

SUSTAINABLE WATER MANAGEMENT BY LOCAL GOVERNMENT ORGANIZATIONS: A CASE STUDY OF KOH LARN, CHONBURI PROVINCE

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ABSTRACT

Koh Larn, a small island under Pattaya City in Chonburi Province, faces long-standing water scarcity due to rapid tourism growth, limited natural freshwater sources, and dependence on water transported from the mainland. This research aims to examine sustainable water management practices implemented by local government organizations (LGOs), focusing on governance structures, infrastructure development, environmental considerations, and community participation. A qualitative methodology— including interviews, field observations, and document analysis— was utilized to investigate the challenges and effectiveness of current water management policies. Findings demonstrate three major components: (1) the need for integrated governance and long-term planning; (2) the urgency to upgrade water infrastructure, particularly desalination capacity and distribution networks; and (3) the importance of community involvement in water conservation initiatives. This study presents a sustainable water management model suited for island communities, contributing to enhanced water security and resilience for local development.

Keywords: Sustainable water management, Desalination, Koh Larn, Local government, Water governance, Tourism impact

INTRODUCTION

Water scarcity is a critical issue affecting coastal and island communities globally, particularly those with limited freshwater sources and intensive tourism activities. Koh Larn, located approximately 7 kilometers from Pattaya City, is one of Thailand's most visited island destinations, welcoming millions of tourists annually. While tourism drives economic growth, it simultaneously places heavy pressure on the island's water supply. Koh Larn lacks natural freshwater storage and therefore depends almost entirely on transported freshwater and limited desalination production. These conditions make sustainable water management essential for long-term community welfare.

Local government organizations (LGOs) in Thailand, particularly Pattaya City Municipality, play a central role in planning, regulating, and providing water-related services on Koh Larn. Similar to other island destinations worldwide, water scarcity affects not only environmental sustainability but also public health, economic stability, and community resilience (Smith & Puczkó, 2014).

This study examines how LGOs implement water management strategies, identifies challenges in governance and infrastructure, and proposes sustainable solutions tailored to island environments. The research contributes to broader discussions on local governance, tourism impacts, and sustainable resource management in Southeast Asia.

The six existing strategies under the 12-year Water Resources Management Strategy have been revised by adding new strategies that lead to more comprehensive action plans. These enhancements allow for better alignment with the 20-year National Strategy. Examples include the development of standardized and affordable drinking water, increasing water-use productivity, improving water drainage efficiency, mitigating basin-level flooding, restoring rivers and canals, preventing and reducing soil erosion in watershed forest areas, and developing watershed land-use plans. The revised strategies were submitted to the Cabinet and approved on 18 June 2019, and subsequently published in the Royal Gazette on 18 September 2019. (20-Year Master Plan for Water Resources Management (2018–2037).

The key components of the 20-Year Master Plan for Water Resources Management (2018–2037) consist of six strategic areas:

1. Water supply management for consumption and domestic use
2. Strengthening water security for the production sector
3. Flood and disaster management
4. Water quality management and water resource conservation
5. Conservation and rehabilitation of degraded watershed forests and prevention of soil erosion
6. Water management and governance

Management refers to a systematic process aimed at achieving organizational goals through planning, directing, and controlling operations. While administration emphasizes policy formulation and strategic planning, management focuses on implementing these policies and plans in practice. The management process encompasses planning, organizational structuring, human resource allocation, leadership, and control to ensure effective operations.

Moreover, management is regarded as both a science and an art. The theories, principles, and knowledge applied in managerial practices represent the scientific aspect, whereas the ability to effectively implement these principles, manage people, and execute tasks reflects the artistic dimension. Effective management requires integrating theoretical knowledge with practical skills, along with an understanding of the capabilities, needs, and motivations of organizational members, in order to achieve the desired goals. Boontamara, T. (2021).

Conceptual Framework and Related Literature

2.1 Sustainable Water Management

Sustainable water management refers to long-term policies and practices ensuring adequate supply and responsible water use. The Global Water Partnership (2020) emphasizes Integrated Water Resource Management (IWRM) which promotes cross-agency planning, efficient consumption, and environmental safeguards.

Approaches to water resource management should emphasize the participation of government agencies and local administrative organizations (LAOs). In terms of policy, the government must prioritize the formulation of national-level water management policies and plans, supported by clearly designated responsible agencies. Lessons can be drawn from the Netherlands, which successfully addressed severe flooding through the Delta Works project—a long-term initiative developed over more

than 40 years following the catastrophic flood of 1953. This case illustrates that sustainable water management requires long-term planning and investment in infrastructure such as dikes, storm surge barriers, and water gates, particularly in low-lying areas.

In the context of Thailand, the government should establish legal and administrative frameworks that enable relevant agencies to operate efficiently and flexibly in addressing both floods and droughts. Local administrative organizations must also play a significant role by coordinating closely with communities within their jurisdictions to support effective implementation.

Regarding administrative processes, water management initiatives should include clearly defined projects, operational procedures, tools, and timelines from initiation to completion to ensure systematic and effective management.

In terms of networking, the use of information technology systems is essential for communication, coordination, and data sharing among relevant agencies. Such systems enhance situational awareness and support systematic problem-solving, particularly in Pathum Thani Province and other interconnected areas.

2.2 The Role of Local Governments in Water Governance

Local governments are primary actors in water distribution, infrastructure investment, and enforcement of environmental regulations. Their effectiveness depends on transparency, stakeholder engagement, and adequate funding (Erfurt-Cooper & Cooper, 2009)

The water resources management organization is a crucial mechanism that enables the country's water management reform to achieve practical results rapidly. In the past, Thailand's water resources management system was fragmented, with responsibilities distributed across more than 48 agencies. This lack of unity and coordination led to overlapping functions, inefficient budget use, and disjointed problem-solving efforts, resulting in a sectoral approach where each agency operated independently rather than collaboratively.

2.3 Tourism and Water Demand on Islands

Tourism significantly increases per-capita water consumption. Studies show that tourist-heavy islands face chronic shortages without infrastructure expansion and conservation strategies (Bender et al, 2007) Koh Larn exemplifies this challenge.

2.4 Community Participation

Local engagement is essential for sustainable environmental management. According to Nonaka and Takeuchi (1995) local knowledge is a foundation for effective community-based solutions. Community enterprises play a crucial role in national economic development by stimulating local economies, creating jobs, and promoting sustainable growth. Chuwichian, P., Soonthornpipit, H., Kulawanich, A., Yoowattana, P., Pongpng, T. (2025).

2.5 Theoretical Framework

This study adopts three theoretical perspectives

1. IWRM (Integrated Water Resources Management) for integrated planning
2. for integrated planning
3. Governance Theory for institutional analysis
4. Community-Based Resource Management

Together, they guide the analysis of Koh Larn's water management system.

OBJECTIVE

1. To analyze current water management practices implemented by local government organizations on Koh Larn.
2. To identify limitations and challenges within the existing water governance framework.
3. To propose sustainable water management strategies appropriate for island environments.

METHODOLOGY

A qualitative research methodology was employed to ensure an in-depth understanding of water management practices. Data were collected using

1. Semi-structured interviews

Participants included Pattaya City officials, Koh Larn residents, business operators, and water distribution personnel.

2. Field observations

Researchers examined desalination plants, water storage tanks, and distribution systems.

3. Document analysis

Review of municipal reports, water supply records, environmental plans, and policy frameworks.

Data Analysis

Thematic analysis following Braun and Clarke (2006) was used to categorize findings into governance, infrastructure, and community participation themes.

Findings

5.1 Governance Challenges

Water governance on Koh Larn is administratively dependent on Pattaya City. Coordination gaps between departments create delays in infrastructure development. Lack of localized authority reduces responsiveness to urgent water shortages.

5.2 Infrastructure Limitations

- Freshwater is transported by barges from the mainland.
- The desalination plant produces limited output due to technical constraints.
- Storage capacity is insufficient during peak tourist seasons.
- Distribution pipes are aged and prone to leakage.

5.3 Community Participation

Residents show awareness of water scarcity, yet systematic water conservation practices are inconsistent. Local businesses use large volumes of water during peak tourism flows, increasing pressure on supply.

Discussion

The analysis reveals that water scarcity on Koh Larn is interconnected with governance limitations, infrastructure deficits, and tourism pressures. Similar to other island destinations, sustainable solutions require integrated planning, investment in desalination technologies, and strengthened community-based conservation programs (Smith & Puczkó, 2014)

Effective water governance requires empowerment of local authorities, multi-stakeholder collaboration, and stronger policy enforcement. Community education programs can shift consumption behavior and reduce demand-side pressure.

7. CASE STUDIES

Case Study 1: Desalination System Expansion

Koh Larn's desalination capacity is comparable to small-scale plants used in Mediterranean islands. However, high electricity use and maintenance costs restrict operational hours.

Case Study 2: Community Water-Saving Campaigns

Pilot campaigns in Tien Beach and Samae Beach communities show improved awareness, yet only partial adoption of conservation practices.

Case Study 3: Thailand's Integrated Coastal Resource Policy

Koh Larn's situation aligns with national coastal resource sustainable management policies, but implementation remains fragmented at the LGO level.

RESULTS

1. Koh Larn's water system remains vulnerable due to inadequate infrastructure and high tourist consumption.
2. Local government capacity must be improved for integrated water planning.

3. Community participation is essential but currently insufficient.
4. Desalination, rainwater harvesting, and smart distribution systems are viable long-term solutions.

CONCLUSION AND FUTURE WORK

The study concludes that sustainable water management in Koh Larn requires

- Strengthening local governance and planning
- Expanding desalination capacity
- Improving water infrastructure and distribution networks
- Enhancing community participation through education
- Implementing long-term IWRM-based strategies

These actions can significantly enhance the island's water security and support sustainable tourism-driven development,

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