O)) for many years. When we want to describe an isotopic composition, we use thea ratio of a target isotope to another isotope with greatermore abundance. For exampleexamples, N has a heavy isotope (^{15}N) with a natural abundance of 0.4 % and a light isotope (^{14}N) that constitutesmakes up all of the remainder. Thus, the N isotope ratio is 15N/14N. In the same way, we use ^{13}C/^{12}C, ^{18}O/^{16}O and so forthon. In isotopic analysis, the absolute abundances of isotopes and the ratio of isotopes are not considered. Rather, we use the stable isotope compositions expressed in terms of delta (δ) values; the ratio of isotopes in the sample compared to the standard ratio using the following equation:

$$\delta^{15}N\ (\delta^{18}O, \delta^{13}C) = \frac{Rsample - Rstd}{Rstd} \times 1000\ (‰)$$

Where Rsample and Rstd represent the ratio of the isotope of the sample and the standard, respectively. The standard references for N, O and C are N gas in the atmosphere, Vienna standard mean ocean water (VSMOW) and PeeDee Belemnite, respectively. Higher δ values indicate increases in the amount of heavy isotopes and lower values indicate decreases. The δ values enable us to describe the isotopic signature sensitively.

The mass difference will result in partial kinetically-caused separation of the light isotopes from the heavy ones during chemical reactions, during biological activities such as metabolization, and during physical processes such as vaporization and diffusion. This process is called "isotope fractionation". For this reason, isotopes of C, N, and O (δ^{13}C, δ^{15}N, δ^{18}O etc.) are the most effective as hydrological and biogeochemical indicators. For example, transformation of NH_4+ to NO_3- by soil microbes or photosynthesis of CO2 to glucose in the leaves deplete the light isotope contained in products (NO_3-N and C-glucose in this case). The δ^{13}C and δ^{15}N can also help ecologists to understand the sources of food and food web structure in terrestrial and aquatic ecosystems, because organisms are enriched in ^{15}N and ^{13}C as their trophic level increases.

This article is reprinted from the 6th issue of Japanese newsletter of this project

The 46th Annual Meeting of the Japanese Society of Cultural Anthropology
June 23, 2012 (Sat.) at Hiroshima University

Our project had a workshop at the 46th annual meeting of the Japanese Society of Cultural Anthropology.

The details of the workshop are as below:

Workshop

”Tropical forest and its society – the prospect of an ethnographic study of Sarawak”

Date: June 23, 2012 (Sat.)

Venue: Hiroshima University

Coordinator: Goro Hasegawa, J.F. Overlin University

Presentation 1

Yumi Kato: Research Institute for Humanity and Nature

”They dynamism of human-nature relationship – a discussion of a case of Sihan”

Presentation 2

Kyoko Sakuma: ASAFAS, Kyoto University

”The views on human-forests interactions based on resource utilization – the case of birds’ nest hunting by the Bulawan people”

Presentation 3

Tetsu Ichikawa: Rikkyo University

”Forest products and ethnography – rain forest and ethnic Chinese, a look at their relationships with indigenous people of Sarawak “

Presentation 4

Goro Hasegawa: J.F. Overlin University

”The significance of Talisman, in the course of forest development – a reconsideration of Iban expansion”

Presentation 5

Katsumi Okuno: J.F. Overlin University

”Ethnography of an interaction between human and forests – Men and nature in the society of Penan”

Commentator:

Noboru Ishikawa: CSEAS, Kyoto University

Photo1: Mr. Hasegawa lead the workshop as a coordinator

Photo2: The back issues of our newsletters were handed out

Photo3: The workshop concluded with a Q and A session

Panel Session at BRC (Borneo Research Council) Conference
June 26, 2012 at Universiti Brunei Darussalam

The members of this project participated in BRC (Borneo Research Council) Conference at Universiti Brunei Darussalam (UBD) in Borneo and held a special panel session.

At the session we could have many positive feedback from the participants. Among others, we were pleased to get acquainted with the researchers from universities overseas. A member of the Australian National University gave us a frank observation to our presentation which encouraged us a lot.

We were fortunate to have an opportunity to share our opinions with a research group which had a presentation called "Political Ecology of the Kapuas River" comprising a group of researchers of Universität Bonn and Universität Bremen. We reached a consensus to share our information and exchange our views and ideas.

The theme and topics of the panel session is as follows:

Panel: Human-Nature Interactions of Riverine Societies in Sarawak
26th June, 2012 at Universiti Brunei Darussalam (UBD)

"Human-Nature Interactions of the Riverine Societies in Sarawak: A Transdisciplinary Approach"
by Noboru Ishikawa

"Socio-Economic Impacts of Oil Palm Industry on Rural Communities in Sarawak, Malaysia"
by Yumi Kato and Ryoji Soda

"Material and Financial Metabolism in Oil Palm Production: A Company in Sarawak"
by Yucho Sadamichi and Fumikazu Ubukata

"Influence of Land-use on Stream Water Chemistry in Bintulu Division, Sarawak, Malaysia: Preliminary Results of Snap-shot Sampling"
by Naoko Tokuchi, Keitaro Fukushima, Hiromitsu Samejima, and Osamu Kozan

"Wildlife Use of Habitat in a Production Forest Environment in Central Sarawak"
by Jason Hon and Hiromitsu Samejima

"The Birds' Nests Commodity Chain between Sarawak and East Asia"
by Daniel Chew and Tetsu Ichikawa

Photo1: Prof. Ishikawa making his presentation at BRC

Photo2: Tea break between the sessions at BRC

Photo3: A snapshot at the post-session party of the conference

Special International Seminar at Kuching, Sarawak

June 29, 2012 at Kuching, Sarawak
Harbour View Hotel

"HUMAN-NATURE INTERACTIONS OF THE RIVERINE SOCIETIES IN SARAWAK: A Transdisciplinary Approach"

A special international seminar held at Kuching, Sarawak Malaysia

The seminar was planned and executed by :

CSEAS, Kyoto University

Grant-in-Aid for Scientific Research (S): "Planted Forests in Equatorial Southeast Asia: Human-nature Interactions in High Biomass Society"

co-sponsored by:

Institute of East Asian Studies, UNIMAS

Sarawak Forestry Corporation.

The objective of the seminar was to propel the collaborations with other researchers overseas and local scholars and to give feedback our research outcomes. The seminar successfully gathered government officials, university researchers, NGO members, corporate officials, media members and members of various research institutions. As many as 70 participants were attended the seminar and we could meet almost all of members with whom we wanted to share the outcome of our project.

Many of the participants stayed all day long for the sessions. We were grateful for valuable advice, given by the participants during the course of "Talking Points", for the further research of this project.

The main objective of this seminar was to show our commitment to our research areas. We believe that it is tremendously important to share our findings and information with local researchers. We feel that our project will be incomplete if it stays one-way. We will continue communicate with the people of Sarawak, through various channels to propel our research project effectvely.

For the details of this conference, please refer the 5th issue of this newsletter.
Also available via our website:

http://biomasssociety.org/en/

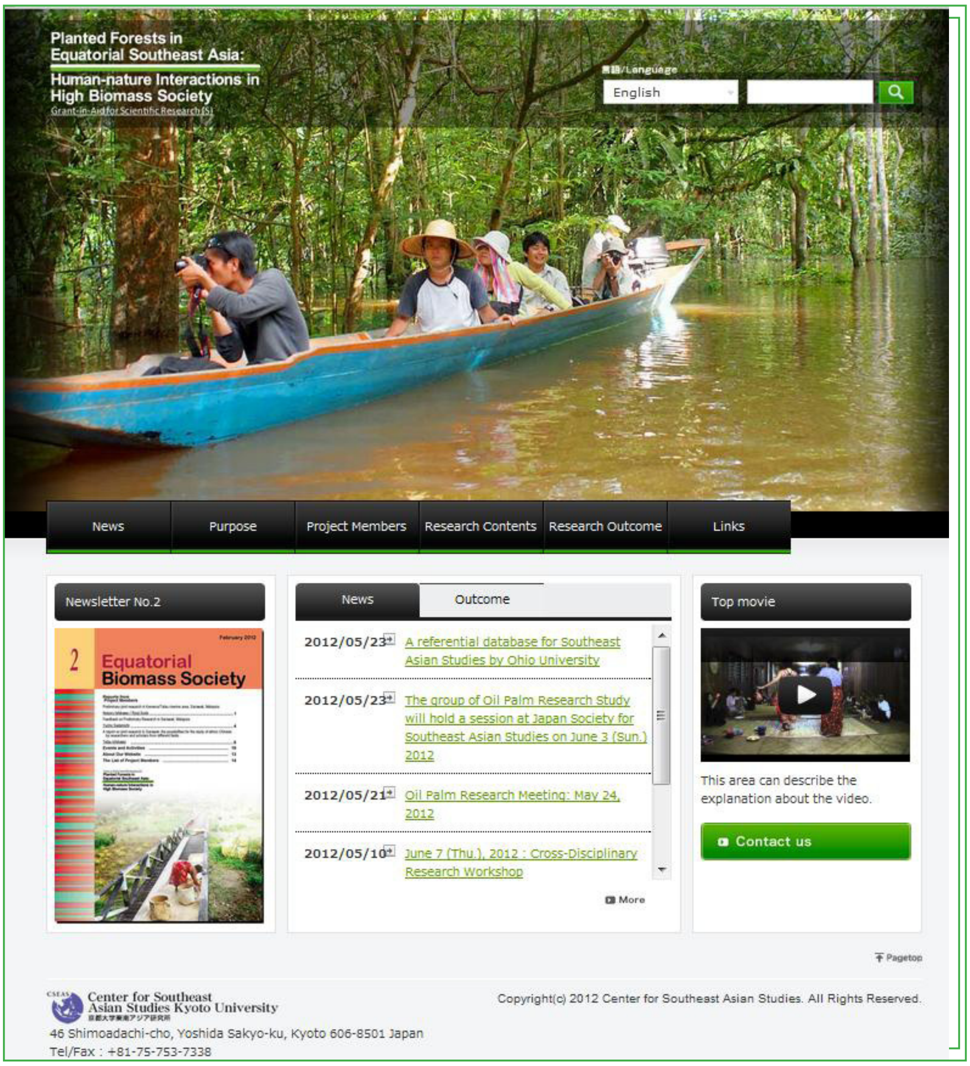
Photo1: The program of the seminar at Kuching

Photo2: A snapshot of media break

Photo3: A snapshot after the success of the seminar

Please visit our website

http://biomasssociety.org/en/



Our project, “Planted Forests in Equatorial Southeast Asia: Human-nature Interactions in High Biomass Society” has its own website.

It covers articles, event information, videos, research outcomes newsletters and much more.

Please visit our website and keep up with our latest activities.

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