

A step in the right direction: towards integrated natural resource management in Sarawak, Malaysia

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Abstract This paper analyses the effect of recent changes in natural resource management policies in Sarawak, Malaysia. Within the time period of the new policies, institutions have been created to administer the new legislation, leading to an overlap in the mandates of the key institutions managing natural resources. Results from an ongoing study in the Niah catchment show that the pace of large-scale land conversion from forest into oil palm plantations has increased, yet new environmental monitoring programmes have improved the natural resource management in the oil palm plantations. Still, the land-use changes have caused a significant decrease in water quality. So far there has been no attempt to plan or coordinate an integrated natural resource management at catchment level in the study area. Nevertheless, the process of changing the approach towards integrated natural resource management has started.

Key words integrated management; land-use changes; river; Sarawak, Malaysia; water

INTRODUCTION

In South East Asia, deforestation and the conversion of secondary forest into plantations and other agricultural activities have caused erosion, loss of biodiversity, reduction of the buffering capacity of the natural vegetation in riparian areas, more frequent flooding, and a general increase in the concentration of nutrients and sediments in rivers (Douglas, 1996; Gupta, 1996; Brooks, 1997). The consequences of these land-use changes on water resources have caught the attention of policy makers, and policies concerning natural resources management in many South East Asian countries have changed fundamentally. It is widely recognized that integrated natural resource management on a catchment basis is the appropriate means to promote and implement policies of sustainable natural resource development. A prerequisite for this is appropriate institutional arrangements, which provide the necessary legislative mandate and allocation of responsibilities, as well as organizational arrangements and decision-making procedures for formulating plans and implementing these. Naturally, extensive changes in the way natural resources are managed must face difficulties in the initial phase.

The purpose of this paper is to analyse the recent changes in natural resource management policies in Sarawak, Malaysia. More specifically, changes in policies and the institutional setting and their impact in the catchments will be investigated using a case study from Niah River catchment, Miri District, Sarawak. The focus of the analysis will be on changes related to water resources.

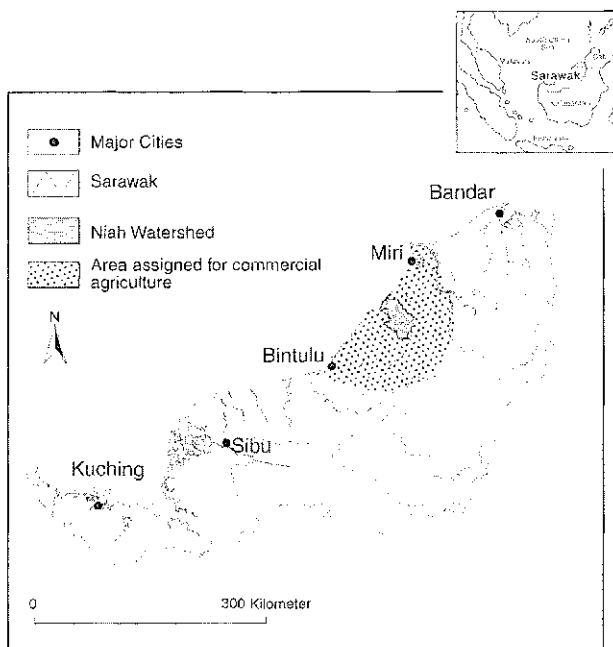


Fig. 1 Location of the Niah River catchment.

POLICIES AND LEGAL FRAMEWORK IN SARAWAK

Sarawak with its 124 450 km² is located on the island of Borneo (Fig. 1). In 1963, after gaining independence from the British colonial system, Sarawak joined the Malaysian Federation. By the year 2020, Sarawak aims to be a fully developed state. In the eighth Malaysian plan, an annual growth rate in GDP of 10% is targeted. Growth in commercial agriculture and land development is considered important in achieving this goal. The oil palm is the most important commercial crop and the area covered by oil palms is expanding rapidly. In Miri District, which is the main area for commercial agriculture, 380 000 ha were under oil palm in 2002, while the total area of oil palm in Sarawak was 450 000 ha. It is the state government's goal to have one million ha oil palm plantations in Sarawak by the year 2010. In Sarawak the majority of land belongs to the state. Allocation of state land is the jurisdiction of the State Planning Authority (SPA) under the Chief Minister's Office. The importance of oil palm production for economic growth can be seen by the fact that recently agricultural plantations have been classified as a public good which implies that SPA can expropriate land for oil palm plantations. The expansion of this sector will have significant implications for water quality as well as quantity.

In the Malaysian Federation, Sarawak has a special status because of its later entrance. The ninth Schedule to the Malaysia Constitution provides for the general distribution of legislative powers between the federal and state governments. Jurisdiction over management of water resources in Sarawak is shared between the state and the Federal Government. However, the majority of water related legislation in Sarawak is state enacted laws and the responsibility of promoting sustainable water

resource management lies at the state level. Sarawak was able to negotiate special provision into the constitution concerning land-related legislation that, among others, provided greater state control over land utilization policy. Because the economy in Sarawak heavily depends on the export of natural resources, the state has continuously been guarding its constitutional rights against interference from the Federal Government.

The Land Ordinance for Sarawak was made public in 1882, while the first important legislation in terms of regulating the use of water resources was not promulgated until 1958 (Land Code, 1958). Prior to 1958, a number of other ordinances were put in place, such as the Natural Resources Ordinance (1949) and the Forest Ordinance (1958). The main objective of these ordinances was to provide a framework to facilitate the exploitation of natural resources and provision of state funded infrastructure such as water supply under the Public Works Department (PWD). The ordinances have been the foundation in shaping the organization of the state government administration on a sectoral basis. There was no recognition of the necessity for an integrated perspective in the decision-making process.

In 1974, the first attempt to take a broader approach towards preventing the negative impact of natural resources utilization was promulgated through the Federal Environment Quality Act (1974). The legislation aims to prevent, abate, and control pollution as well as enhance the environment in Malaysia. It is also applied in Sarawak and is enforced by Department of Environment (DoE). The objectives of DoE Sarawak are to prevent and control excessive pollution and to integrate and implement environmental factors in project planning.

Two water resource studies were carried out in the 1980s, stressing the importance of a more integrated approach to water resource management. Subsequently, Sarawak State decided to take immediate action and to adopt an integrated approach towards the utilization of water and other resources. This decision started a process of establishment of new institutions and legislation at the state level. In 1991, the State Water Authority (SWA) and the Sarawak Water Resource Council (SWRC) were formed. The objective of SWA is to promote the integration of water resources, land-use planning and management in the State of Sarawak. It is the responsibility of SWA to propose areas to be declared water catchment areas, where the water resources are considered of importance. SWRC was formed to advice SWA on water appraisals.

To provide legislative and administrative mechanism for an effective environmental protection and management, a Natural Resources and Environment Ordinance was passed in 1994. The Natural Resource and Environment Board (NREB) was established to enforce the Ordinance. The responsibilities of NREB are to formulate policies and guidelines to ensure that the exploitation, conservation and management of natural resources in the state will not cause any adverse impact on the environment. NREB is empowered to administer the development and management of water catchment areas for public water supply (Water Ordinance, 2000). Shortly after its establishment NREB issued the Natural Resources and Environment (Prescribed Activities) Order in 1994. The Order contains provisions directing project proponents to protect and manage the environment within their project sites through the mechanism of Environmental Impact Assessments (EIA) procedures. (EIAs related to land use are thus under NREB, while EIAs on industries, such as oil palm mills, fall under DoE.)

In 1996, the Federal Government initiated an Integrated Coastal Zone Management (ICZM) Programme co-ordinated by the State Planning Unit. The ICZM was based on a collaborative participation of all stakeholders, including government agencies, such as NREB, PWD and DoE, and non-governmental organizations. The main objective was to strengthen the environmental management for the overall creation of a sustainable economic and ecological potential in the coastal zone of Sarawak. The coastal zone was defined as areas influenced by tidal waters. Thus, the natural resource management was not made on a catchment basis.

In summary, the recent policy framework related to water resource management is characterized by fragmented and overlapping responsibilities of different government agencies. According to Memon & Mohamed (1999), the apparent overlap in the legislative mandates of DoE, SWA, SWRC and NREB is partly due to the terms of Sarawak's constitutional relationship with the Federal Government relating to jurisdiction over Sarawak's water resources. The relatively late acknowledgement of water as an important resource in Sarawak, and the rapid pace of development in Sarawak, were putting pressure on the decision-making process. Thus, the new institutions (SWA, SWRC and NREB) were created to fill specific gaps in the former legislation without sufficient coordination. A comprehensive restructuring of the laws governing the natural resource management in Sarawak and the institutions implementing them would have been desirable. The government's response to the overlap in mandates and institutions has been to put an emphasis on inter-departmental co-ordination. Consequently, DoE is present in NREB's board that approves EIAs and Environmental Monitoring plans. The controller of NREB is a member of the Planning and Management Committee under SWRC and the Water Supply and Sewerage Branch of PWD has been appointed to be the Secretariat of the SWRC.

THE STUDY AREA

The study area lies in Miri District and Niah Sub-district and covers approximately 1300 km² (Fig. 1). It is located in the coastal zone between Bintulu and Miri where large-scale land cover changes have taken place since the mid-1960s. Lately, the area has been assigned to commercial agricultural development, e.g. oil palm plantations, by the state government. In this paper a distinction is made between the catchment of the Niah River and the hydrological catchment for the local Niah Subis water treatment plant, called the sub-basin. The latter is analysed in more detail due to its importance for public water supply.

The catchment topography is generally characterized by an alluvial coastal plain, which rises gently towards a hilly interior. The annual rainfall is ~2600 mm. The river and its tributaries are the main water source for the people living in the catchment. Today, the villages located downstream from the local Niah Subis treatment plant have piped water, while the rest rely on rain and river water. The majority of the population of about 16 000 people is Iban (shifting cultivators). Furthermore, there is an unknown number of migrant workers, mainly from Indonesia, working and living in the oil palm plantations. The pattern of settlements reflects the drainage patterns as the Iban settle along the main river because of its prior importance as a source of infrastructure. In 2001, the majority of the population was concentrated in the northern part of the

catchment, while nine longhouses (2000 inhabitants) and an unknown number of oil palm workers are living in the sub-basin.

Institutions working in the catchment

The three most important institutions working with water related issues in the catchment are:

Department of Environment (DoE) Sarawak started monitoring the river water quality in Niah in 1983, initially to establish a baseline for water quality and subsequently to detect water quality changes and identify pollution sources. The river water quality appraisal is based on the water quality index (WQI)¹. DoE has five sampling points in Niah catchment (Fig. 2). They have out-licensed the monthly collection and analysis for chemicals² to a private company. Thus, they can access the data for free, while other institutions have to pay.

Public Works Department (PWD) runs the Niah Subis water treatment plant. It was established in 1983 on a request from an oil palm mill. Today, it supplies water to more than 16 000 people in Niah area. PWD has one water sampling point in the catchment located at the treatment plant (Fig. 2). Collection of water data commenced in 1983. PWD do not have the financial means to analyse the drinking water for pesticides and herbicides.

Natural Resource and Environment Board (NREB) opened their administrative office in Miri in the beginning of 1998. The main responsibility of NREB in the area is monitoring the oil palm plantations. In addition, NREB carry out a river watch programme aiming at getting baseline data as well as detecting sources of pollution. Since 1998, they have been collecting water samples at five sampling points on a monthly basis in the catchment (Fig. 2).

DATA COLLECTION AND PROCESSING

This case study was initiated in October 2001 in the hydrological catchments of the River Niah. Land cover changes over a 30-year period were identified in the catchment by means of Landsat satellite images from 1972, 1985, 1990 and 2001. Land cover maps were produced from analysis of the satellite images and further processing using Geographical Information Systems (GIS). The areas under logging are identified by the appearance of logging roads in the forest class as information on logging concessions are not yet available. A GIS plantation layer was generated combining information from a land cover map (2001), Forest Department, Land and Survey and approved EIA reports. The layer was later combined with information on the year specific oil palm plantations were approved by the government to make yearly plantation maps over the catchment area.

¹ In Sarawak, river water quality is measured according to the Department of Environment's interim water quality index (WQI) that is based on parameters such as dissolved oxygen, BOD, COD, ammoniacal nitrogen, SS and pH. The WQI serves as a basis for environmental assessment of a watercourse in relation to pollution categorization and designated classes of beneficial uses as provided for under the National Water Quality Standards for Malaysia.

² TDS, total organic carbon, BOD, COD, ammonia, nitrate nitrogen, total nitrogen, detergent, total alkalinity, total hardness, fluoride, chloride, iron, manganese, aluminium.

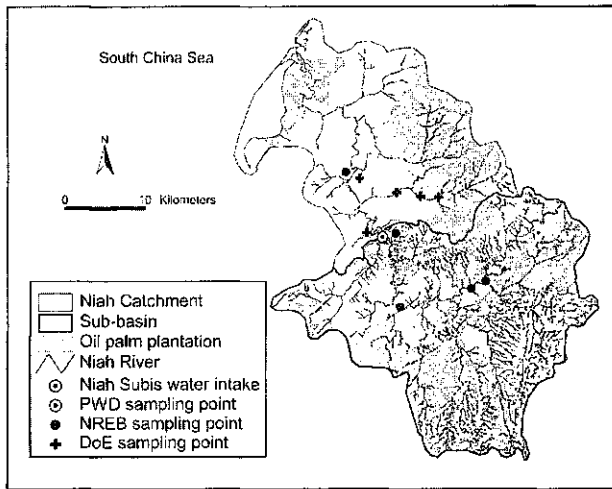


Fig. 2 Location of approved oil palm plantations and sampling points in Niah catchment.

The land cover changes are related to information about changes in land-use strategies obtained from interviews with local administrative-, agricultural- and forest officers, oil palm plantation managers, Iban elders, village leaders, and a baseline questionnaire survey covering all 51 settlements in the catchment. Information about the management activities of relevant institutions in the Niah catchment was obtained from interviews with representatives from the institutions.

Land-use changes

The study distinguishes between two types of land use: large-scale commercial enterprises, such as logging and oil palm plantations located on state land, and small-scale commercial farming and shifting cultivation located along the rivers, main roads and close to the urban centres in the northern part of the catchment. The focus of this paper is the large-scale land-use changes taking place on state land.

Logging started in the coastal area of Niah catchment around 1965 and expanded to the northern part of the catchment in the beginning of the 1970s. By 1985, the land-use pattern had changed dramatically. The logging activities had moved to the eastern and southern parts of the catchment. In the northern part, logging had ceased and previously logged areas were gradually converted into oil palm plantations. By 1990, most of the state land in the catchment, except for the Niah national park and a small part of the Niah forest reserve, had been logged at least once.

In the sub-basin, in the southern part of the catchment, the establishment of the first oil palm plantations was approved in 1976. During the 1970s and 1980s, five new oil palm plantations were approved and the share of oil palm slowly increased. In 1990, the land allocated to oil palm plantations accounted for 14% of the sub-basin. As seen in Fig. 3, this trend changed drastically at the beginning of the 1990s. Since 1992, the government has approved at least one new oil palm plantation each year. In 2001, the percentage of land allocated for oil palm plantations in the Niah sub-basin was 67%

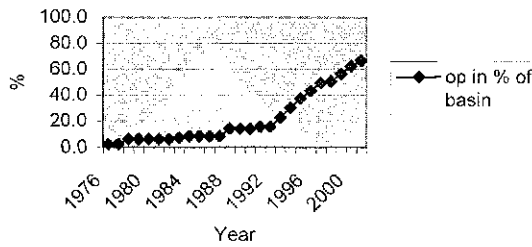


Fig. 3 Percentage of government approved oil palm plantations in the sub-basin.

(Fig. 2). The percentage is slightly higher since two of the approved plantations are overlapping. Other “idle” land areas in the sub-basin are going to be given as compensation to one of the plantations.

A land cover map generated from a Landsat ETM satellite image of 10 July 2001 reveals that approximately 50% of the sub-basin is covered by oil palms. The three main reasons for this discrepancy are: some of the newly approved plantations are still in the logging or establishing phase; two plantations have court cases pending since part of the allocated land is claimed to be NCR land by local shifting cultivators; and some areas within the plantation are unsuitable for oil palms. In the entire Niah River catchment, oil palm production accounts for approximately 40% of the area.

Land allocation for large-scale commercial agricultural production is controlled by the SPA, therefore land use and land-use changes on state land are directly determined by government policy. The fact that world market prices for oil palm have periodically been weak seems to have limited impact on the government’s policies.

Quarterly visits of NREB staff to the plantations are the most tangible results of the new approach to natural resource management in Sarawak. The NREB staff visit the plantations to see if they follow the guidelines stated in their Environmental Management Plan (EMP). The EMP is an integrated part of the EIA procedure. In cases where the recommendations and guidelines of the EIAs and EMPs are not followed, monthly inspections of the plantation are undertaken by the NREB until the problem is resolved. However, due to insufficient manpower this level of supervision is not always possible. If an oil palm plantation does not follow EIA/EMP recommendations, NREB sends a written warning and usually gives the plantation one month to rectify the problem. Otherwise the NREB can compound the plantation and finally take the responsible parties to court. NREB sends out warning letters every day. The most frequent environmental problem is oil palm plantations not maintaining the prescribed buffer zones along the rivers.

CHANGES IN WATER QUALITY

Local administrators, staff at the Niah Subis treatment plant, and farmers living both up and downstream of the main river, agree that the water quality has declined. They focus especially on the darker colour of the river, increased sedimentation, more frequent flooding and a decline in the quantity and number of fish species in the river. According to the PWD staff at the Niah Subis treatment plant, the water quality was

better in the 1980s than the 1990s. The logging activities in the 1980s did not have a serious impact on water quality because the logging was usually not carried out in the proximity of the river. After 1990 the water quality started to decrease. This change was due to the establishment of oil palm plantations where large areas were completely cleared for vegetation, resulting in increased sediment loads in the river. Because of the lost "sponge" effect of the forest, the number of flooding events has increased, and in general the variability of the water level in the river increased. According to PWD Niah, the floods come more frequently and faster after rain but also go down faster.

Preliminary results of analysis of water data show that the water in Niah previously could be classified as Class IIB under the WQI. Class IIB is not supposed to be used as raw water supply. In the late 1990s the water quality deteriorated and now often falls under the Class III, which may only be used for water supply with advanced treatment (such as a carbon filter). This is not the case in the Niah Subis treatment plant, where the water is only filtered and chlorine treated. According to PWD headquarters, they might have to close the treatment plant in the future because of the decline in the river quality. However, the capacity of the neighbouring small plants cannot meet the demand for clean water in the Niah area.

As seen in Fig. 2, there is an overlap in the sampling points of DoE, NREB and PWD. NREB and DoE both sample monthly in Batu Niah town, and all three institutions sample at the intake point of the Niah Subis water treatment plant. There is currently no sharing of data. The three institutions partly have different objectives behind their water monitoring. However a combined sampling could be both more cost effective and provide more frequent monitoring, including relevant tests for pesticides.

CONCLUSION AND RECOMMENDATIONS

A major responsibility of the State Water Authority is to approve and protect water catchments to secure the water resources. Although the Public Works Department proposed Niah Subis as a water catchment area in 1994, the Cabinet has only recently approved this proposal. However, during the nine-year process the State Planning Authority has continuously allocated land for oil palm plantations in the catchment to achieve Sarawak State's economic goals. One oil palm plantation has even been approved within the 8 km buffer zone from the water intake point, which is considered a minimum requirement for a water supply catchment. Therefore, Niah Subis water catchment can no longer live up to the regulations concerning water quality stipulated in the Water Ordinance.

In conclusion, the pace of the land-use changes has increased to meet the state's demand for economic growth. However, the quarterly visits by the NREB staff and the new monitoring programmes have improved the natural resource management in the oil palm plantations. Nevertheless, the land-use changes have caused a significant decrease in water quality. Thus in Niah Subis sub-basin it seems that economic growth has been a stronger priority for the government than the need to protect the water supply for 16 000 people.

The Integrated Coastal Zone Management programme has so far been the only larger attempt to make integrated natural resource management in the area. After an initial phase, the programme seems to be a bit dormant. Due to the presence of many

different institutions in the programme, still working on a sectoral basis, the definition of the physical area covered by the programme was not based on catchment boundaries. Consequently, in the ten-year period of the new approach towards natural resource management in Sarawak there has been no attempt to co-ordinate the natural resource management in Niah on a catchment basis.

To improve the natural resource management in Sarawak, the overlap in mandates between the institutions needs to be removed and the collaboration of institutions in-between needs to be improved. Even though the output of the new natural resource management policies in Sarawak might seem limited, it should be kept in mind that the process has just started and environmental considerations are now an integrated part in the development process.

In order to secure the future water resources in Sarawak, integrated natural resource plans at the catchment level are needed. To meet economic goals, the large-scale land-use changes will continue in areas not already logged and converted into oil palm plantations. As the timber resources in Sarawak are decreasing due to over-logging and conversion of forests into agricultural plantations, the right to clear-cut an area during the establishment of a plantation has increasing importance, which can make the establishment of oil palm plantations economically viable even at times of low oil palm prices.

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