

THE DRIVERS OF WETLAND USE IN TEMERLOH DISTRICT, PAHANG, MALAYSIA

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Abstract

Wetlands in Malaysia are declining rapidly due to their conversion to monoculture agricultural production, especially oil palm. The main issue examined in this paper—using Temerloh District in Pahang State of Malaysia as our focus—is, what are the driving forces behind the increasing conversion of wetlands?

Data was collected through qualitative research methods, including focus groups and key-informant interviews. In addition, secondary data and 34 semi-structured household questionnaires were used to complement the information obtained from interviews and project and community visits. The findings revealed three major factors driving the use of wetlands in the district: legal, economic, and ecological. Legally, land is private property, which means that the owner can put it to whatever purpose he or she wants. Economic considerations include taxes on both used and unused land, availability of funds, interest on the part of developers, and communities' and individuals' perceptions of wetlands as wastelands. Additionally, government-linked companies and community cooperatives roles' in wetland use are driven by the need for local economic development. Ecologically, most community members find wetlands to be highly suitable for oil palm cultivation. In conclusion, economic considerations and improvement of rural livelihoods override the need for wetlands conservation. Policies need to strike the right balance between improved livelihoods, development of the local economy, and conserving local wetlands.

Introduction

To sustain desired ecosystem functions and transform negatively impacted ecosystems into more desirable states, Tallis et al. (2008) and Folke et al. (2004) have suggested the need for active adaptive management and governance for resilience. This approach, according to Armitage (2006), connects community-based management with regional and national government-level management, and links scientific management with traditional

management systems. It also encourages the sharing of knowledge and information, and promotes collaboration on management goals and outcomes of socio-ecological systems.

Such arguments support strong links between ecosystem services and sustainable development, particularly development efforts that aim to reduce rural poverty (Tallis et al, 2008; Kereiva and Marvier, 2007). A longstanding criticism of widespread top-down approaches to natural resource management is that the very communities that interact directly with and depend on natural resources have often been excluded from much of the natural resource management process (Tania and Daniel, 2003; Gichuki, 1997). Therefore, within the context of natural resource management, it is useful to understand the distributional impacts of different management options and governance regimes in the face of disturbances, fluctuations in ecosystem services, changing societal preferences, and the needs of local communities and other stakeholders.

Wetland¹ ecosystems are important within the purview of conservation and sustainable development because of their rich diversity of flora and fauna (NPBD, 2015). Wetlands are some of the world's most important and productive environments, covering about 9 percent of the earth's surface and vital for human survival (Clean Malaysia, 2015). They provide many ecosystem services that contribute to human well-being and poverty alleviation (Millennium Ecosystem Assessment, 2005). Provisioning services from wetlands (such as food and fiber) are essential for human welfare, while regulating services (such as the recharge of groundwater and protection from natural hazards), are critical to sustaining vital ecosystem functions that deliver many benefits to people (McInnes, 2009). Wetlands are the only group of ecosystems to have their own international convention: the Ramsar Convention signed in 1971 (Sakataka and Namisiko, 2014). According to Ramsar Convention Factsheet 7 (Ramsar Convention 2015), more than a billion livelihoods are presently sustained by wetlands globally.

Since 1900, more than half of wetlands worldwide have been converted for agricultural production and infrastructure development (Schuyt, 2005). This ongoing conversion constitutes the opportunity cost of wetland protection. The services provided by wetlands—such as habitats for species, protection against floods, water purification, amenities, and recreational opportunities—typically have no market price (Woodward and Wui, 2001). Therefore, decision-makers often conclude that the opportunity costs of sustainable wetland management exceed the benefits (Schuyt, 2005).

Malaysia has a rich and diverse natural environment, including many wetlands, which constitute about 10 percent of the total land area of the country. Wetlands are ecologically and economically important to Malaysia's development (Clean Malaysia, 2015) including mangrove swamps, peat swamps, mudflats, and coral reefs (Mohd and Noorzan, 2007). The Malaysia Nature Society defines wetlands as lands

submerged or inundated by water all or for any period of time (Malaysia Nature Society, 2003). Various communities in Malaysia that live near and around wetlands have relied on these resources for centuries. However, natural ecosystems are increasingly being converted to monocultural agricultural and industrial production by a number of institutional actors, including large corporate land managers, smallholder farmers, and community cooperatives. Where land is community-controlled, cooperatives, corporate investors, and quasi-government institutions have invested in draining and converting natural wetlands to oil palm production.

As a result, Malaysia is experiencing a rapid decline in its wetlands, with critical implications for the country's economy, society, and the environment (Clean Malaysia, 2015). Although a strong case can be made that protecting and restoring wetlands is paramount to Malaysia's socio-economic development, existing natural resource management policies are contributing to the rapid decline of these ecosystems.

The critical issues around the use of wetlands by communities and other stakeholders in Malaysia, specifically in the Temerloh district of the state of Pahang, include institutions, funding sources, and policy incentives, which are the most important elements in decision-making regarding the use of local wetlands. What are the driving forces behind the increasing conversion of these wetlands? How can viable alternatives to extractive industries, policy incentives, and appropriate technical support for community-based management decisions be identified and scaled to support local economic development that both generates income and protects critical ecosystems?

These are the larger issues explored in this study. The aim is to gain more insight into the dynamics of decision-making around wetlands, in order to inform government policies determining both rural economic development and ecological conservation.

Conceptual Issues and Literature

Food security, water, and energy are critically important to human well-being. A key priority of the UN's Sustainable Development Goals is incorporating sustainable resource management concerns into human well-being goals, through appropriate targets and indicators (UNEP 2014). Rapid economic and urban development are negatively impacting wetland resources globally. These impacts can only be mitigated when the managers in question understand the linkages between wetlands as a natural resource, livelihoods, and the roles of various stakeholders in the management of these wetlands. Within communities, what drives the use of this resource? Who are the actors, and how do their actions promote or undermine the sustainable use of the wetlands? These issues are captured in the ongoing discourse on Socio-Ecological Systems (SES), which includes wider issues of governance, co-management and community-based natural resource

management (Ostrom, 2009, 2011, Fernandez-Gimenez, 2008, Rotha et al, 2005).

Natural resources are ecologically complex because they are highly interconnected, and are “shaped by unpredictable internal and external changes” (Rammel et al., 2007, p. 9). Additional complexity arises given that natural resource management involves a diverse array of institutions, stakeholders, and interests interacting across temporal and spatial scales (Potts, 2015; Gruber, 2010; Ostrom, 2009). It is therefore not surprising that the management of these resources is often a highly political and contentious process (Potts, 2015, Ostrom, 1990). According to Brugnach et al. (2011), natural resources management can be challenging because ecological and social systems involve a high degree of nonlinearity, uncertainty, interconnectivity, and conflict.

The central question driving much research on community-based natural resource management (CBNRM) is, how can communities of resource users effectively organize themselves to self-regulate their use of shared resources? (Fernandez-Gimenez, 2008) CBNRM has been defined as “a process by which landholders gain access and use rights to, or ownership of, natural resources; collaboratively and transparently plan and participate in the management of resource use; and achieve financial and other benefits from stewardship” (Child and Lyman, 2005). CBNRM focuses on the collective management of ecosystems to promote human well-being, and aims to devolve authority for ecosystem management to the local (community) level (Fabricus and Collins, 2007). In practice, CBNRM is about ways in which the state can share rights and responsibilities regarding natural resources with local communities (Rotha et al, 2005). A closely related term—and one that is very relevant to governance and participation in natural resources management—is *co-management*, defined as a management regime in which decision-making authority is shared among local people and local, regional, or national government (Fernandez-Gimenez, 2008; Pinkerton, 1989).

CBNRM tends to be associated with approaches where the focal unit for joint natural resource management is the local community. It has also been applied to approaches where local communities play a central, but not exclusive, role in natural resource management (Rotha et al. 2005). Communities are characterized by dynamic relations of: (i) multiple and somewhat conflicting interests, (ii) different actors attempting to influence decision-making, and (iii) internal as well as external institutions shaping decision-making processes (Agrawal and Gibson 1999). Depending on the actual relations within a particular group of people, their knowledge, and the conditions according to which they can make decisions, local communities may sometimes, but not always, be the most “appropriate” unit for natural resource management (Rotha et al, 2005).

Figure 1 provides a modified overview of the framework developed by Ostrom (2009). It shows the relationships among three

first-level core subsystems (resource systems, governance systems, and users) of a socio-ecological system (SES) that affect each other, as well as links between social, economic, and political settings and related ecosystems. Ostrom used this framework to depict the relationships and role of networks (stakeholders) in a SES. Networks, according to Ostrom (2009), are useful descriptors of ecological systems that can show the composition of and interactions between multiple elements. They can also be used to assess the consequences of perturbations at the community level. The subsystems are (i) resource systems (wetlands), (ii) governance systems (e.g., the government and other organizations that have some control over wetlands) and (iii) users (e.g., individuals and communities who use wetlands for sustenance, recreation, or commercial purposes).

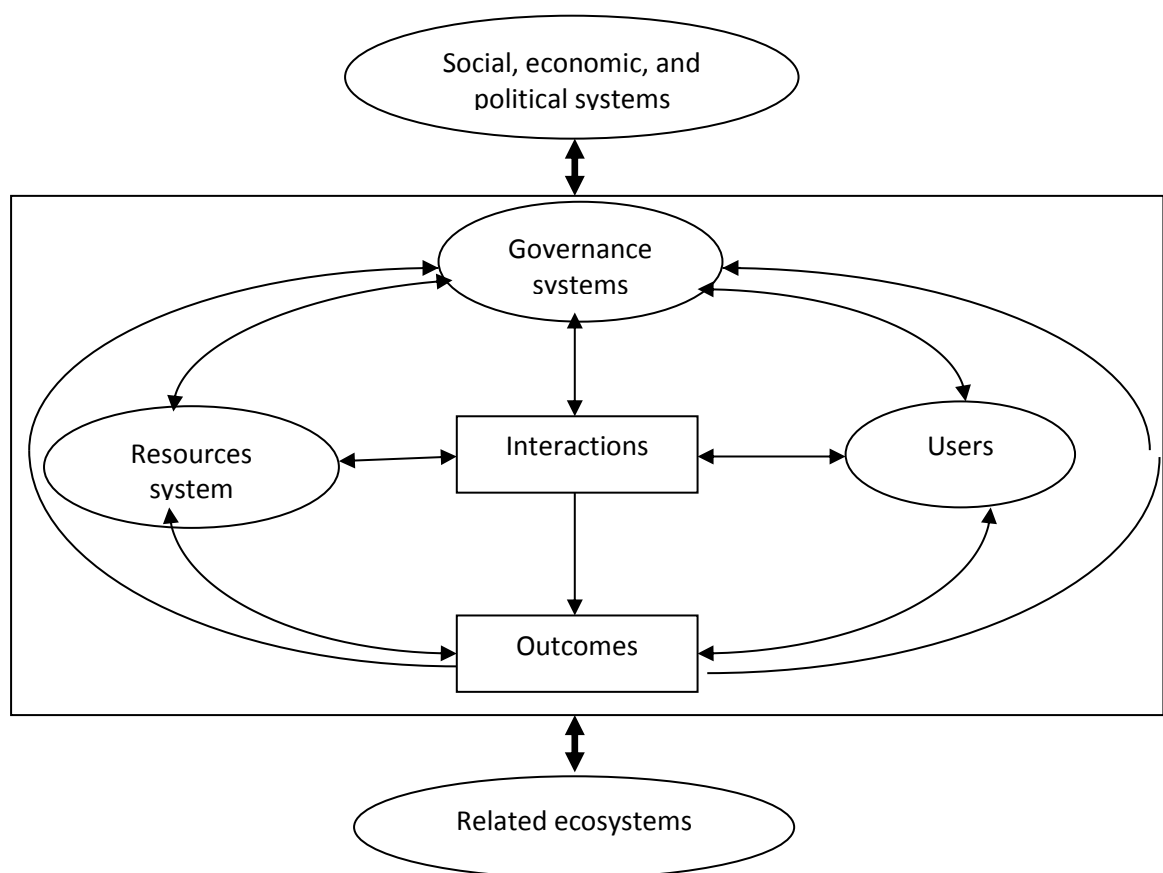


Figure 1. Core subsystems in a framework for analyzing socio-ecological systems²

Data and Methods

Complex governance systems involve numerous and diverse stakeholders, with varied knowledge and experience. Consequently, this diversity of perspectives must be acknowledged and incorporated into an assessment of such a system (Potts, 2015).

This project employed the following qualitative research methods: review of relevant literature, focus group discussions (FGDs), key-informant interviews, and open source materials. Key informants interviewed were primarily community leaders. Cooperative executives, government officials, and officers of Government Link Companies (GLCs)³ were also interviewed to identify specific decision-making processes used in developing wetland projects in the Temerloh area. Three FGDs were conducted, comprising 6-14 men and women in each group. Fifty semi-structured questionnaires were distributed to households to complement interviews as the primary source of data, out of which only 34 were either retrieved or sufficient for analysis. The questionnaire elicited information on income derived from the use of local wetlands, and community participation in natural resources management including wetlands. Details of the data gathering are as follows:

- Communities and projects visited: 19
- Interviews with government officials: 4 (agriculture [2], land, drainage, and town planning)
- Interviews with community residents: 8
- Focus group discussions: 3 (Kampung Chatin, Kampung; Luas Metakab; and Paya Mengkuang Mukin Lebak)
- Interviews with Government Link Company officers: 3 (FELCRA, RISDA, and FOA)
- Questionnaires administered: 34

Temerloh is a district in central Pahang, Malaysia. Temerloh Town is the capital of the district (see Figure 2). It is the second-largest city in Pahang, and is noted for its sprawling oil palm plantations, wetlands, and patin fish. It is located about 180 kilometers from Kuala Lumpur along the Kuantan-Kuala Lumpur highway road. The district consists of two areas: the 1,442 square kilometer Municipal Council Area; and the 808 square kilometer Outer Municipal Council Area. Colloquially, "Temerloh" usually refers to the territory under the administration of Temerloh Municipal Council, which includes the smaller towns adjacent to the city such as Mentakab, Lanchang, Kuala Krau and Kerdau.

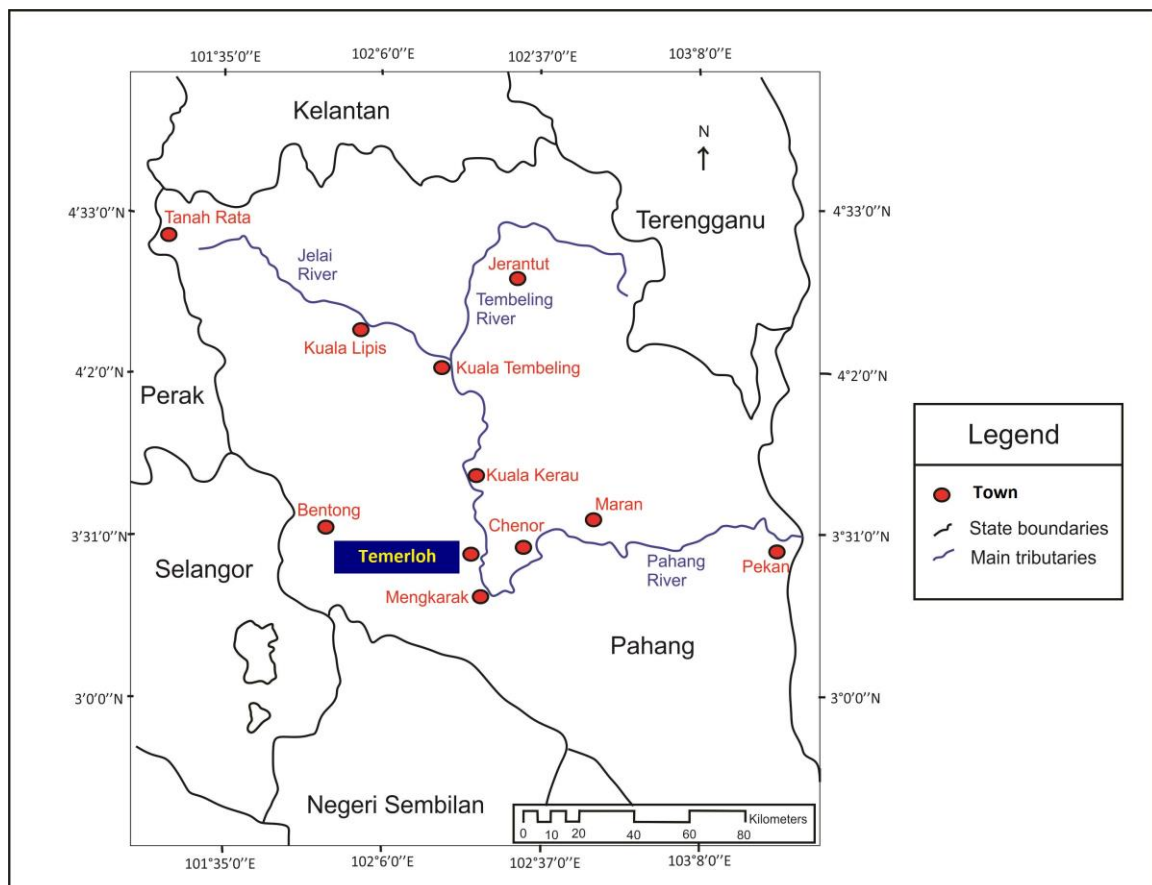


Figure 2. Map of Pahang, Malaysia

Findings and discussions

This section discusses the main findings of the study, which revealed three major factors driving the use of wetlands in the district: legal, economic, and ecological. Legally, lands are private property, which allows the owner to convert it to other uses, which in rural areas tends to mean agricultural uses. Economic considerations include the overall drive to convert wetlands for economic benefits. Specifically, taxes on lands, availability of funds, the interest of developers in pursuing oil palm projects, and the perception by communities and individuals of wetlands as wastelands create the economic push for wetland conversion. In addition, GLCs' and community cooperatives' roles in wetland use are driven by the needs for improved livelihoods and local economic development.

Ecologically, most community members see wetlands as highly suitable for oil palm cultivation. These economic and ecological factors are discussed using specific examples of Farmers Agriculture Authority (a GLC) and a local community (Kampung Chatin).

Patterns of wetland use in Temerloh

The wetlands in Temerloh are characterized based on location, nature of wetland projects, and the specific type of projects (see Table 1).⁴ Based on this classification, wetlands can be considered in two groups: those found within the city of Temerloh itself, and those found in surrounding local communities. Wetlands are used for agricultural and non-agricultural activities. They are also classified based on ownership of projects, including those owned by individuals and families, communities, private developers, and GLCs. Though there are many oil palm projects managed by cooperatives in the Temerloh district, not many are actually wetland-based. However, all the agricultural and non-agricultural projects on wetlands both within and outside the city of Temerloh are linked to the sustainable development of the city.

Location of wetlands	Urban (3) (Located within Temerloh and suburbs)	Kgs* Chatin, Buki Kelutu, Bukit Augin
	Village/Communities (17)	Kgs Paya Luas, Taram, Rista, Jeragam, Sokmak, Delam, Gelatan, Lompat, Raja, Lupuk, Keramat, Bukit Kemuing, Pelengo, Baru Lebak Mankarak, Buntun Pulau, Gatung
Ownership of projects	Owned by individuals/families (4)	<ul style="list-style-type: none"> • Fish pond project in Kg Sokmek, Kg Baru Lebak • Oil palm project in Kg Jeragam • Buffalo project in Kg Lompat
	Owned by community cooperatives (5)	<ul style="list-style-type: none"> • Fish pond and corn project in Kg Chatin • Oil palm projects in Kgs Raja, Keladan, Gatung and Paya Luas
	Owned/managed by private companies (5)	<ul style="list-style-type: none"> • Water park in Temerloh • Housing projects in Kg Bukit Kemuing, Pelengo, Buntun Pulau and Kg Baru Lebak Mankarak
	Owned/managed by Government link companies (1)	<ul style="list-style-type: none"> • Oil palm project in Kg Paya Luas owned by Farmers Organisation Authority
Type of projects	Oil palm projects (6)	Kgs Paya Luas, Rista, Jeragam, Keladan, Raja, Luas, Baru Lebak
	Fish ponds (4)	Kgs Chatin, Buntun, Pulau and Sokmek
	Livestock (3)	<ul style="list-style-type: none"> • Buffalo project in Kg Lompat • Poultry projects in Kgs Gelatan

		and Sokmek
	Recreation (3)	Water/theme parks in Temerloh, Kgs Tanjun Keramat, Lebak
	Commercial buildings (2)	Temerloh, Kg Bukit Augin
	Housing projects (4)	Kg Bukit Kemuing, Buntun Pulau and Pelengo
	Mixed uses combining more than one of the above (3)	Multipurpose wetland use in Kgs Rista, Taram, Sokmek

* Kg is the abbreviation for Kampung

Table 1. Characteristics of wetlands in Temerloh⁵

Most of the wetlands that have been converted in Temerloh have been used for oil palm plantations. Most of these oil palm wetland projects are registered with the District Office Agriculture Department, where there is a comprehensive list of proposals for the cultivation of oil palm in the wetlands, and are regarded as legal projects. Any oil palm wetland project that is not registered with the government is regarded as illegal. According to the officer interviewed, many such illegal projects exist. A list of oil palm projects on wetlands in Temerloh is presented in Table 2.

Area	Community	Size (Hectares)
Mukim Jenderak	1. Paya Sok	75
	2. Paya Biut	65
	3. Paya Luas	40
	4. Paya Tevenssing	25
	5. Paya Nawaa	20
	6. Paya Pelong	16
	7. Payah Sekoh	25
Mukim Lipat Kajang	1. Paya Lipat Kajang	66
Mukim Sanssang	1. Paya Parat Sassang	62
	2. Paya Telok Sentens	60
	3. Paya Badok	51
Mukim Mentakab	1. Paya Pendi	36
	2. Paya Triang	25
Mukim Semantan	3. Paya Buluh	23
	4. Paya Jerangan	16
Mukim Perak	1. Paya Baroh	36

	2. Paya Gertah Kelada	12
Mukim Sunsang	1. Paya Gantok (cooperative)	29
	2. Paya Megkung (cooperative)	11
	3. Tanbang	6
Mukim Lebah	1. Paya Besar Lebah	39
	2. Paya Lebah	39
	3. Paya Paga Kuih	30
	4. Paya Paga	18

Table 2. Oil palm projects on wetlands in Temerloh District⁶

A mix of activities take place in wetlands: in Kampung Lompat, the land is used for paddy, livestock, fish ponds, and growing fruits and vegetables; while in villages such as Kampung Sokmek, economic activities include a homestay, catering services, oil palm, goat-raising, and sport fishing. Many of the owners of agricultural projects built on wetlands claimed there is no need to register their projects with the government because the government does not provide financial support for projects that are registered.

Legal drivers of wetlands use

The International Union for the Conservation of Nature-Global Tiger Forum (IUCN-GTF) Framework on Governance of Protected Areas states: “It is important to consider the policies, the institutions, the processes, and the power relations affecting (governance of) natural resources. The inter-play between these is of prime importance to the successful conservation of resources and to their contribution to livelihoods” (IUCN, 2011). The legal drivers of wetland use in Temerloh, as found in this study, revolve around the laws of land ownership and use (as specified by various Land Codes and other ordinances). Malaysia’s land use policy is “use-oriented,” i.e., designed for maximum exploitation and development. Thus, conversion of land for urbanization, industrial, agricultural, mining, and forestry development all have a higher priority than conservation.

The National Land Code is very important with respect to all land matters. It was enacted pursuant to Article 76(4) of the Malaysian Constitution, and basically reflects the Malaysian Torrens system (Talaat et al, 2013). The Torrens system ensures that a title cannot be annulled or voided (Wu and Kepli, 2011). This system helps to avoid uncertainty of title. One copy of the title is kept at the registry, while the landowner keeps the second copy.

The rapid disappearance of Malaysian wetlands is allowed in part because the governance of wetlands—spelled out in the National Wetlands Policy (NWP) of 2004 (MNRE, 2014)—conflicts with the government’s Land Use Policy (LP) (Barau and Stringer (2015). The NWP, according to the Ministry of Natural Resources and Environment (2014), aims to meet Malaysia’s obligations under the Ramsar

Convention and Convention on Biological Diversity (CBD). The four objectives of this policy are as follows:

- 1) protection and conservation of different types of wetlands;
- 2) integration of wetland conservation interests into overall natural resource planning;
- 3) increase of scientific and technical knowledge; and
- 4) increase of public appreciation of wetland functions or benefits and the restoration of degraded wetlands.

In contrast, the major statutes governing land use are contained in the National Land Code (NLC), which is applicable in Peninsular Malaysia.⁷ However, the Land Capability Classification (LCC), applicable throughout Malaysia, divides land use into five categories: mining, agriculture (covering a wide range of crops), agriculture for a restricted range of crops, forestry; and conservation, based on potential productivity and economic yield of the land in question (Ibini et al 2012).

So while the NWP emphasizes conservation and protection of ecosystems and does not explicitly recognize public rights to access wetland areas, the LP, by contrast, is “use-oriented”—i.e. designed for maximum exploitation and development of land resources (MoSTE, 1997). According to Ibini et al (2012), when decisions are made regarding conversion of wetlands to other land uses, the cost/benefit analyses used in these situations often do not take into account the full range of benefits of the wetland area to be converted. As noted by Maniam and Singaravello (2015) and Barau and Stringer (2015), this disconnect between conservation projects, policies, and local communities at the sub-national level is not particular to Pahang, but also extends to southern Malaysia’s Johor state and in most states of peninsular Malaysia.

GLCs, developers, communities, and individuals have used the provisions of this law to convert most wetlands to agricultural lands in most rural areas of Temerloh. Landowners are free to put their private property to whatever use they want, and this is especially true for agricultural land. According to an official in the Temerloh district planning office, “the district does not have any right to impose policy on wetlands because they are basically private property. However, development within the city must follow the existing land use regulations and that applies to the use of wetlands. Wetlands are not seen as part of the physical development of the city because landowners have rights over their lands.” This is a major factor causing the conversion of wetlands—a point of general agreement among the government officials interviewed.

Economic drivers of wetlands use

The use and management of natural resources is greatly impacted by economic, socio-political, and institutional factors. These factors operate separately and in combination in affecting resource

management at the household, regional, national, and international levels (Thapa and Weber, 1994). These factors also determine who has what kind of access to which kind of natural resources, and what use they can make of such resources.

In addition to existing law and policy issues, this study finds that economic factors are also largely responsible for the increasing conversion of wetlands in the Temerloh district. Economic issues revolve around payment of property tax on land (including wetlands), and a prevailing perception among rural communities that wetlands are wasted or abandoned lands.

The Pahang state government imposes taxes on all lands whether used or not, including wetlands. Therefore, individuals and communities have an incentive to convert the wetlands to economically beneficial purposes, especially for agriculture. According to a livestock farmer in Kampung Sokmek, “It is hoped that the project will bring good benefit to the villagers (land owner). This is because the lands are left abandoned. Rather than being left abandoned, the palm oil plantation project will generate income for the land owners and they will not just be paying the tax on unused land.”

Similarly, the owner of a crop and livestock project built on wetlands in Kampung Sokmek asserted, “The use of existing wetlands is fueled by the need to utilize the wetlands for economic benefits rather than allowing it to waste and continue to pay tax on them.” The same explanation was offered by a community project leader in Kampung Gatung, where there is presently a wetland oil palm project run by 45 members of the community in conjunction with a developer. Yet another example of communities’ perception of untouched wetlands as unproductive land was seen in Kg Gatung. There, 45 community members started an oil palm project in 2015 in conjunction with a developer, located on what the community leader described as abandoned land.⁸

Economic factors largely determine the actions of individuals, community cooperatives working with developers, communities working through their Village Security, and Development Committee and the GLCs. The existing disconnects between laws and policies have been exploited by these groups to convert wetlands to agricultural use, resulting in the rapid decline of these wetlands in the country—again, in an effort to make profits and improve the economic conditions of the local communities.

Two examples of this dynamic are presented below, in which a GLC and a community cooperative attempt to achieve their economic objectives by converting wetlands to oil palm plantations and other agricultural use. The central players are the Farmers Organization Authority and the community of Kampung Chatin.

Farmers Organization Authority (FOA)

Through the GLCs, government agencies at various levels in Malaysia have been directly and indirectly involved in the use and management of natural resources, including wetlands. The major objectives of the FOA, a relatively significant GLC, is to expand agricultural production among smallholder farmers, both through improved marketing and the opening up of rural lands for cultivation. Again, land in rural areas is seen primarily as agricultural land, and wetlands are often regarded as wastelands that are difficult to use for purposes other than agriculture. The GLC, including FOA, look for ways whereby wetlands can become useful for profitable agricultural purposes.

An explicit and specific goal of FOA is to increase household incomes in Temerloh. Farmers and other residents of Temerloh buy shares in FOA, up to a maximum of RM20,000 per person on a 20/80 percent profit-sharing formula. Dividends as high as 10 percent are paid out on quarterly basis. Initial capital used to start operations in 2000 came from the Pahang state government, while the subsequent RM 1.3 million in rolling capital came from member shares. There are presently about 3,000 members, including individuals, groups, and communities. Temerloh is one of the highest dividend-paying branches in Malaysia, and they have never defaulted on the quarterly payout of dividends. They use the pool of money to invest in agricultural projects like oil palm plantations, patin fish farming, banana and jackfruit crops, and agricultural processing industries. FOA currently has approximately 330 hectares of oil palm plantations built on wetlands in Kampung Paya Luas: the largest assemblage of oil-palm acreage in the Pahang region.

According to an official interviewed at the FOA office in Temerloh, “The land we use is mostly leftover land, waste or jungle lands”—underscoring the point that even many government agencies see wetlands as wastelands. Not surprisingly, FOA encourages wetland owners to give up these “wastelands” for agricultural investments on their behalf. Once the farmer provides the land, all operations and investment are borne by FOA, while the farmer waits for the profit to come from the farming enterprise. And in terms of profitability, FOA’s oil palm wetland project in Kampung Paya Luas has been a success: “The authority has operated profitably over the years. For instance, we made as much as RM1 million from the oil palm project and other agricultural ventures in Temerloh in 2015. This made the FAO in Temerloh District one of the highest [profit-]making [regions] in the whole country.”⁹. This success in Temerloh fuels itself, providing additional impetus for FOA to acquire more “wastelands” for agricultural use in the rural areas of the district.

Kampung Chatin

Top-down approaches to resource conservation and sustainability have led to problems of resource depletion, lack of local

participation, and failed policies and programs aimed at resource conservation. In an attempt to find new solutions, community-based co-management posits that local communities should have direct control over the management, utilization, and benefits of local resources. Kampung Chatin—a community of 14 households in Temerloh which is surrounded by wetlands—provides a unique example of direct community involvement in the use of its wetlands. After laying fallow for 30 years, the wetlands of Kampung Chatin were converted for agriculture and aquaculture use starting in 2013. The major economic uses for the wetlands that surround the community are fish ponds and corn farming. Corn farming is particularly attractive to the community, due to its high profitability: requiring only 60 days to grow, corn can be harvested much faster than oil palm trees, which take years to grow and become productive.

Wetland use in this community is largely determined by the local Village Development and Security Committee (*Jawatankuasa Kemajuan dan Keselamatan Kampung*, or JKKK). These committees were established to complement the efforts of government in the rural planning and implementation process. They are empowered to develop their own project proposals and programs, and also to oversee their implementation under the supervision of both the Housing and Local Government Ministry and the Rural Development Ministry. In Kampung Chatin, nomination for JKKK leadership is by mutual consent among the members of the community.

Members are involved in project conceptualization, financial contributions for project implementation, and project execution. The entire process is highly participatory, and involves consensus by members of the community on all decisions. There is a robust relationship among all members of the community, which helps in effective project management.

The two examples presented here illustrate how formal and informal institutions actively engage in local resource use for economic reasons. Common to them, once again, is the perception that wetlands lack value in their present form. Additionally, apart from the economic value derived from converting wetlands to agriculture, building social capital is another outcome of wetland use. In other words, the use of the wetland as a common resource by the whole community has promoted bonding among community members.

The cases of FAO and Kampung Chatin clearly demonstrate the effectiveness of resource management by local institutions for economic benefits—but in ways that do not provide for the protection of the wetlands.

Ecological drivers of wetlands use

The ecological conditions of wetlands are favorable for growing oil palm. An interviewee in a FGD claimed that “all of the villagers in Paya Luas depend 100 percent on palm oil and rubber plantation. However, wetland is more suitable for palm oil plantation than rubber

plantation.”¹⁰ Other interviews with community members, including farmers, indicated that oil palm planted on wetlands is easy to maintain and does not require much labor to raise the trees to maturity—compared, for example, to growing rice, which is more labor-intensive. As one farmer explained, “We no longer plant paddy rice. The paddy rice is labor intensive and brings less profit. Often times, the paddy is affected by pests and diseases... So it is easy to do oil palm projects.”¹¹ According to local farmers, moreover, palms planted in wetlands also have a greater yield than those planted on non-wetlands and bring more profits.

Another example of an ecological driver—as introduced above in the Kampung Chatin case—is the widely held belief that growing corn on wetlands is highly profitable. According to a local agricultural expert, a “new improved variety of corn can be grown and harvested within 45 to 60 days. With this, corn can be planted and harvested as many as five times in a year. This brings more money with less investments. Our community is poised to promote the cultivation of corn on wetlands and Temerloh [through holding regular events like] corn festivals and exhibitions.”¹² For Kg Chatin, the option of planting a fast-growing, high-yield crop with little investment, on land that would not otherwise provide any source of income, has proven very attractive.

Due to the wide publicity given to the Kg Chatin community members’ corn farming—on radio, television, and social media—stories of that community’s success have reached many other communities in the district, thereby stimulating their interest in the cultivation of corn on wetlands. As more communities learn about the suitable ecological conditions for corn farming on wetlands, and about the potential economic successes that may result, it seems likely that more of the remaining wetlands in Temerloh may be converted to corn farms.

Conclusion

Wetlands in Temerloh have become very important for agricultural development, producing not only palm oil but also fruits and vegetables. Wetlands are also used for commercial and recreational purposes, including theme parks. When used for agricultural, commercial, recreational, or tourism purposes, wetlands contribute to the development of rural communities by helping to improve livelihoods for residents. Wetlands also play a valuable role in flood mitigation by acting as retention ponds. For all of these reasons and more, wetlands are crucial to the rapidly developing city of Temerloh.

In this paper, the major factors driving the use of wetlands in Temerloh District have been categorized into *legal*, *economic*, and *ecological*. The usage-oriented nature of Malaysian land policy allows landowners to use private land as they choose, hence the rapid conversion of wetlands. Economically, most wetlands are viewed as abandoned or wasteland unless and until they can be made economically beneficial. Additionally, taxation of both used and unused lands by government, availability of funds, and the interest level of

developers are all economic incentives to use wetlands. GLCs, communities', and individuals' motivations to use wetlands are based on the need for improved livelihoods and local economic development. Thus, economic issues tend to supercede the need to conserve wetlands.

The findings of this study agree with results of previous studies including Barau and Stringer, (2015), Schuyt and Brander (2004) and O'Connell (2003), which found that the wide range of human activities which have altered wetlands around the world and caused their degradation are basically results of economic or financial pressures. In other words, economic considerations and improved rural livelihoods override the need for conservation of wetlands.

The Malaysian government has demonstrated its concern for wetland conservation by putting in place the National Wetland Policy. Beyond this policy, however, there is a need to harmonise, strengthen, and fully implement existing laws and policies, provide alternative livelihoods for people living in wetland areas, make available more financial resources for wetland conservation, and raise awareness of the benefits of protecting wetlands.

Furthermore, within the context of CBNRM, the examples in this study show a high degree of community participation in the use of wetlands in Temerloh, reflected in the ways that local institutions and cooperatives have organized themselves. In the case of Kampung Chatin, the focal unit for joint natural resource management is the local community. As stated by Rotha et al (2005), it is debatable if communities can be the most "appropriate unit for natural resource management in view of their knowledge and conditions according to which they can make decisions." This brings about the issue of co-management: a management regime whereby decision-making authority is shared between local people and local, state, or national government. Guided by Ostrom's framework (2009), this study also clearly demonstrates the relationships among three first-level core subsystems of a socio-ecological system (resource systems, governance systems and users), as well as linked social, economic, and legal settings. The composition of and interactions among these multiple elements have also revealed the consequences of perturbations at the local level—which is, ultimately, the degradation of the nation's wetlands.

In conclusion, the numerous laws, policies, and international conventions meant to protect Malaysia's wetlands have failed to achieve that end. Key recommendations to government at all levels include: strengthening and implementing existing laws and policies for wetland protection; providing alternative livelihoods for people living in wetland areas; making available more financial resources for wetland protection; and improving local residents' awareness of the importance of protecting wetlands. Certainly, the general perception among most community members that wetlands are wastelands implies a lack of adequate education on the part of the government on the importance of

wetlands. Investments in alternative livelihoods, such as non-farm ventures or other types of local industry, are necessary to discourage people from converting wetlands to other uses. Government at federal and state levels should also grant tax breaks to wetland owners, who are motivated to convert wetlands to recover the taxes they currently have to pay regardless of land use. Finally, there is need for government, appropriate agencies at all levels, NGOs, and community based organizations to educate and create more awareness in the communities about the importance of conserving wetlands.

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Notes

¹ The Ramsar Convention (1971) defined wetlands as areas of marsh, fen, peatland, or water, whether natural or artificial, permanent, or temporary, with water that is static or flowing, fresh, brackish, or salt, including areas of marine water the depth of which at low tide does not exceed 6 meters.

² Source: modified by author from Ostrom, 2009, p.420

³ A government link company is a legal entity created by a government to undertake commercial activities on behalf of an owner government. Their legal status varies from being a part of government to stock companies with a state as a regular stockholder (Ani et al, 2014).

⁴ Based on data from author's fieldwork

⁵ Source: Author's fieldwork, 2016

⁶ Source: Drainage Department, Temerloh District Office

⁷ East Malaysia uses the Sabah Land Ordinance and Sarawak Land Ordinance.

⁸ Interview with Kg Gatung community leader

⁹ Interview with FAO official in Temerloh, October 2016

¹⁰ FGD participant

¹¹ FGD participant

¹² A community leader in Kg Chatin