COMPONENT 2

INTEGRATION OF NATURAL CAPITAL ACCOUNTS INTO LOCAL DEVELOPMENT PLANNING AND OPERATIONS

THE INTEGRATION OF NATURAL CAPITAL ACCOUNTING IN PUBLIC AND PRIVATE SECTOR POLICY AND DECISION-MAKING FOR SUSTAINABLE LANDSCAPES

NATURAL CAPITAL

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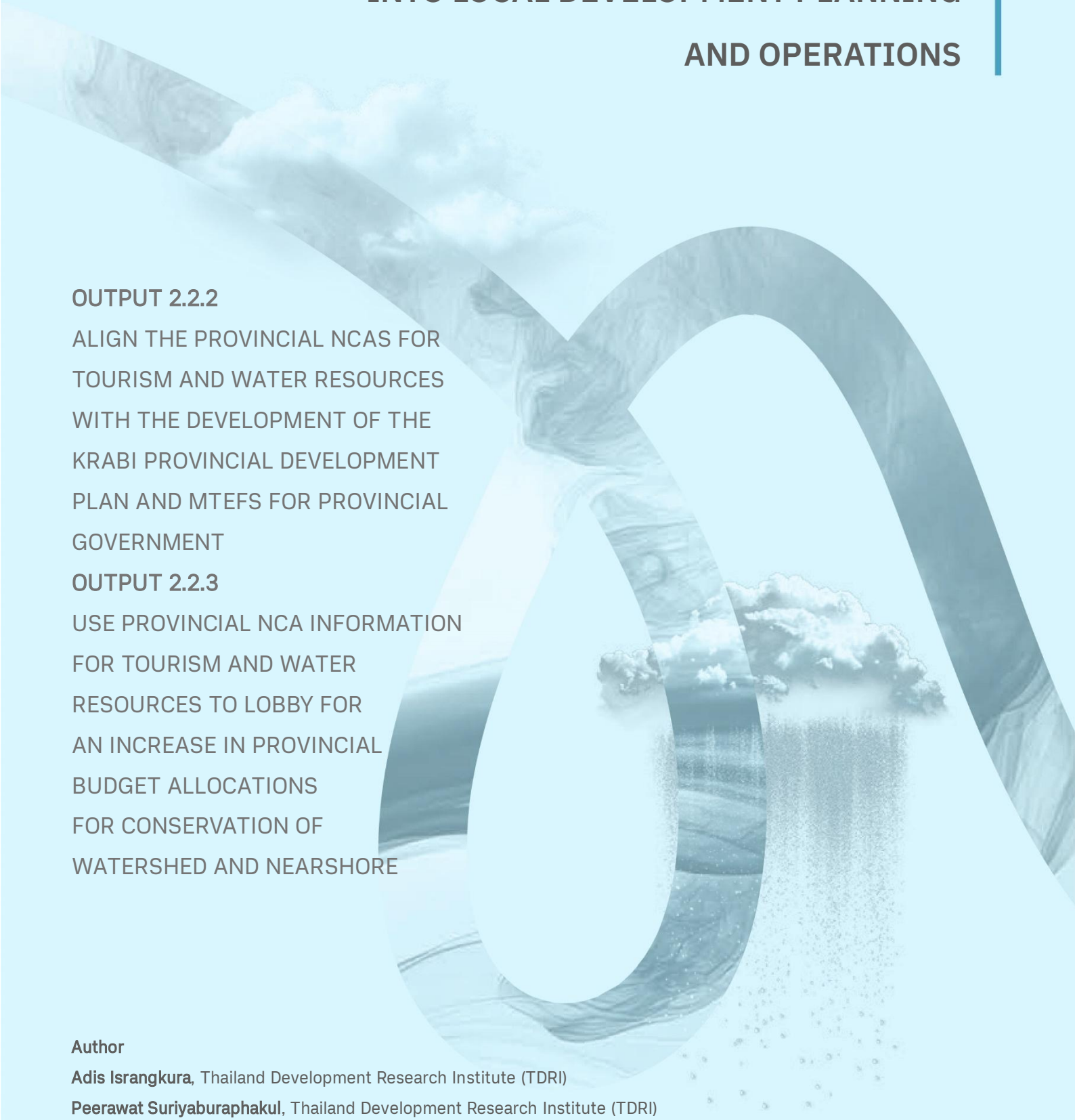

OUTPUT 2.2.2

ALIGN THE PROVINCIAL NCAS FOR TOURISM AND WATER RESOURCES WITH THE DEVELOPMENT OF THE KRABI PROVINCIAL DEVELOPMENT PLAN AND MTEFS FOR PROVINCIAL GOVERNMENT

OUTPUT 2.2.3

USE PROVINCIAL NCA INFORMATION FOR TOURISM AND WATER RESOURCES TO LOBBY FOR AN INCREASE IN PROVINCIAL BUDGET ALLOCATIONS FOR CONSERVATION OF WATERSHED AND NEARSHORE

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We also wish to sincerely thank the agencies that participated in the **focused expert consultation convened on 5 June 2026** to gather feedback on linking natural capital accounts to the provincial development plan and MTEF, namely:

- Krabi Provincial Office
- Krabi Provincial Office of Natural Resources and Environment
- Krabi Provincial Office of Public Works and Town & Country Planning
- Krabi Provincial Energy Office
- Krabi Provincial Local Administration Office
- Krabi Technical College
- Krabi Provincial Industry Office
- Krabi Land Development Station
- Hat Noppharat Thara–Mu Ko Phi Phi National Park
- Krabi Provincial Office (reaffirmed)
- Tourism Authority of Thailand (TAT), Krabi Office
- Krabi Provincial Fisheries Office
- Provincial Waterworks Authority, Ao Luek Branch
- Office of Marine and Coastal Resources No. 10
- Krabi Provincial Office of Tourism and Sports
- Ao Nang Subdistrict Administrative Organization
- Krabi Provincial Statistical Office
- Krabi Provincial Agriculture and Cooperatives Office

Their insights and cooperation have significantly enriched the research process, strengthened the integration of natural capital accounting into provincial planning frameworks, and provided a foundation for evidence-based policy development.

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Executive Summary

Krabi Province possesses a diverse and valuable natural capital base encompassing forests, limestone mountains, freshwater bodies, waterfalls, mangroves, seagrass meadows, coral reefs, and nearshore marine ecosystems. These ecological assets underpin the province's tourism economy, sustain local livelihoods, and contribute to long-term competitiveness. However, increasing pressures from ecosystem degradation, water shortages, and wastewater challenges highlight the urgent need for systematic valuation and integration of natural capital into provincial planning and budgeting.

Within this project, Natural Capital Accounting (NCA) was established at the provincial level under the SEEA framework, focusing on tourism-related accounts and water resource accounts. The accounts serve not only as a knowledge base but also as a policy instrument for aligning development strategies with the province's ecological capacities. Key activities included participation in the Joint Public and Private Sector Committee for Economic Problem Solving (JPPCC) and a focused expert consultation, both of which provided critical feedback on linking NCA data to Krabi's provincial development plan and Medium-Term Expenditure Framework (MTEF).

The consultations underscored several important findings. First, stakeholders recognized that NCA reveals both the economic benefits of ecosystems and the costs of degradation, thereby strengthening the rationale for conservation and restoration investments. Second, participants emphasized the need to communicate results in accessible formats, such as infographics, to broaden stakeholder engagement. Third, provincial leaders highlighted the importance of institutionalizing NCA as a permanent information system integrated into planning and budgeting processes. Fourth, water resource challenges—including wastewater discharge and seasonal shortages—were identified as priority issues requiring holistic management. Fifth, project proposals derived from NCA data were considered feasible and implementable, with budget requirements in the range of tens of millions of baht. Sixth, recommendations stressed that wastewater management should adopt cooperative approaches with enterprises to foster collaboration rather than punitive enforcement.

The expert consultation further highlighted lessons from waste and wastewater management projects, island ecosystem conservation, and national park management. These included the need for legal feasibility in waste management measures, preventive investment in wastewater treatment systems, controlled access to high-value tourism sites based on ecological carrying capacity, and balancing marine conservation with community livelihoods. Institutional constraints such as land tenure and legal permissions were also noted as critical factors influencing project implementation.

Overall, the study demonstrates that integrating natural capital accounts into Krabi's provincial development plan and MTEF can elevate environmental projects from low-priority conservation expenditures to strategic investments in sustaining the province's revenue base, tourism competitiveness, and quality of life. By embedding NCA data into project proposals supported by evidence on costs, benefits, and efficiency, Krabi Province can advance toward a development trajectory that harmonizes economic growth with ecosystem conservation and long-term sustainability.

1. Introduction

Krabi Province possesses a significant economic foundation derived from tourism, natural resources, and coastal ecosystems. The province is endowed with diverse ecological assets, including forests, limestone mountains, freshwater bodies, waterfalls, mangroves, seagrass meadows, coral reefs, and nearshore marine ecosystems. Collectively, these constitute critical natural capital that underpins local economic activity, enhances the quality of life of residents, and sustains the province's long-term competitiveness. However, the utilization of such natural capital requires systematic information capable of reflecting its economic value, degradation, risks, and the role of ecosystems in supporting provincial socio-economic development.

Within the framework of the project, provincial-level Natural Capital Accounting (NCA) has been established, focusing on two key dimensions: (i) tourism-related natural capital accounts and (ii) water resource accounts. These accounts serve as an essential knowledge base for articulating the interlinkages between natural resources, ecosystems, tourism revenues, water security, and the environmental costs of ecosystem degradation in Krabi Province. Importantly, NCA is not merely an exercise in environmental data compilation; it constitutes a policy instrument that can inform provincial development planning, project prioritization, and budget allocation in alignment with the province's natural resource base, which lies at the core of its economic development. Integrating NCA into successive provincial development plans will enable Krabi to design evidence-based projects with balanced objectives of conservation and resource utilization, while also strengthening the province's capacity to communicate budgetary needs to central agencies.

In this context, OUTPUT 2.2.2 and OUTPUT 2.2.3 are pivotal in ensuring that natural capital accounts transcend academic study and are effectively applied in provincial policy and budgeting processes. Specifically, OUTPUT 2.2.2 emphasizes linking tourism and water resource accounts with Krabi's provincial development plan and the Medium-Term Expenditure Framework (MTEF). OUTPUT 2.2.3 focuses on employing NCA data as policy evidence to support requests for increased provincial budget allocations dedicated to the conservation of upstream, coastal, and nearshore marine ecosystems.

2. Implementation of Activities

To advance the application of natural capital accounts on tourism and water resources in Krabi provincial planning and budgeting processes, the research team implemented two major activities: (i) Participation in the Joint Public and Private Sector Committee for Economic Problem Solving (JPPCC) in Krabi Province on 26 May 2026, and (ii) Convening a focused expert consultation to gather feedback on linking natural capital accounts to the provincial development plan and the Medium-Term Expenditure Framework (MTEF) on 5 June 2026.

2.1 Participation in the Joint Public and Private Sector Committee for Economic Problem Solving (JPPCC) in Krabi Province on 26 May 2026

Participation in the JPPCC meeting of Krabi Province was undertaken with the objective of communicating the results of natural capital accounting to stakeholders involved in provincial economic

development, including government agencies, private sector representatives, and actors engaged in tourism and natural resource management. The meeting served as an important platform to demonstrate that natural capital accounts can be employed as evidence-based inputs for strategic provincial planning, particularly in relation to nature-based tourism, water security, wastewater management, and the conservation of ecosystems that constitute the province's revenue base. TDRI was honored to be invited to participate in this meeting, with the official invitation letter from the Krabi Provincial Office presented in Appendix 1.

The discussions highlighted the necessity for Krabi Province to employ information that systematically integrates economic, social, and environmental dimensions in order to support provincial development planning and the prioritization of future projects. This need arises from the province's economic structure, which is directly dependent on natural resources and ecosystems, especially the tourism sector that relies on the quality of natural attractions, coastal ecosystems, marine resources, freshwater bodies, and landscapes as critical factors in attracting visitors and generating income. Within this context, degradation of natural resources and ecosystems—whether of natural tourist sites, coastal and nearshore marine systems, or water quality and wastewater issues—would inevitably affect the province's capacity to accommodate tourists, the revenues of local enterprises, the quality of life of residents, and the long-term image of Krabi as a premier nature-based tourism destination. Consequently, Natural Capital Accounting (NCA) plays a vital role as an informational instrument that enables the province to clearly perceive both the economic benefits of ecosystems and the costs or risks associated with natural resource degradation.

Following the presentation of Krabi's natural capital accounts under the SEEA framework, together with related activities such as youth birdwatching camps, seagrass conservation and restoration, conservation diving, and the wastewater issues particularly in Ao Nang Subdistrict, as well as five project proposals, feedback and recommendations were received from participants. Several key points emerged. First, experts and participants emphasized that the research findings on Krabi's natural capital accounts are highly significant, as they reveal both the economic benefits derived from ecosystems and the degradation of natural resources that may undermine the province's revenue base, particularly tourism income. Such information can therefore be used to inform rational and evidence-based approaches to the conservation and restoration of Krabi's natural resources.

Second, the meeting recommended that research results be communicated and disseminated in more accessible formats to reach wider audiences, such as through visual summaries or infographics, thereby enabling government agencies, private sector actors, communities, and the general public to understand the importance of natural capital accounts and to recognize practical ways of applying this information in resource management and provincial development.

Third, the Governor of Krabi observed that the establishment of natural capital accounts has already provided the province with a critical data foundation, and stressed the importance of continuing and expanding this work to ensure that the information becomes comprehensive and can sustainably support provincial development planning in the long term. This perspective underscores the need for natural capital accounts to evolve beyond

being a temporary research output into a permanent information system integrated with provincial planning and budgeting processes.

Fourth, the meeting discussed water resource challenges in Krabi, encompassing both wastewater discharged into the sea and seasonal water shortages. Observations were made regarding groundwater flows into the sea that remain underutilized. The research team clarified that relevant agencies, particularly the Royal Irrigation Department, have plans to implement projects that will enhance the capacity of medium-scale water sources, which are expected to significantly improve water storage potential. This discussion highlighted the necessity of considering water resource management holistically, including water quantity, quality, utilization, and impacts on coastal ecosystems.

Fifth, the research team explained that TDRI can support Krabi Province in drafting project proposals for budget allocation requests, as the team possesses data on the costs, benefits, and economic efficiency of natural resources and ecosystem services, and has received guidance from budgetary agencies on how to prepare proposals with clarity to increase the likelihood of approval. Such support would enable provincial project proposals to be grounded in robust data, articulated with clear policy rationale, and reflective of the necessity of investment in conservation and restoration of natural resources.

Sixth, the meeting inquired about the approximate budgetary requirements of the five proposed projects. The research team clarified that the projects involve estimated budgets in the range of tens of millions of baht. The Governor of Krabi remarked that this level of funding is feasible for provincial budgetary support, indicating that project proposals derived from natural capital accounts are practically implementable and can be integrated into the provincial budgeting process.

Seventh, in relation to wastewater management, particularly the proposed inspection of wastewater in key areas, recommendations were made that such activities should adopt constructive and advisory approaches with enterprises rather than punitive measures. This approach would foster collaboration among government agencies, private sector actors, and communities in addressing wastewater problems, especially in major tourism areas such as Ao Nang and Phi Phi Island, which are vital to both the tourism economy and coastal ecosystems of the province.

In conclusion, the meeting underscored that Krabi's natural capital accounts have strong potential to serve as a critical instrument for shaping provincial development directions, prioritizing projects, and supporting budget allocations for the conservation and restoration of natural resources. This is particularly relevant to tourism, water resources, upstream ecosystems, coastal ecosystems, and nearshore marine ecosystems. Applying this information in provincial development plans and the Medium-Term Expenditure Framework will enable Krabi Province to formulate policies and projects that are consistent with its natural capital base and will support sustainable economic development in the long term.

Figure 1 Joint Public and Private Sector Committee for Economic Problem Solving (JPPCC) in Krabi Province on 26 May 2026

Source: Photograph by the author, 2026

2.2 Convening a focused expert consultation to gather feedback on linking natural capital accounts to the provincial development plan and the Medium-Term Expenditure Framework (MTEF) on 5 June 2026.

During the consultation, participants from relevant agencies provided additional comments on the application of natural capital accounts to support the development of Krabi's provincial plan and the Medium-Term Expenditure Framework (MTEF), as well as the preparation of environmental project proposals. The feedback covered issues of waste management, wastewater treatment, island ecosystem conservation, national park management, provincial planning and budgeting, and institutional and legal constraints.

The research team shared lessons learned from environmental projects in Krabi, particularly in waste and wastewater management in major tourism areas. These experiences underscored that addressing environmental problems in tourism destinations requires a combination of empirical data, management measures, and legal considerations.

On waste management, reference was made to a pilot project modeled on Japanese practices, which introduced semi-transparent garbage bags with specific logos in Ao Nang to encourage waste separation and facilitate source identification. However, the project was discontinued due to legal and enforcement limitations. Local governments could not fully mandate the use of designated bags, while still being responsible for collecting general waste in standard black bags. This reduced incentives for some operators to adopt the system. The lesson highlighted the need to design waste management measures in tourism areas with careful consideration of legal feasibility, incentive mechanisms, and the roles of local authorities.

On wastewater treatment in Ao Nang, the research team emphasized the urgency of addressing wastewater discharged into the sea, which threatens marine water quality, coastal ecosystems, the image of tourist destinations, and long-term tourism capacity. Collaborative work with the Krabi Provincial Office of Natural Resources and Environment involved site inspections and advisory visits to 40 hotels, using a cooperative approach to encourage environmental improvements rather than punitive enforcement.

In partnership with King Mongkut's University of Technology Thonburi, water sampling revealed that BOD levels in some areas exceeded the standard of 4 mg/L by several times, confirming the severity of the issue. This evidence can strengthen wastewater management project proposals for inclusion in provincial plans and annual budgets.

Regarding island-level conservation, plans were discussed for small-scale wastewater treatment systems in Koh Sriboya to prevent community and tourism-related wastewater from affecting seagrass meadows and dugong habitats, which are ecologically valuable and culturally significant. Similar plans were proposed for Koh Lanta to accommodate future increases in tourist numbers, particularly after the completion of a connecting bridge. These initiatives illustrate that wastewater management should be viewed as preventive investment to support economic and tourism development without damaging nearshore marine ecosystems.

Representatives from Hat Noppharat Thara–Mu Ko Phi Phi National Park provided information on measures for managing high-value natural tourism areas. These included zoning, defining carrying capacity, and developing data systems to support management. The park has implemented seasonal closures, such as closing Koh Yung and Maya Bay for two months during the monsoon season, to allow ecosystems to recover from tourism pressures. This reflects the necessity of managing natural attractions based on ecological limits rather than maximizing visitor numbers.

For carrying capacity, the park set a limit of 375 visitors per round at Maya Bay. Once the quota is reached, boats must wait offshore until the current group departs. This mechanism exemplifies controlled access to balance tourism with ecosystem conservation. The park is also developing an online ticketing system (E-ticket) and QR code scanning checkpoints to improve visitor management and data accuracy. Such systems can support tourism-related natural capital accounts and future assessments of the relationship between visitor numbers, tourism revenues, and ecosystem pressures.

On local fisheries, the park designated zones where communities may harvest resources or conduct small-scale fishing, provided activities remain at least one kilometer away from coral reefs. This approach reflects efforts to balance marine conservation with local livelihoods, a key dimension of sustainable coastal and island development in Krabi.

Representatives from the Krabi Provincial Office highlighted constraints and opportunities in advancing environmental projects within provincial plans and budgets. They noted that environmental projects are often ranked lower in priority compared to tourism or infrastructure projects. To secure funding, conservation, wastewater management, or ecosystem restoration projects must be clearly incorporated into provincial development plans. Natural capital accounts can elevate environmental projects by linking them directly to economic development goals, framing them not merely as conservation expenditures but as investments in maintaining the resource base that generates provincial income, particularly through tourism and quality of life improvements.

They also emphasized that land tenure and legal permissions are major obstacles in implementing environmental infrastructure projects such as wastewater treatment systems, nature trails, or conservation facilities. Projects in public lands, forests, national parks, or multi-agency jurisdictions require early verification of land status and legal permissions to avoid delays or risks of non-implementation despite budget approval.

Representatives from the Krabi Local Administration Office and Ao Nang Subdistrict Administrative Organization provided insights into waste management, particularly efforts to develop cluster-based waste transfer and disposal infrastructure. A key initiative is the waste transfer station in Ban Klang Subdistrict, designed to handle waste from Ao Luek and Plai Phraya districts before disposal at a private waste-to-energy facility. This reflects the need for inter-local cooperation and private sector involvement in final waste treatment. However, Krabi Municipality still bears responsibility for waste from 23 local governments, prompting attempts to establish additional cluster-based disposal centers. Some projects have faced public opposition, resulting in reliance on private landfills that do not meet scientific standards. These challenges reveal that waste management in Krabi is not merely technical but involves governance structures, system capacity, public acceptance, and environmental oversight. From the perspective of natural capital accounts, inadequate waste management can affect coastal ecosystems, water resources, tourism image, and long-term environmental costs.

In summary, participants agreed that advancing the use of natural capital accounts in Krabi must proceed alongside urgent local problem-solving, including wastewater management in tourism areas, island wastewater treatment systems, waste management, defining tourism carrying capacity, and balancing conservation with community livelihoods. To achieve policy impact, NCA data must be integrated into provincial planning and budgeting processes from the outset, particularly through project proposals supported by evidence on costs, benefits, efficiency, ecosystem impacts, and alignment with provincial development strategies. At the same time, legal conditions, land tenure, stakeholder participation, and local agency readiness must be considered to ensure effective implementation.

Figure 2 Convening a focused expert consultation to gather feedback on linking natural capital accounts to the provincial development plan and the Medium-Term Expenditure Framework (MTEF) on 5 June 2026

Source: Photograph by the author, 2026

3. Proposals for Integration into Krabi's Provincial Development Plan and MTEF

Based on the results of natural capital accounting and the feedback received from the JPPCC meeting and the expert consultation, the research team developed detailed examples of project proposals. These are intended to serve as prototypes for the Provincial Office in considering the inclusion of projects into the provincial development plan and the Medium-Term Expenditure Framework (MTEF). The proposals are categorized according to the nature of investment and appropriate budget levels. Their central aim is to concretely link natural capital accounting data with budget allocation, focusing on investments that sustain, restore, and utilize natural capital in a sustainable manner. The emphasis is placed on projects related to eco-tourism, water conservation, wastewater management, and the protection of coastal and nearshore marine ecosystems. The essence of the proposals can be distinguished into two principal areas as follows.

3.1 Landscape Development and Nature Trails

This proposal focuses on the development of natural learning sites and eco-tourism destinations grounded in Krabi's natural capital. The objective is to enhance the quality of tourist attractions, improve safety and accessibility, and promote learning about ecosystems, local history, and natural resource conservation. The development of nature trails can also help distribute income to local communities, create high-quality tourism activities, and reduce pressure on the province's primary tourist sites.

Project on the Development of a Nature Study Trail in the Urban Forest Initiative and the Local Learning Site on Plant Genetics and Community History at Ban Nai Nang, Krabi Province

This project aims to develop a nature study trail within the Urban Forest Initiative area, which serves as a learning site on plant genetics, local ecosystems, and the community history of Ban Nai Nang. The area possesses strong potential to be developed into an eco-learning and eco-tourism destination that integrates forest conservation, youth education, and supplementary income generation for the community. The project should include improvements to the walking trail, the installation of interpretive sign age on plant species, ecosystems, and local history, as well as landscape enhancements to accommodate visitors while maintaining ecological carrying capacity and minimizing impacts on natural resources.

The project is consistent with the application of Natural Capital Accounting (NCA), as it represents an investment that sustains and enhances the value derived from natural capital in forest areas and local learning sites. At the same time, it contributes to raising awareness of conservation among residents, students, tourists, and surrounding communities. The details and budget of the project can be summarized in Tables 1 and 2 as follows.

Table 1 Project details regarding the Development of a Nature Study Trail in the Urban Forest Initiative and the Local Learning Site on Plant Genetics and Community History at Ban Nai Nang, Krabi Province

Topic	Details
1. Project name	The Development of a Nature Study Trail in the Urban Forest Initiative and the Local Learning Site on Plant Genetics and Community History at Ban Nai Nang, Krabi Province
2. Relevant Strategies and Plans	1. Krabi Provincial Development Plan (2023–2027) 2. Krabi Five-Year Tourism Development Plan (2023–2027) 3. Krabi Community-Based Tourism Development Plan
3. Development Approach	The project aims to upgrade the area into a well-prepared, safe, and easily accessible eco-learning site that integrates ecological and local historical knowledge. The nature study trail will be developed in harmony with the existing ecosystem, minimizing impacts on vegetation and the environment. Interpretive signage will be installed to provide information on plant genetics, local flora, biodiversity, the urban forest ecosystem, and the history of the Ban Nai Nang community. This will enable residents, youth, students, and tourists to use the area as a structured learning site and foster awareness of natural resource conservation. Community participation will be emphasized throughout all stages, including route planning, content selection for interpretive signage, site maintenance, and the development of future eco-learning and tourism activities. The project will enhance the potential of the Urban Forest Initiative at Ban Nai Nang as a community-level learning site, support the conservation of plant genetics and local wisdom, and create a small-scale eco-tourism destination with unique identity, consistent with Krabi's vision of becoming a high-quality tourism city that balances natural resource conservation with sustainable community development.
4. Rationale	Ban Nai Nang, Village No. 3, Khao Kram Subdistrict, Mueang Krabi District, is an area with strong potential in terms of natural resources, community traditions, and local history. The Urban Forest Initiative already serves as a site for studying plant genetics and ecosystems near the community, providing opportunities for environmental education, biodiversity conservation, and the preservation of local wisdom. However, the area requires further development of basic infrastructure to ensure safe access and effective learning, particularly through a nature study trail that can accommodate students, youth, residents, tourists, and other visitors. The development of a 70-meter nature study trail will enhance the readiness of the Urban Forest Initiative as a learning site, offering opportunities to study plant genetics, local flora, the urban forest ecosystem, and community history, while raising awareness of conservation among residents and visitors. In addition, the trail can be expanded into an eco-tourism and community learning site aligned with Krabi's direction toward high-quality tourism that values natural resources, local culture, and community participation.

Topic	Details
5. Objectives	1. To develop a 70-meter nature study trail as basic infrastructure for learning about plant genetics, ecosystems, and local history. 2. To promote the Urban Forest Initiative at Ban Nai Nang as a community learning site on natural resources and the environment for students, youth, residents, and tourists in Krabi. 3. To support eco-tourism and community-based tourism consistent with the area's potential. 4. To encourage community participation in the conservation, management, and sustainable use of natural resources.
6. Indicators and Targets	1. Completion of an additional 70-meter nature study trail that is fully functional. 2. Number of interpretive signs and learning points installed. 3. Number of users, including students, youth, residents, and tourists. 4. Level of user satisfaction with the nature study trail. 5. Degree of community participation in maintaining and utilizing the site on a continuous basis.
7. Main Activities	1. Surveying the area and determining the route of the 70-meter nature study trail. 2. Designing the trail to suit the terrain, ecosystem, and learning purposes. 3. Improving the site and constructing the trail, including walkways and appropriate materials. 4. Preparing and installing interpretive signage on plant genetics, local flora, ecosystems, and community history. 5. Conducting training and awareness campaigns for residents on the care and use of the nature study trail.
8. Implementing Agencies	1. Krabi Provincial Administrative Organization 2. Office of Marine and Coastal Resources No. 10 3. Ban Nai Nang Community
9. Duration	1 year
10. Budget	857,782.85 Baht
11. Outputs	1. Extension of the nature study trail by 70 meters, enhancing readiness for learning and eco-tourism. 2. Installation of interpretive signage and learning points on plant genetics, ecosystems, and local history. 3. Provision of community-level infrastructure to support environmental, educational, and community-based tourism activities. 4. Improved accessibility and safety for students, youth, residents, and tourists.

Topic	Details
12. Outcomes	1. Establishment of a community-level natural learning site in Krabi, consistent with the province's vision of high-quality and sustainable tourism. 2. Increased knowledge and awareness among residents, youth, and visitors regarding the conservation of plant genetics and local ecosystems. 3. Enhanced community participation in the conservation and sustainable use of natural resources.

Table 2 Budget for the Development of a Nature Study Trail in the Urban Forest Initiative and the Local Learning Site on Plant Genetics and Community History at Ban Nai Nang, Krabi Province

Items	Unit Price (Baht)	Quantity	Total (Baht)
Survey and preparation of the nature trail layout plan	20,000.00	1 plan	20,000.00
Site signboard (120 × 240 cm, concrete or metal posts)	12,000.00	1 sign	12,000.00
Interpretive and educational signage (60 × 40 cm, concrete or metal posts)	5,000.00	7 signs	35,000.00
Plant species identification signs (20 × 30 cm, concrete or metal posts)	275.00	70 signs	19,250.00
Nature study trail (concrete walkway, 70 meters)	11,021.90	70 meters	771,532.85
Total			**857,782.85**

Source: 1. The construction budget estimates for the nature study trail were referenced proportionally from the cost structure of similar projects, specifically the construction of nature study walkways implemented by the Mangrove Resource Management Center, Phetchaburi Province.

Project on the Development of a Nature Study Trail at Wang Thewada Sacred Water Source and Huai To Waterfall, in Honour of His Majesty the King

This project aims to develop a nature study trail in the area surrounding the Wang Thewada sacred water source and the Huai To Waterfall, in honour of His Majesty the King. These sites are of ecological, hydrological, and cultural significance, valued both as natural water resources and as ecosystems that support nature-based tourism. At present, access to the area is difficult due to damaged or missing sections of the existing paths, creating obstacles for residents and visitors alike. The project therefore seeks to construct a wooden walkway and riverside resting points along a route of approximately 70 meters, together with two suspension bridges. These facilities will improve accessibility, enhance safety, and allow visitors to experience the natural environment in a manner that is appropriate and sustainable. The design of these small-scale infrastructure improvements will be harmonized with the surrounding environment, minimizing disturbance to natural habitats while supporting the management of eco-tourism activities.

From a policy perspective, the project reflects the role of natural capital accounting in highlighting the importance of water resources and upstream ecosystems for tourism and community well-being. Investment in the nature study trail represents both the development of a tourism site and the enhancement of safe access to natural resources, while simultaneously promoting the conservation of water sources that are vital to the province. In this way, the project contributes to balanced development that integrates tourism promotion, natural resource conservation, and improvements in quality of life. The details of the project can be summarized as follows.

Table 3 Project details regarding the Development of a Nature Study Trail at Wang Thewada Sacred Water Source and Huai To Waterfall, in Honour of His Majesty the King

Topic	Details
1. Project name	Wang Thewada Sacred Water Nature Trail Development Project at Huai To Waterfall, in Honour of His Majesty the King
2. Relevant Strategies and Plans	1. Krabi Provincial Development Plan (2023–2027) 2. Krabi Five-Year Tourism Development Plan (2023–2027) 3. Krabi Community-Based Tourism Development Plan 4. Krabi Provincial Development Plan (2023–2027)
3. Development Approach	The project focuses on developing a nature study trail that is safe and appropriate for the terrain. Initial activities include surveying the existing route, identifying damaged or missing sections, accident-prone areas, and suitable locations for wooden walkways, riverside resting points, and suspension bridges. The structures will be designed to be stable, durable, and environmentally harmonious. The 70-meter wooden walkway and resting points will support nature observation, recreation, and riverside ecosystem learning, with attention to user safety, water drainage, material durability, and minimal environmental impact. Two suspension bridges will connect inaccessible sections, ensuring continuous and safe movement within the site.
4. Rationale	The Wang Thewada sacred water source and Huai To Waterfall are areas with strong potential for nature-based tourism, ecosystem learning, and recreation. They feature distinctive natural resources, streams, waterfalls, and landscapes suitable for development as a nature study trail. However, damaged or missing paths currently hinder access, reducing convenience and safety for residents, students, youth, and tourists. Developing appropriate infrastructure—specifically a 70-meter wooden walkway, riverside resting points, and two suspension bridges—will resolve these issues, improve accessibility, reduce accident risks, and enhance the site's capacity to support eco-tourism and environmental learning.
5. Objectives	1. To develop a safe, convenient, and appropriate nature study trail at Wang Thewada sacred water source and Huai To Waterfall. 2. To address damaged or missing paths that obstruct access for residents and tourists.

Topic	Details
	3. To promote nature-based tourism and ecosystem learning in the area. 4. To upgrade the site's readiness to accommodate visitors and support sustainable tourism development in Krabi Province.
6. Indicators and Targets	1. Completion of a 70-meter wooden walkway and riverside resting points, fully functional. 2. Completion of two suspension bridges, ensuring safe connectivity. 3. Increase in tourist numbers visiting Khao Phanom Bencha National Park compared to pre-construction levels. 4. Higher satisfaction levels among residents and tourists regarding convenience and safety of the trail.
7. Main Activities	1. Surveying the area to identify damaged, missing, or high-risk sections of the trail. 2. Designing wooden walkways, riverside resting points, and suspension bridges suitable for the terrain. 3. Constructing a 70-meter wooden walkway, riverside resting points, and two suspension bridges to connect inaccessible sections.
8. Implementing Agencies	1. Krabi Provincial Administrative Organization 2. Khao Phanom Bencha National Park
9. Duration	1 year
10. Budget	4,974,000 Baht
11. Outputs	1. A 70-meter wooden walkway and riverside resting points for nature study and recreation. 2. Two suspension bridges connecting previously inaccessible sections. 3. Improved convenience and safety of the nature study trail at Wang Thewada sacred water source and Huai To Waterfall. 4. Enhanced readiness of the site to accommodate residents, students, youth, and tourists.
12. Outcomes	1. Residents and tourists can access the Wang Thewada sacred water source and Huai To Waterfall more safely and conveniently. 2. Problems of difficult access due to damaged or missing paths are resolved. 3. Increased capacity of the site to support nature-based tourism and ecosystem learning activities. 4. Greater opportunities for communities and local agencies to expand tourism, learning, and conservation activities in the area.

Table 4 Budget for the Development of the Wang Thewada Sacred Water Nature Trail at Huai To Waterfall, in Honour of His Majesty the King

Items	Unit Price (Baht)	Quantity	Total (Baht)
Wooden walkway and riverside resting points (70 meters)	1,492,000.00	1 walkway	1,492,000.00
Wooden suspension bridges	1,741,000.00	2 bridges	3,482,000.00
Total			**4,974,000.00**

Source: 1. The budget estimates are based on the official cost summary for construction works under the project for developing the Wang Thewada Sacred Water Nature Trail at Huai To Waterfall, in Honour of His Majesty the King, prepared by Khao Phanom Bencha National Park, Krabi Province.

3.2 Environmental and Wastewater Management in Key Areas of Krabi Province

This proposal focuses on addressing wastewater and environmental management challenges in Krabi's major tourism areas, particularly islands, coastal zones, and sites with high concentrations of economic activities and "floating populations" generated by tourism. Wastewater management is directly linked to natural capital accounts on water resources and tourism, as water quality affects public health, the attractiveness of tourism destinations, the integrity of marine ecosystems, and the province's overall competitiveness.

Integrating wastewater management projects into the provincial development plan and the Medium-Term Expenditure Framework (MTEF) would enable Krabi to plan environmental investments in a systematic and continuous manner. This integration should encompass problem identification, infrastructure development, monitoring, regulatory enforcement, and collaboration with communities and businesses.

Wastewater Management Project in Koh Lanta District

Koh Lanta District is one of Krabi's most important tourism destinations, with extensive use of land and coastal areas for accommodation, restaurants, marine transport, and tourism services. The rapid growth of these activities has placed significant pressure on wastewater treatment systems and environmental management, particularly during peak tourism seasons when both tourist numbers and temporary populations increase substantially.

Wastewater management in Koh Lanta should therefore prioritize the identification of pollution sources, assessment of the capacity of existing treatment systems, and the development of management approaches tailored to the island context. It should also establish mechanisms for cooperation among local administrative organizations, businesses, and communities. Implementation should combine structural measures (such as infrastructure investment) with administrative measures (such as monitoring and enforcement) to ensure sustainable outcomes.

From the perspective of natural capital accounting, this project can highlight the economic costs of water quality degradation on tourism and marine ecosystems. Such data can be used to justify budget allocations aimed at preventing long-term economic losses. In this way, wastewater management in Koh Lanta becomes not only an environmental necessity but also a strategic investment in sustaining tourism, protecting ecosystems, and safeguarding community well-being. The details of the project can be summarized as follows.

Table 5 Details of the Wastewater Management Project in Koh Lanta District

Topic	Details
1. Project name	Wastewater Management Project in Koh Lanta District
2. Relevant Strategies and Plans	1. 20-year Master Plan on Water Resources Management (2018-2037) 2. Ministry of Interior Operational Plan (2023–2027), Strategy 3: Regional, Urban, and Economic Area Development for Balanced Growth 3. 20-Year Community Wastewater Management Action Plan (2018–2037) 4. Krabi Provincial Development Plan (2023–2027)
3. Development Approach	Upgrade wastewater collection and treatment systems to accommodate future community and tourism growth, particularly following the construction of the Koh Lanta Bridge, which is expected to increase tourist numbers, temporary populations, and business establishments. The project will begin with surveys of wastewater volumes, sources, and suitable treatment plant sites, followed by the development of community-level treatment systems. It will integrate wastewater collection, treatment, and stakeholder participation from local governments, communities, and businesses. This will reduce untreated discharges into public waterways, mangroves, and coastal areas, protect environmental quality and public health, mitigate impacts on marine ecosystems, and strengthen Koh Lanta's readiness as a sustainable, high-quality tourism destination.
4. Rationale	Koh Lanta District, Krabi Province, is a high-potential marine tourism area, distinguished by natural resources such as beaches and coastal community lifestyles, which form the foundation of the province's tourism economy. The new Koh Lanta Bridge has reduced travel time to only 10 minutes and allows 24-hour access, making the island more accessible and likely to attract more tourists, temporary populations, and investments in accommodation, restaurants, and tourism services. However, this growth increases wastewater volumes from communities and businesses. Without proper collection and treatment systems, wastewater may be discharged directly into public waterways, canals, mangroves, coastal zones, and marine ecosystems, affecting water quality, public health, natural resource integrity, and Koh Lanta's image as a quality tourism destination. It may also disrupt aquatic life, plant growth, and coastal ecosystem balance, which are critical natural capital assets of the area.

Topic	Details
5. Objectives	1. To develop community wastewater treatment systems in Koh Lanta capable of handling increasing wastewater volumes from community and tourism expansion. 2.To prepare environmental infrastructure to accommodate rising tourist numbers following improved transport connectivity. 3. To prevent and reduce untreated wastewater discharge into public waterways, mangroves, coastal zones, and marine ecosystems. 4. To safeguard environmental quality, public health, and Koh Lanta's image as a sustainable marine tourism destination.
6. Indicators and Targets	1. Number of villages benefiting from community wastewater treatment systems. 2. Number of treatment systems constructed and operational. 3. Compliance of treated effluent quality with relevant standards. 4. Reduction in high-risk areas with untreated wastewater discharge into public waterways.
7. Main Activities	1. Survey community data, wastewater volumes, sources, and high-risk discharge areas. 2. Conduct feasibility studies and design community-level wastewater treatment systems (oxidation pond models). 3. Secure suitable sites for treatment plants, considering environmental, land use, and community acceptance factors. 4. Construct wastewater collection systems with 36 pumping stations (one per community). 5. Construct five wastewater treatment systems (one per subdistrict). 6. Establish five management committees (one per treatment system). 7. Provide training and awareness campaigns for residents, businesses, and local fisheries groups on source-level wastewater management. 8. Develop databases and reporting systems for monitoring and long-term wastewater management planning.
8. Implementing Agencies	1. Krabi Provincial Administrative Organization 2. Five Subdistrict Administrative Organizations in Koh Lanta District (Koh Lanta Yai, Koh Lanta Noi, Koh Klang, Khlong Yang, Sala Dan) 3. Local businesses (hotels, restaurants, tourism enterprises) and communities in Koh Lanta
9. Duration	2 years
10. Budget	56,831,800 Baht

Topic	Details
11. Outputs	1. Community wastewater treatment systems established to handle wastewater in Koh Lanta. 2.Improved wastewater collection systems channeling community wastewater into treatment facilities. 3. Reduction in untreated wastewater discharged into public waterways. 4. Availability of water quality data and wastewater management information for long-term planning.
12. Outcomes	1. Improved and protected water quality in public waterways, mangroves, and coastal areas of Koh Lanta. 2. Cleaner, safer, and more hygienic environments for residents and tourists. 3. Reduced impacts of wastewater on aquatic and coastal ecosystems, supporting healthier aquatic life and vegetation. 4. Enhanced environmental infrastructure readiness to accommodate future tourism growth. 5. Strengthened image of Koh Lanta as a high-quality, sustainable marine tourism destination. 6. Tourism development in Koh Lanta progresses in balance with natural resource conservation and improved community well-being.

Table 6 Budget for the Wastewater Management Project in Koh Lanta District

Items		Unit Price (Baht)	Quantity	Total (Baht)
Wastewater Treatment System – Contact Aerated Filter	Wastewater treatment system – contact aerated filter (constructed wetland)	1,250,000	5 systems	6,250,000
	Wastewater collection pipes within clusters	686,400	36 pipes	24,710,400
	System maintenance cost (per year)	26,280	5 systems	131,400
Wastewater pumping stations and holding tanks	Earthworks and reinforced concrete tank structures (20–25 m^3)	215,000	36 units	7,740,000
	Submersible wastewater pumps (2 sets per station)	150,000	36 pumps	5,400,000
	Piping, valves, and internal station equipment	65,000	36 systems	2,340,000
	Coarse screens for solid waste	30,000	36 screens	1,080,000
	Electrical control cabinets and water level control systems	95,000	36 cabinets	3,420,000
	Installation works, electrical systems, and testing	80,000	36 installations	2,880,000
	Miscellaneous costs (approx. 10–15%)	80,000	36 units	2,880,000
Total				**56,831,800**

Source: 1. Statistical data on the number of villages and population in Koh Lanta District, based on the 2023 population and household statistics of Krabi Province.

2. Construction budget estimates referenced from the contact aerated filter (CAF) wastewater treatment system of the Pollution Control Department.
3. Cost estimation for wastewater pumping stations and holding tanks provided by Dr. Suchanya Wongrod (wastewater management expert).

Wastewater Management Project in Koh Sriboya Subdistrict

Koh Sriboya Subdistrict is an area of importance for coastal communities, fisheries resources, and the potential for community-based and eco-tourism. Wastewater management in this area is essential to prevent adverse impacts on coastal water quality, local livelihoods, and nearshore marine ecosystems such as seagrass beds.

The project should emphasize approaches tailored to small island and community contexts, including decentralized wastewater treatment systems, management of household and tourism-related wastewater, community awareness and participation, and the establishment of water quality monitoring systems in critical areas.

This project is significant for integrating natural capital accounting data into provincial development planning, as it demonstrates that coastal water quality conservation is not only an environmental issue but also a key condition for community economic security, small-scale fisheries, and sustainable tourism development. The details of the project can be summarized as follows.

Table 7 Details of the Wastewater Management Project in Koh Sriboya Subdistrict

Topic	Details
1. Project name	Wastewater Management Project in Koh Sriboya Subdistrict
2. Relevant Strategies and Plans	1. 20-year Master Plan on Water Resources Management (2018-2037) 2. Ministry of Interior Operational Plan (2023–2027), Strategy 3: Regional, Urban, and Economic Area Development for Balanced Growth 3. 20-Year Community Wastewater Management Action Plan (2018–2037) 4. Krabi Provincial Development Plan (2023–2027)
3. Development Approach	Strengthen wastewater management from communities and enterprises to reduce direct discharges into public waterways, mangroves, and the sea. The area is a critical seagrass habitat and feeding ground for rare marine species such as dugongs. Activities will begin with surveys of wastewater sources, discharge points, risk areas, wastewater volumes, and flow paths from communities to the sea. Based on this, appropriate systems will be designed for coastal and island contexts, including grease traps, improved primary treatment, wastewater collection points, and small-scale or nature-based treatment systems (e.g., stabilization ponds). Community participation will be promoted among residents, businesses, local fisheries groups, and local governments to reduce wastewater at source. Continuous monitoring of water quality in public waterways, mangroves, and coastal areas will be undertaken to evaluate progress and plan long-term solutions. This will help maintain water quality, reduce pressure on seagrass habitats, support dugong survival, improve public hygiene, and promote sustainable community economy, fisheries, and eco-tourism.

Topic	Details
4. Rationale	Koh Sriboya Subdistrict, Krabi Province, comprises three major island communities: Koh Sriboya, Koh Pu–Koh Jum, and Koh Hang. These coastal and island areas are ecologically significant, particularly as important seagrass habitats. Seagrass provides food, nursery grounds, and habitats for many marine species, including dugongs, which depend on seagrass and suitable water quality for survival. The integrity of seagrass habitats is directly linked to biodiversity, coastal ecosystem stability, and sustainable use of marine resources by local communities. However, settlement, coastal fisheries, tourism, and service activities generate wastewater from households, restaurants, accommodations, and enterprises. Without proper management, wastewater may be discharged directly into public waterways, canals, mangroves, and the sea, leading to degraded water quality, increased organic matter, excess nutrients, fats, and pollutants. This can disrupt seagrass growth, reduce habitat suitability for marine species, and threaten dugong feeding grounds in the long term.
5. Objectives	1. To develop appropriate wastewater management systems for communities in Koh Sriboya Subdistrict, Krabi Province. 2. To reduce wastewater discharges from communities and enterprises into public waterways, mangroves, and the sea. 3. To maintain coastal water quality, supporting the restoration and protection of seagrass habitats, which are critical feeding grounds for dugongs and other marine species.
6. Indicators and Targets	1. Number of households or enterprises with installed or improved wastewater management systems. 2. Number of wastewater discharge points mitigated or risk reduced. 3. Increased proportion of wastewater treated before environmental discharge. 4. Improvement trends in water quality in public waterways and coastal areas. 5. Number of training or awareness activities on wastewater management conducted in communities. 6. Increased seagrass coverage in the area.
7. Main Activities	1. Survey wastewater sources, discharge points, and risk areas. 2. Conduct feasibility studies and design wastewater treatment systems for Koh Sriboya communities. 3. Secure suitable sites for treatment systems, considering environmental, land use, and community acceptance. 4. Construct wastewater collection systems with six pumping stations (one per community, excluding Koh Hang, which lacks electricity and piped water). 5. Construct two wastewater treatment ponds (for Koh Sriboya and Koh Pu–Koh Jum).

Topic	Details
	6. Establish two management committees (one per treatment system). 7. Provide training and awareness campaigns for residents, businesses, and local fisheries groups on source-level wastewater management. 8. Develop databases and reporting systems for monitoring and long-term wastewater management planning.
8. Implementing Agencies	1. Koh Sriboya Subdistrict Administrative Organization 2. Communities, businesses, and civil society groups in Koh Sriboya Subdistrict
9. Duration	2 years
10. Budget	10,960,960 Baht
11. Outputs	1. Installation and improvement of wastewater management systems for communities and enterprises in Koh Sriboya Subdistrict. 2. Reduction in direct wastewater discharges into public waterways, mangroves, and the sea. 3. Database of wastewater sources, risk points, and coastal water quality. 4. Increased community and business knowledge and discipline in wastewater management.
12. Outcomes	1. Improved coastal water quality in Koh Sriboya Subdistrict. - Reduced impacts of wastewater on seagrass habitats, creating conditions conducive to restoration. 2. Increased presence of dugongs and marine species relying on seagrass habitats. 3. Improved public hygiene and quality of life for local residents. 4.Sustainable community economy and eco-tourism development alongside natural resource conservation.

Table 8 Budget for the Wastewater Management Project in Koh Sriboya Subdistrict

Items		Unit Price (Baht)	Quantity	Total (Baht)
Wastewater Treatment System – Contact Aerated Filter	Wastewater treatment system – contact aerated filter (constructed wetland)	1,250,000	2 systems	2,500,000
	Wastewater collection pipes within clusters	686,400	6 pipes	4,118,400
	System maintenance cost (per year)	26,280	2 systems	52,560
Wastewater pumping stations and holding tanks	Earthworks and reinforced concrete tank structures (20–25 m^3)	215,000	6 units	1,290,000
	Submersible wastewater pumps (2 sets per station)	150,000	6 pumps	900,000
	Piping, valves, and internal station equipment	65,000	6 systems	390,000
	Coarse screens for solid waste	30,000	6 screens	180,000
	Electrical control cabinets and water level control systems	95,000	6 cabinets	570,000
	Installation works, electrical systems, and testing	80,000	6 installations	480,000
	Miscellaneous costs (approx. 10–15%)	80,000	6 units	480,000
Total				**10,960,960**

Source: 1. Statistical data on the number of villages and population in Koh Lanta District, based on the 2023 population and household statistics of Krabi Province.

2. Construction budget estimates referenced from the contact aerated filter (CAF) wastewater treatment system of the Pollution Control Department.
3. Cost estimation for wastewater pumping stations and holding tanks provided by Dr. Suchanya Wongrod (wastewater management expert).

Wastewater Patrol Project in Ao Nang and Koh Phi Phi

Ao Nang and Koh Phi Phi are major tourism areas in Krabi Province, highly significant for the province's revenue and tourism image. These areas are environmentally fragile due to intensive use from tourism activities, accommodations, restaurants, marine transport, and service industries. Regular monitoring and inspection of wastewater are therefore critical measures to prevent adverse impacts on seawater quality, coastal ecosystems, and tourist confidence.

The Wastewater Patrol Project in Ao Nang and Koh Phi Phi should focus on establishing a system for monitoring wastewater sources, conducting patrols in high-risk areas, collecting water quality data, coordinating with local administrative organizations and regulatory agencies, and developing a database for continuous situation tracking. The information generated can be used to design site-specific corrective measures and to support planning for future investments in wastewater treatment systems.

From a strategic perspective, this project directly aligns with the objectives of OUTPUT 2.2.3, as it utilizes data on water resources and coastal ecosystems to strengthen budget allocations for conservation and environmental management in economically critical areas of the province.

Table 9 Details of the Wastewater Patrol Project in Ao Nang and Koh Phi Phi

Topic	Details
1. Project name	Wastewater Patrol Project in Ao Nang and Koh Phi Phi
2. Relevant Strategies and Plans	1. 20-year Master Plan on Water Resources Management (2018-2037) 2. Ministry of Interior Operational Plan (2023–2027), Strategy 3: Regional, Urban, and Economic Area Development for Balanced Growth 3. 20-Year Community Wastewater Management Action Plan (2018–2037) 4. Krabi Provincial Development Plan (2023–2027)
3. Development Approach	Strengthen wastewater monitoring and surveillance in Ao Nang and Koh Phi Phi through proactive and continuous inspections. Regular patrols will be conducted in high-risk areas and major discharge points, recording data on wastewater sources, discharge characteristics, grease trap conditions, and preliminary treatment systems of communities and enterprises, as well as water quality in relevant areas. This database will support problem analysis and targeted solutions. Guidance will be provided on proper wastewater management practices, such as installation and maintenance of grease traps, separation of food waste before discharge, maintenance of preliminary treatment systems, and compliance with local environmental regulations. In cases of improper discharge, warning measures, corrective deadlines, follow-up inspections, and enforcement of relevant laws will be applied. Results will be compiled into a database identifying recurring risk points, areas requiring system improvements, and enterprises needing special monitoring. This will enable local authorities to plan

Topic	Details
	wastewater management more accurately, encourage discipline among communities and businesses, reduce untreated discharges into public waterways, and sustainably improve water quality in Ao Nang and Koh Phi Phi.
4. Rationale	Ao Nang and Koh Phi Phi are internationally significant marine tourism destinations in Krabi Province, hosting large numbers of tourists, communities, hotels, restaurants, and service businesses. These activities generate increasing volumes of wastewater. If improperly managed or discharged directly into public waterways, canals, coastal zones, and marine ecosystems, wastewater can degrade water quality, harm public health, damage Krabi's tourism image, and undermine natural resources that form the province's economic foundation. Although some major tourism sites already have treatment systems or environmental control measures, effective wastewater management requires continuous monitoring and surveillance to ensure discipline in source-level management, compliance with laws and standards, and reduction of illegal or untreated discharges into natural water bodies.
5. Objectives	1. To monitor and patrol wastewater discharges from communities and enterprises into public waterways in Ao Nang and Koh Phi Phi. 2. To promote discipline among residents and businesses in wastewater management and compliance with environmental standards. 3. To raise awareness and provide guidance on source-level wastewater management. 4. To support improved water quality in Ao Nang and Koh Phi Phi and maintain Krabi's image as an international-quality tourism destination.
6. Indicators and Targets	1. Conduct wastewater patrols twice per year. 2. Number of communities and enterprises receiving guidance and improving wastewater management systems. 3. Reduction in high-risk points or cases of improper wastewater discharge. 4. Improvement trends in water quality in public waterways and coastal areas. 5. Reduction in wastewater-related complaints in the area.
7. Main Activities	1. Survey and map wastewater risk points in Ao Nang and Koh Phi Phi. 2. Conduct patrols to monitor wastewater discharges into public waterways. 3. Inspect preliminary wastewater management systems of enterprises (e.g., grease traps, in-building treatment systems, drainage). 4. Provide guidance to communities and businesses on proper wastewater management. 5. Record and compile inspection results into a database for monitoring and planning. 6. Follow up on corrective actions in cases of improper wastewater discharge.

Topic	Details
8. Implementing Agencies	1. Ao Nang Subdistrict Administrative Organization 2. Hotels, restaurants, service businesses, and communities in Ao Nang and Koh Phi Phi
9. Duration	Implemented annually (recurring project)
10. Budget	644,000 Baht per year
11. Outputs	1. Database of wastewater risk points and sources in Ao Nang and Koh Phi Phi. 2. Regular patrols and surveillance of wastewater discharges (twice per year). 3. Communities and enterprises receive guidance on proper wastewater management. 4. Reports of inspection results and recommendations for system improvements. 5. Increased monitoring and corrective actions in high-risk areas.
12. Outcomes	1. Improved discipline among communities and enterprises in wastewater management. 2. Reduction in untreated wastewater discharges into public waterways. 3. Reduced impacts of wastewater on waterways, canals, and coastal areas in Ao Nang and Koh Phi Phi. 4. Enhanced environmental quality and public hygiene for local residents. 5. Strengthened positive image of Ao Nang and Koh Phi Phi as international-quality tourism destinations.

Table 10 Budget for the Wastewater Patrol Project in Ao Nang and Koh Phi Phi

Items		Unit Price (Baht)	Quantity	Total (Baht)
Ao Nang	Working group meetings	50,000	2 times/year	100,000
	Enterprise meetings	70,000	2 times/year	140,000
	Wastewater patrols			
	Food allowance	300	40 persons/2 times	12,000
	Compensation	500	40 persons/2 times	20,000
	Accommodation (2 nights per patrol)	1,000	40 rooms/2 times	40,000
	Certificates for enterprises	5,000	2 times/year	10,000
Koh Phi Phi	Working group meetings	50,000	2 times/year	100,000
	Enterprise meetings	70,000	2 times/year	140,000
	Wastewater patrols			
	Food allowance	300	40 persons/2 times	12,000
	Compensation	500	40 persons/2 times	20,000
	Accommodation (2 nights per patrol)	1,000	40 rooms/2 times	40,000
	Certificates for enterprises	5,000	2 times/year	10,000
Total				**644,000**

Source: 1. Budget data referenced from actual expenditure incurred during the wastewater patrol in Ao Nang on 8–9 June 2026.

4. Conclusion

The implementation of natural capital accounting (NCA) for tourism and water resources in Krabi Province, and its linkage with the provincial development plan and the Medium-Term Expenditure Framework (MTEF), demonstrates how provincial-level NCA can transcend its role as a purely academic database to become a practical policy instrument. This integration enables evidence-based planning and budget allocation, particularly in support of ecosystem conservation initiatives for upstream forests, coastal ecosystems, and nearshore marine environments.

For Krabi Province, whose economy is highly dependent on natural resources and ecosystems —through tourism, services, and related economic activities, NCA provides a clear understanding of the interconnections between ecosystem integrity, economic revenues, water security, and the quality of life of local communities. It also strengthens the justification for conservation and restoration budget proposals by presenting environmental investment not merely as expenditure, but as a strategic investment to safeguard the resource base underpinning long-term economic growth and competitiveness.

Deliberations at the Joint Public–Private Committee for Economic Problem Solving (JPPCC) in Krabi Province and expert focus group meetings revealed strong demand for NCA data to guide local development strategies. Priority projects include the development of eco-tourism trails and landscape-based attractions, improvements in wastewater management systems to accommodate tourism growth, restoration of upstream ecosystems to enhance water security, and conservation of coastal and nearshore marine ecosystems that serve as critical resources for marine tourism and small-scale fisheries.

In response, the research team developed five prototype projects addressing conservation, restoration, and sustainable use of natural resources. These proposals were designed to align with provincial development strategies, annual operational plans, and government budgetary mechanisms, thereby ensuring their applicability as models for integration into official planning and budget processes.

Moreover, NCA data can inform the provincial MTEF, allowing for medium-term investment planning that goes beyond annual budget cycles. This facilitates continuity in environmental investment, alignment with resource conditions and environmental risks, and prioritization of projects based on long-term economic, social, and environmental returns.

Importantly, the Bureau of the Budget should consider allocating resources to provinces based not only on resident population but also on tourist density and the adequacy of essential infrastructure —such as wastewater treatment, waste management, and water supply systems—to meet the combined demands of residents and visitors.

The integration of NCA into provincial planning and budgeting represents a critical step toward advancing the concept of “nature-based investment.” This approach reframes environmental expenditure as investment in maintaining and enhancing the value of natural capital, which is fundamental to sustainable economic development. It promotes a balanced trajectory of economic growth, ecosystem conservation, and improved quality of life for local communities.

Appendix 1 the JPPCC meeting invitation letter from the Krabi Provincial Office

ด่วนที่สุด

ที่ กบ ๐๐๑๗.๒/ว ๒๔๔๒

ศาลากลางจังหวัดกระบี่
๙/๑๐ ถนนอุตรกิจ กบ ๘๑๐๐๐

๑๕ พฤษภาคม ๒๕๖๙

เรื่อง การประชุมคณะกรรมการร่วมภาครัฐและเอกชนเพื่อแก้ไขปัญหาทางเศรษฐกิจจังหวัดกระบี่ (กรอ.จังหวัดกระบี่) ครั้งที่ ๔/๒๕๖๙

เรียน บัญชีแนบท้าย

อ้างถึง หนังสือจังหวัดกระบี่ ด่วนที่สุด ที่ กบ ๐๐๑๗.๒/ว ๑๔๓๓ ลงวันที่ ๒๓ มีนาคม ๒๕๖๙

สิ่งที่ส่งมาด้วย ๑. วาระการประชุมฯ จำนวน ๑ ฉบับ
๒. แบบตอบรับ จำนวน ๑ ฉบับ

ตามที่จังหวัดกระบี่ ได้มีการประชุมคณะกรรมการร่วมภาครัฐและเอกชนเพื่อแก้ไขปัญหาทางเศรษฐกิจจังหวัดกระบี่ (กรอ.จังหวัดกระบี่) ครั้งที่ ๓/๒๕๖๙ เมื่อวันที่ ๓๑ พฤษภาคม ๒๕๖๙ ณ ห้องประชุมพนมเบญจา ชั้น ๕ ศาลากลางจังหวัดกระบี่ ๙/๑๐ ไปแล้ว นั้น

จังหวัดกระบี่ ได้กำหนดจัดการประชุมคณะกรรมการร่วมภาครัฐและเอกชนเพื่อแก้ไขปัญหาทางเศรษฐกิจจังหวัดกระบี่ (กรอ.จังหวัดกระบี่) ครั้งที่ ๔/๒๕๖๙ ในวันที่ ๒๖ พฤษภาคม ๒๕๖๙ เวลา ๑๐.๐๐ น. ณ ห้องประชุมปลายพระยา ชั้น ๒ ศาลากลางจังหวัดกระบี่ ๙/๑๐ จึงขอเชิญท่านเข้าร่วมประชุมฯ ตามวัน เวลา และสถานที่ดังกล่าว ทั้งนี้ ขอให้หน่วยงานที่มีประเด็นที่ต้องชี้แจง จัดส่งเอกสารและข้อมูล พร้อมแบบตอบรับให้ฝ่ายเลขานุการ ภายในวันที่ ๒๐ พฤษภาคม ๒๕๖๙ เวลา ๑๑.๓๐ น. ทางไปรษณีย์อิเล็กทรอนิกส์ krabi.plan@gmail.com รายละเอียดปรากฏตามสิ่งที่ส่งมาด้วย

จึงเรียนมาเพื่อพิจารณาดำเนินการในส่วนที่เกี่ยวข้องต่อไป

ขอแสดงความนับถือ

(นายสุวิทย์ สุริยะวงศ์)
รองผู้ว่าราชการจังหวัด ปฏิบัติราชการแทน
ผู้ว่าราชการจังหวัดกระบี่

สำนักงานจังหวัด
กลุ่มงานยุทธศาสตร์และข้อมูลเพื่อการพัฒนาจังหวัด
โทร. ๐-๗๕๖๒-๒๑๓๘/ โทรสาร. ๐-๗๕๖๑-๒๒๒๘

บัญชีแนบท้าย

หนังสือสำนักงานจังหวัดกระบี่ ด่วนที่สุด ที่ กบ ๐๐๑๗.๒/ว๒๔๔๒ ลงวันที่ ๑๕ พฤษภาคม ๒๕๖๙
เรื่อง รายงานการประชุมคณะกรรมการร่วมภาครัฐและเอกชนเพื่อแก้ไขปัญหาทางเศรษฐกิจจังหวัดกระบี่ (กรอ.จังหวัดกระบี่) ครั้งที่ ๔/๒๕๖๙

<u>คณะกรรมการร่วมภาครัฐและเอกชนเพื่อแก้ไขปัญหาทางเศรษฐกิจจังหวัดกระบี่ (กรอ.จังหวัดกระบี่) จำนวน ๒๔ คน</u>

๑) ผู้ว่าราชการจังหวัดกระบี่
๒) รองผู้ว่าราชการจังหวัดกระบี่ที่ได้รับมอบหมาย
๓) ประธานคณะกรรมการบริหารหอการค้าจังหวัดกระบี่
๔) ประธานสภาอุตสาหกรรมจังหวัดกระบี่
๕) ประธานสภาอุตสาหกรรมท่องเที่ยวจังหวัดกระบี่
๖) ประธานสมาคมธนาคารไทยจังหวัดกระบี่
๗) คลังจังหวัดกระบี่
๘) พาณิชย์จังหวัดกระบี่
๙) อุตสาหกรรมจังหวัดกระบี่
๑๐) เกษตรและสหกรณ์จังหวัดกระบี่
๑๑) ท่องเที่ยวและกีฬาจังหวัดกระบี่
๑๒) ท้องถิ่นจังหวัดกระบี่
๑๓) ประชาสัมพันธ์จังหวัดกระบี่
๑๔) นายวัฒนา ธนาศักดิ์เจริญ ผู้ทรงคุณวุฒิด้านเศรษฐกิจ
๑๕) นายชวน ภูเก้าล้วน ผู้ทรงคุณวุฒิด้านสังคม
๑๖) รองอธิการบดีมหาวิทยาลัยการกีฬาแห่งชาติ วิทยาเขตกระบี่
๑๗) โยธาธิการและผังเมืองจังหวัดกระบี่
๑๘) ผู้อำนวยการสำนักงานเจ้าท่าภูมิภาค สาขากระบี่
๑๙) หัวหน้าสำนักงานจังหวัดกระบี่
๒๐) เลขาธิการหอการค้าจังหวัดกระบี่
๒๑) เลขาธิการสภาอุตสาหกรรมจังหวัดกระบี่
๒๒) เลขาธิการสภาอุตสาหกรรมท่องเที่ยวจังหวัดกระบี่
๒๓) เลขาธิการสมาคมธนาคารไทยจังหวัดกระบี่
๒๔) หัวหน้ากลุ่มงานยุทธศาสตร์และข้อมูลเพื่อการพัฒนาจังหวัด สำนักงานจังหวัดกระบี่

<u>ผู้เข้าประชุม</u>

๒๕) ปลัดจังหวัดกระบี่
๒๖) นายแพทย์สาธารณสุขจังหวัดกระบี่
๒๗) ผู้อำนวยการโรงพยาบาลกระบี่
๒๘) ผู้อำนวยการสำนักงานทรัพยากรธรรมชาติและสิ่งแวดล้อมจังหวัดกระบี่
๒๙) ผู้อำนวยการแขวงทางหลวงชนบทกระบี่
๓๐) ผู้อำนวยการแขวงทางหลวงกระบี่
๓๑) ขนส่งจังหวัดกระบี่
๓๒) ผู้อำนวยการโครงการชลประทานกระบี่

๓๓) ธนารักษ์พื้นที่กระบี่
๓๔) พลังงานจังหวัดกระบี่
๓๕) ผู้อำนวยการท่าอากาศยานกระบี่
๓๖) ผู้อำนวยการการประปาส่วนภูมิภาค สาขากระบี่
๓๗) นายอำเภอเมืองกระบี่
๓๘) นายกสมาคมธุรกิจการท่องเที่ยวจังหวัดกระบี่
๓๙) นายกสมาคมโรงแรมจังหวัดกระบี่
๔๐) ผู้อำนวยการสำนักงานการกีฬาแห่งประเทศไทย จังหวัดกระบี่
๔๑) นายกสมาคมกีฬาแห่งจังหวัดกระบี่
๔๒) นายภูวดิท ปรีชานนท์
๔๓) นายกองค์การบริหารส่วนจังหวัดกระบี่
๔๔) นายกเทศมนตรีเมืองกระบี่
๔๕) นายกองค์การบริหารส่วนตำบลอ่าวนาง
๔๖) ประธานสถาบันวิจัยเพื่อการพัฒนาประเทศไทย (TDRI)

(ร่าง)

ระเบียบวาระการประชุม

คณะกรรมการร่วมภาครัฐและเอกชนเพื่อแก้ไขปัญหาทางเศรษฐกิจจังหวัดกระบี่ (กรอ.จังหวัดกระบี่)

ครั้งที่ ๔/๒๕๖๙

ในวันที่ ๒๖ พฤษภาคม ๒๕๖๙ เวลา ๑๐.๐๐ น.

ณ ห้องประชุมปลายพระยา ชั้น ๒ ศาลากลางจังหวัดกระบี่ ๙/๑๐

ระเบียบวาระที่ ๑ - **เรื่องที่ประธานแจ้งให้ที่ประชุมทราบ**

ระเบียบวาระที่ ๒ - **เรื่องรับรองรายงานการประชุมคณะกรรมการ กรอ. จังหวัดกระบี่ ครั้งที่ ๗/๒๕๖๙ เมื่อวันที่ ๓๑ มีนาคม ๒๕๖๙**

ระเบียบวาระที่ ๓ - **เรื่องเพื่อทราบ**

- ระบบบัญชีทุนทางธรรมชาติด้านการท่องเที่ยวและด้านทรัพยากรน้ำจังหวัดกระบี่ (มูลนิธิสถาบันวิจัยเพื่อการพัฒนาประเทศไทย (TDRI)

ระเบียบวาระที่ ๔ - **เรื่องเพื่อพิจารณา**

๔.๑ การแข่งขันบาสเกตบอลเยาวชนรุ่นอายุไม่เกิน ๑๘ ปี รายการ FIBA U๑๘ Asia Cup SEABA Qualifiers ๒๐๒๖ (หอการค้าจังหวัดกระบี่ สำนักงานการกีฬาแห่งประเทศไทย จังหวัดกระบี่ และสมาคมกีฬาแห่งจังหวัดกระบี่)

๔.๒ การเสนอตัวเป็นเจ้าภาพการจัดประชุม กรอ.กลุ่มจังหวัดภาคใต้ฝั่งอันดามัน (หอการค้าจังหวัดกระบี่)

๔.๓ ความคืบหน้าการพัฒนาท่าอากาศยานนานาชาติกระบี่ (หอการค้าจังหวัดกระบี่ และท่าอากาศยานนานาชาติกระบี่)

๔.๔ การสถาปนาความสัมพันธ์เมืองคู่มิตรระหว่างจังหวัดกระบี่กับนครปูซาน (กลุ่มงานอำนวยการ สำนักงานจังหวัดกระบี่)

ระเบียบวาระที่ ๕ - **เรื่องอื่น ๆ (ถ้ามี)**

แบบตอบรับการเข้าร่วมประชุมคณะกรรมการร่วมภาครัฐและเอกชน
เพื่อแก้ไขปัญหาทางเศรษฐกิจจังหวัดกระบี่ (กรอ.จังหวัดกระบี่)
ครั้งที่ ๔/๒๕๖๙
วันที่ ๒๖ พฤษภาคม ๒๕๖๙ เวลา ๑๐.๐๐ น.
ณ ห้องประชุมปลายพระยา ชั้น ๒ ศาลากลางจังหวัดกระบี่

หน่วยงาน มูลนิธิสถาบันวิจัยเพื่อการพัฒนาประเทศไทย (TDRI)

๑. การเข้าร่วมประชุม

☑ สามารถเข้าร่วมประชุมได้ด้วยตนเอง

☐ ไม่สามารถเข้าร่วมประชุมได้ด้วยตนเอง โดยขอส่งผู้แทนเข้าร่วมประชุม ดังนี้

นาย/นาง/นางสาว รศ. ดร. อดิศร์ อิศรางกูร ณ อยุธยา
ตำแหน่ง หัวหน้าโครงการ
เบอร์โทร 081-885-0483

นาย/นาง/นางสาว ฟิรอัช สุริยบูรพกุล	3. นางสาว รสิตา หาญสวัสดิ์
ตำแหน่ง นักวิจัย	ผู้ประสานงานโครงการ
เบอร์โทร 090-991-0631	085-249-9249

๒. ประเด็นที่ต้องการเสนอบรรจุไว้ในระเบียบวาระ

☐ ไม่มี

☑ มี

ประเด็น ระบบบัญชีทุนทางธรรมชาติด้านการท่องเที่ยว และด้านทรัพยากรน้ำจังหวัดกระบี่

ลงชื่อ ฟิรอัช สุริยบูรพกุล
(ฟิรอัช สุริยบูรพกุล)
ตำแหน่ง นักวิจัย

หมายเหตุ กรุณาส่งแบบตอบรับทางอีเมล์ krabi.plan@gmail.com หรือ แจ้งรายชื่อผู้เข้าร่วมประชุมได้ที่ ๐๗๕-๖๒๒-๑๓๘ และภายในวันที่ ๒๐ พฤษภาคม ๒๕๖๙

กลุ่มงานยุทธศาสตร์และข้อมูลเพื่อการพัฒนาจังหวัด
สำนักงานจังหวัดกระบี่
โทรศัพท์ ๐๗๕-๖๒๒-๑๓๘/โทรสาร ๐๗๕-๖๑๒-๒๒๘

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