

Impacts Of The National Economic And Social Development Plan On Songkhla Lake Basin Development Thailand

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ABSTRACT

The objectives of this study were to explore the impacts of Thailand's eleven National Economic and Social Development Plans (NESDP or NP¹) on the development, natural resources, and environment of the Songkhla Lake Basin (SLB), Thailand, and to propose policy recommendations for this development. Data on development in the SLB were collected through literature reviews and through four focus group discussions for related stakeholders in the four sub-basins. Our results showed that the focus of development changed from economic development in NP1 through NP7 to a new model of holistic "people-centered development" with an emphasis on sustainability in NP8 through NP11. During this time (1961-2013), economic development has progressed in the SLB. For instance, 443 irrigation projects were developed to support expanded rice paddy fields, the area of shrimp farms increased to a current total of 60,174 rais, rubber plantations encroached into 30% of the total watershed area, and the number of factories increased to 2,748. This increased development has led to water pollution, sedimentation in Songkhla Lake, degradation of the watershed, and the depletion of fishery resources, requiring urgent remedial action. We recommend that mechanisms are provided for the public to fully participate in formulating basin development plans by, for example, establishing a Songkhla Lake Basin Development Institute and conducting a basin-level strategic environmental assessment.

Keywords: National Economic and Social Development Plan; Songkhla Lake River Basin; Impacts of development

INTRODUCTION

The Songkhla Lake Basin (SLB) is located along the eastern coast of southern Thailand (see Figure 1) and is one of 25 river basins in the country. The basin has an area of 8,729 km², including 7,687 km² of land area and 1,042 km² of lakes (ONEP, 2005). Songkhla Lake is a lagoon lake with a salinity that varies seasonally, and the lake consists of four parts, including (1) a freshwater portion called Thale Noi in the upper region, (2) the Upper Songkhla Lake, (3) the Middle Songkhla Lake, and (4) the Lower Songkhla Lake connected to the Gulf of Thailand in the Muang district, Songkhla province (Sirichai & Doungsuwan, 2009). The total population in the SLB was approximately 1.7 million people in 2011 (DPA, 2012) and the economy was dependent on the agricultural, industrial, wholesale/retail, and service sectors. In addition, the average per capita income has increased through time. For example, the average per capita income in Songkhla and Phattalung provinces in 2010 was 119,041 and 65,756 baht/year, respectively, displaying an increase of 33% and 54%, respectively, from 2000 levels (NSO, 2012).

Thailand has formulated 11 National Economic and Social Development Plans (NPs) during the past 50 years. The first NP (NP1) through the fourth NP (NP4) were implemented between 1961 and 1981 and focused on economic development; NP5 through NP7 were implemented from 1982 to 1996 and focused on decentralizing

¹It is customary to abbreviate National Economic and Social Development Plan as NP with the first plan denoted NP1, the second plan denoted NP2, and so forth.

development; and NP8 through NP11 focused on people-centered development (Nopakun, 2010). During the first to seven NPs, it has been reported that the country experienced economic prosperity while facing numerous social problems, leading to unsustainable development (ONESDB, 2008).

Although the direction of development has changed since NP8, development under these plans continues to impact the SLB in negative ways. The objectives of this research were (1) to understand the impacts of Thailand's NPs on natural resources and patterns of development in the SLB and (2) to provide policy recommendations to resolve short- and long-term issues related to development in this region.

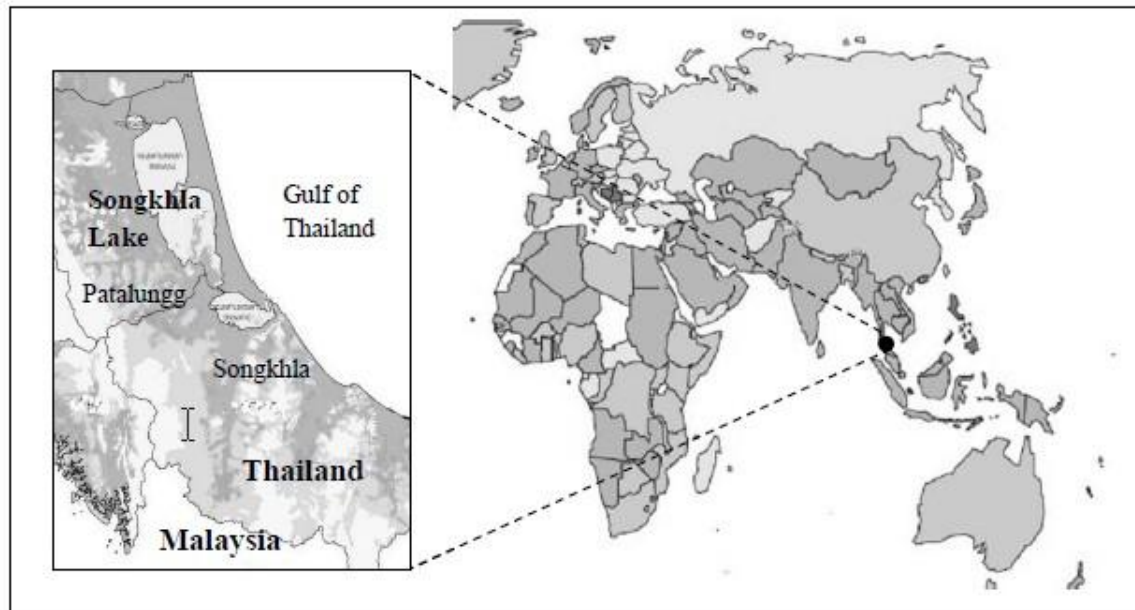


Figure 1: Location Of Songkhla Lake Basin

METHODOLOGY

We examined patterns of development and their impacts on natural resources and the environment in the SLB under the implementation of the 11 NPs from 1961 to 2013 following a literature review. The “*Songkhla Lake Basin, Basins and Lakes impacts of Development: Irrigation, Aquaculture, Rubber plantation and Port*” were search terms we looked for in the literature search, and collected only about 20 peer-reviewed, relevant articles. We also conducted four focus groups composed of representatives from related sectors, including the general public (89 persons), members of local administrative and government organizations (35 persons), and individuals from academic institutions (18 persons), to discuss how past and present development have affected the SLB, and which specific questions were asked of them - “*What is the problem of SLB, how would you describe the cause, and what is your opinion to solve the problem?*”

RESULTS AND DISCUSSION

Literature Review: Pattern Of development In The SLB From 1961 To 2013

Patterns of development in the SLB under Thailand's 11 NPs are summarized in Table 1.

Development That Enhanced Agriculture And Aquaculture Productivity

Irrigation Development For Rice Paddies

NP2 was implemented from 1967 to 1971 with an objective of “*Accelerating rice productivity through improving efficiency in production to increase productivity per rais*” (ONESDB, 2008). Since 1948, 443 irrigation

projects were initiated in the basin in order to expand rice field areas. Presently, there are 1,150,400 rais of rice fields that benefit from these irrigation projects. Moreover, five canals that connected the upper Songkhla Lake to the Gulf of Thailand were blocked in order to protect seawater intrusion (Sirichai & Doungsuwan, 2009).

Shrimp Aquaculture

Since 1987, the area of the SLB comprised of rice fields have encroached by shrimp ponds with promotion of shrimp aquaculture under NP4 to NP 7 (1982-1996). Accordingly, tiger prawn (*Peneaus monodon*) aquaculture has rapidly expanded in the area around Songkhla Lake (Tanavud et al., 2001). Shrimp farms, in general, increased from 21,800 rais in 1982 to 48,700 rais in 2000 to 60,174 rais in 2011 (IRCNE, 2010), leading to a 276% increase in the area of shrimp farms from 1982 to 2011.

Rubber Plantations

From 1982 to 1984, the Thai government gave farmers the right to convert forests to rubber plantations and offered them certificates of ownership (Tongrak, 2003). Accordingly, the area of the SLB comprised of rubber plantations increased following this policy and other guidelines for land reform under NP4 and for poverty alleviation under NP5 (DPA, 2012). Currently, rubber plantations continue to expand in the SBL and throughout Thailand because of increasing prices and demand for rubber, especially in neighboring China (RRIT, 2012).

Industrial And Infrastructure Development

Industry

NP1 through NP4 emphasized growth in the industrial sectors for export, leading to a steady increase in the growth of this sector (Pintobtang et al., 2002). The number of factories in Thailand grew from 2,431 in 2007 to 2,748 in 2011, with 2,276 of them as of 2011 located along highways in Songkhla province (Songkhla Province Industry Office, 2012).

Songkhla Port

The Songkhla port was constructed following industrial development under NP1 through NP4 in order to increase economic efficiency within the SLB. This port was first proposed in 1982 (Talor et al., 1985) and became fully operable in 1987. Nine hundred and forty meters of rock-filled dam were also built at the southern portion at the mouth of Songkhla Lake (Kriengkajon, 2006). The direction of Thailand's NPs and pattern of development in SLB is shown in Table 1.

Table 1: Direction of Thailand’s NPs and Pattern of Development in SLB

Plan And Direction Of Development	Pattern Of Development In SLB
<p>NP1 to NP4 (1961-1981)</p> <p>Economic development for exporting purposes, increase and distribute income to provincial parts, restore and improve natural resources management.</p>	<p>-Irrigation projects in Ranod district caused of blocking 5 canals for water flow into Upper Songkhla Lake (Sirichai & Doungsuwan, 2009). Medium size irrigation projects were also developed in the SLB (Water resource regional office 8, 2007). Hatyai and Songkhla towns were developed to be center of civilization in Southern Thailand through construction of port, fishery jetty, Tinnasulanon bridge, and Southern industrial settlement (Pintobtang et al., 2002).</p>
<p>NP4 to NP7 (1982-1996)</p> <p>Distribute industrial activities to provincial parts, maintain financial security, development of towns and specific areas in order to distribute prosperity to provincial parts, and resolve economic and social problems.</p>	<p>-Proposal of a salinity barrier across Songkhla Lake and construction of reservoir in Sadao district. (John Taylor and Son, 1985).</p> <p>-Increase of shrimp farms in SLB in 1987 (Sirichai & Doungsuwan, 2009).</p> <p>- Increase of seafood processing industries and rubber industries (Pintobtang et al., 2002).</p>
<p>NP8 to present</p> <p>People-centered development and participation in natural resources and environmental management strengthen governance in country’s management, and increasing capacity of the country for competition.</p>	<p>-Rapid expansion of city. In 1999, a wastewater treatment plant was constructed in order to treat wastewater from Hatyai municipality (Regional Environmental Office no.16, 2009). Since 2007, oil palm plantations were expanded into paddy field areas and wetlands (Kampera, et al., 2008)</p> <p>-Songkhla Port was expanding in 2003 (Kriengkajon, 2006) During 2003-2005 rubber price increased (Charenmjiratragul, 2012)</p> <p>-Emsong Project proposed 25 priorities projects (Emsong Project, 1997). - Songkhla Lake Development Master Plan was developed in 2005 (ONEP, 2005) and revised in 2011 (ONEP,2012)</p>

Focus Groups: Impacts Of Development On The Environment, Natural Resources, And Livelihoods Of Local People In The SLB

According to the results of the focus groups, participants cited a variety of problems related to development in the SLB (see Table 2), including barriers to water flow in Songkhla Lake, sedimentation in Thale Noi and Kukud, poor water quality caused by wastewater release, increases in agricultural, shrimp farm, and industrial areas, encroachment of peat swamp forest, land use conversion from rice paddies to rubber plantations, increasing coastal erosion around the outer part of Songkhla Lake, encroachment into the watershed for rubber plantations that has led to conflicts between local communities and government organizations, intrusion into protected areas, decreases in fishery resources due to overfishing, sedimentation of Songkhla Lake, and illegal fishery operations.

Table 2: Environmental Problems During Implementation Of Each NP That Identified By Stakeholders Of Focus Group Discussion In Four Areas

Environmental Problems	NP1-NP4	NP5-NP7	NP8-NP11
	(1961-1981)	(1982-1996)	(1997- Present)
• Blocking of flow in Songkhla Lake	✓	✓	✓
• Sedimentation in Thale Noi and Kukud	✓	✓	✓
• Poor water quality cause by wastewater released from communities		✓	✓
• Increase of agriculture area, shrimp farms and industries			✓
• Encroachment of peat swamp forest			✓
• Change of land use from paddy field to rubber plantation			✓
• Increase of coastal erosion around outer part of Songkhla Lake		✓	✓
• Encroachment of watershed for rubber plantation purpose that lead to conflict between local communities and government organizations, interlope of protected areas		✓	✓
• Decrease of fishery resources because of over fishing, sedimentation of Songkhla Lake, and illegal fisheries.			✓

Water flows have been blocked between Songkhla Lake and the Gulf of Thailand because of a watergate constructed at the confluence of these water bodies. This has further resulted in sedimentation and decreased water levels in Songkhla Lake (Kriengkajon, 2006). Similar patterns and consequences have been observed in saline waters in St. Lucia and the Mfolocy Rivers in South Africa, which have impacted the lake's longevity (Lawrie & Stretch, 2011) and following the construction of a dam in the upper portion of the Lancan River in Yunan province, China, which has reduced water flow in the middle and lower portions of the river (Zhao et al., 2012). Conversely, when a new river mouth was constructed to connect Chilika Lake to the Bay of Bengal in India, improved water flow, lower sedimentation, and increased fishery resources and plankton production were observed (Chilika Development Authority, 2012; Dube et al., 2010).

In addition to decreased water flow, development in the SLB - specifically the expansion of shrimp aquaculture - has resulted in poor water quality and related environmental problems that have decreased the area's productivity. Similar issues have been observed in Bangladesh where shrimp aquaculture negatively impacted mangrove forests, other agricultural areas, water quality, salt water intrusion, and the abundance and diversity of aquatic species (Paul & Vogl, 2011). Shrimp aquaculture has also led to eutrophication in New Caledonia Lake in southeastern Vietnam (Anh et al., 2010; Thomas et al., 2010) and severe saltwater intrusion (60%) in coastal areas of Mexico (Berlanga-Robles et al., 2011).

Rubber plantations have encroached into many areas of the SLB, including Kao Pu- Kao Ya National Park. Currently, 30% (90,000 rais) of a first class watershed in the U-tapao Sub-Basin has been converted to rubber plantations (Charernjiratragul, 2012). This activity has increased soil erosion and sedimentation in Songkhla Lake (Department of Mineral Resources, 2008). In the Changhua River Basin located in Hainan, China, rapid deforestation of more than 277 km² has occurred for rubber and orchard plantations from 1995 to 2005 (Zhai et al., 2012), leading to soil deterioration through decreased organic matter and increased soil acidity (Zhang, 2007). In southeastern Vietnam, rubber plantations now occur on all land suitable for this activity (146,000 ha; Nguyen, 2012).

Fishery resources in Songkhla Lake have also deteriorated following changes to water flow, water quality, salinity, and sedimentation, which have impacted the livelihoods of local fishermen (Iwasaki & Shaw, 2010). Moreover, overfishing in Songkhla Lake has led to declining fishery resources (Chesoh & Lim, 2008); catch per unit effort (CPUE) of set bag nets in Songkhla Lake has decreased from 3.6 kg/set bag net/day in 1994 (Choonhapran, 1996) to 0.77 kg/set bag net/day in 2008 (Marine Resources Research Center and the Lower Gulf of Thailand Coast, 2008).

Finally, individuals in local communities have changed their occupations from farmers to other jobs (e.g., industrial labor). Labor jobs increased from 53,900 in 1997 to 78,000 in 2007 in Songkhla province (The Office of Industrial Economics, 2008) and from 409 in 1991 to 4,010 in 2009 in Phattalung province (PIO, 2011). As individuals began working outside of the community, social problems became more prevalent, including deteriorated relationships between community members, insufficient incomes, and increases in health problems and broken families (Peangnu & Paduka, 2007).

Recommendations For Future Development In The SLB

Based on the literature review and discussions following the four focus groups, we make the following recommendations for future development in the SLB:

1. Emphasize the importance and urgency of current environmental and social problems. Current environmental issues, such as overfishing in Songkhla Lake, conversion of watersheds and peat swamp forests, water pollution, and coastal erosion, should be prioritized and addressed.
2. Integrate related development plans in the SLB. Several government organizations working in the SLB continue to work within their own isolated frameworks, leading to fragmented management within the region. A single development plan should be created that integrates the objectives and actions of all related institutions in the region.

3. Promote participation in the public and related sectors. All stakeholders should be given the opportunity to be involved in the development of the region, from plan development to monitoring and assessment, in order to mitigate conflicts between stakeholder groups.
4. Perform a strategic environmental assessment (SEA). A SEA could act as an important tool for promoting the involvement of all sectors in determining initial concepts, developing more integrated plans in the future, and selecting appropriate policies, plans, and projects for sustainable development in the SLB.
5. Improve governance for the effective management of the SLB. Participation by government organizations, public sectors, and communities can promote social unity with the SLB for future generations.

CONCLUSIONS

Although Thailand's 11 NPs have led to critical socioeconomic advances in the region, they have also resulted in negative environmental impacts. For example, we found that over the last 50 years, development projects under the NPs have resulted in 1) water pollution caused by wastewater from agricultural and industrial activities, 2) increased sedimentation in Songkhla Lake resulting from soil erosion following landcover conversion, the blocking of water flows, and fishing activities, and 3) decreases in fishery resources that have resulted from the blocking and changing of water flows, the release of untreated wastewater from several sources, and the high use of legal and illegal fishing equipment.

Based on these results, we make a number of recommendations for resolving these environmental problems. Environmental threats should be prioritized and addressed immediately through, for example, regulations on fishing equipment and illegal fishing and the use of defensive measures to reduce landuse conversion. To achieve sustainable development in the SLB, effective basin management mechanisms and budgets should be integrated for all stakeholders through strategic environmental assessment tools. SEA will be an important tool to involve all sectors to determine sustainable development direction, participation of integrated plan and projects that correspond to the basin area to reduce confliction in the area, such as a case blocking of saline water Pak Ra – Wa, the saline barrier deep sea port, the reservoir project in the upstream area, to establish industrial estate, etc., as well as reducing the impact of SLB in the long-term.

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