Overview of the mangrove ecosystem and conservation challenges in Thailand

Overview of the mangrove ecosystem and conservation challenges in Thailand report for Global Environmental Institute (GEI).
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Introduction

Mangroves are critical coastal ecosystems found in tropical and subtropical regions worldwide. These unique intertidal forests significantly maintain ecological balance, protect shorelines and support livelihoods. Mangroves consist of the mangrove tree, a shrub or tree, that grows mainly in coastal saline or brackish water. The mangroves in Asia represent some of the most extensive and diverse mangrove ecosystems globally. Southeast Asia holds approximately one-third of the world's mangrove forests. Countries such as Indonesia, Thailand, Myanmar, Malaysia, the Philippines, and Vietnam are key regions with significant mangrove cover.[1] These forests provide critical ecological services, including habitat for numerous species, coastal protection against erosion and storm surges, and carbon sequestration.[2]

As of 2020 14.93% of the 2,139,308.93 km total coastline of the planet is designated as being mangrove forests. This equates to 147,358.99 km^2 or 14,735,899.10 hectares (ha).[3] Thailand accounts for less than 0.02% of this value (2,480 km^4 and 277,923 ha).[5]

The status of mangroves in Thailand

Mangrove forests in Thailand are found mainly on the south and eastern coasts of Thailand in the Gulf of Thailand and the Andaman Sea.[6] The area declined from about 2 million rai (320,000 hectare) in 1975 to 1 million (160,000 hectare) in 1996. It started recovering in 2004, to 1.5 million rai (240,000 hectare), because of conservation and rehabilitation efforts.

The current mangrove area, about 70 percent of this coastline, is under mangroves covering a total area of 1,737,020 rai (278,000 hectares) in 24 provinces along the coast of Thailand.[7] Phang Nga province has 9.2% of Thailand’s mangrove area, which represents the largest area of mangrove forest in Thailand.

[1] Giri, C., Ochieng, E., Tieszen, L. L., Zhu, Z., Singh, A., Loveland, T., & Duke, N. (2011). Status and distribution of mangrove forests of the world using earth observation satellite data. Global Ecology and Biogeography, 20(1), 154-159.
[2] Donato, D. C., Kauffman, J. B., Murdiyarso, D., Kurnianto, S., Stidham, M., & Kanninen, M. (2011). Mangroves among the most carbon-rich forests in the tropics. Nature Geoscience, 4(5), 293-297.
[3] Global Mangrove Watch. (2024). https://www.globalmangrovewatch.org/ Accessed March 2024.
[4] UNESCO (2020). Mangrove ecosystems of Thailand. https://unesdoc.unesco.org/ark:/48223/pf0000375054
[5] Chaiklang, P., Karthe, D., Babel, M., Giessen, L., & Schusser, C. (2024). Reviewing changes in mangrove land use over the decades in Thailand: Current responses and challenges. Trees, Forests and People, 100630.
[6] Pumijumnong, N. (2014). Mangrove forests in Thailand. Mangrove ecosystems of Asia: Status, challenges and management strategies, 61-79.
[7] Department of Marine and Coastal Resources Ministry of Natural Resources and Environment. (2022). https://km.dmcr.go.th/c_11/d_19775. Accessed December 2024.

Mangrove areas of Thailand

Table 1: Mangrove extent across Thailand by province. Source: Modified from mangrove coverage data in year 2022 (DMCR, 2022) (6.25 Rai = 1 hectare).

	Province	Area (Rai)	Area (Hectares)	Percentage
1	Trat	1,150,992	184,159	6.6%
2	Chanthaburi	615,878	98,540	3.5%
3	Rayong	643,999	103,040	3.7%
4	Chon buri	484,430	77,509	2.8%
5	Chachoengsao	255,716	40,915	1.5%
6	Samut Prakan	203,782	32,605	1.2%
7	Bangkok	89,324	14,292	0.5%
8	Samut Sakhon	329,212	52,674	1.9%
9	Samut Songkhram	156,309	25,009	0.9%
10	Phetchaburi	331,818	53,091	1.9%
11	Prachuap Khiri Khan	1,309,481	209,517	7.5%
12	Chumphon	1,126,528	180,244	6.4%
13	Suratthani	970,146	155,223	5.5%
14	Nakhon Si Thammarat	928,225	148,516	5.3%
15	Phatthalung	385,381	61,661	2.2%
16	Songkhla	1,014,615	162,338	5.8%
17	Pattani	279,842	44,775	1.6%
18	Narathiwat	239,757	38,361	1.4%
19	Ranong	1,408,869	225,419	8.1%
20	Phang Nga	1,610,663	257,706	9.2%
21	Phuket	341,943	54,711	2.0%
22	Krabi	1,467,990	234,878	8.4%
23	Trang	1,108,672	177,388	6.3%
24	Satun	1,028,800	164,608	5.9%
	TOTAL	**17,482,371**	**2,797,180**	**100%**

There are 81 different mangroves species found in Thailand. Of these 34 species are considered 'true' mangrove species. The most commonly found species are *Rhizophora apiculata*, followed by *Xylocapus granatum*, *Xylocarpus moluccensis*, and *Rhizophora mucronata*. Regions such as the Phang Nga and Trang provinces contain the most diverse range of species, while the Phuket region is the least diverse.[8]

[8] Department of Marine and Coastal Resources Ministry of Natural Resources and Environment. (2022). https://km.dmcr.go.th/c_11/d_19775. Accessed December 2024.

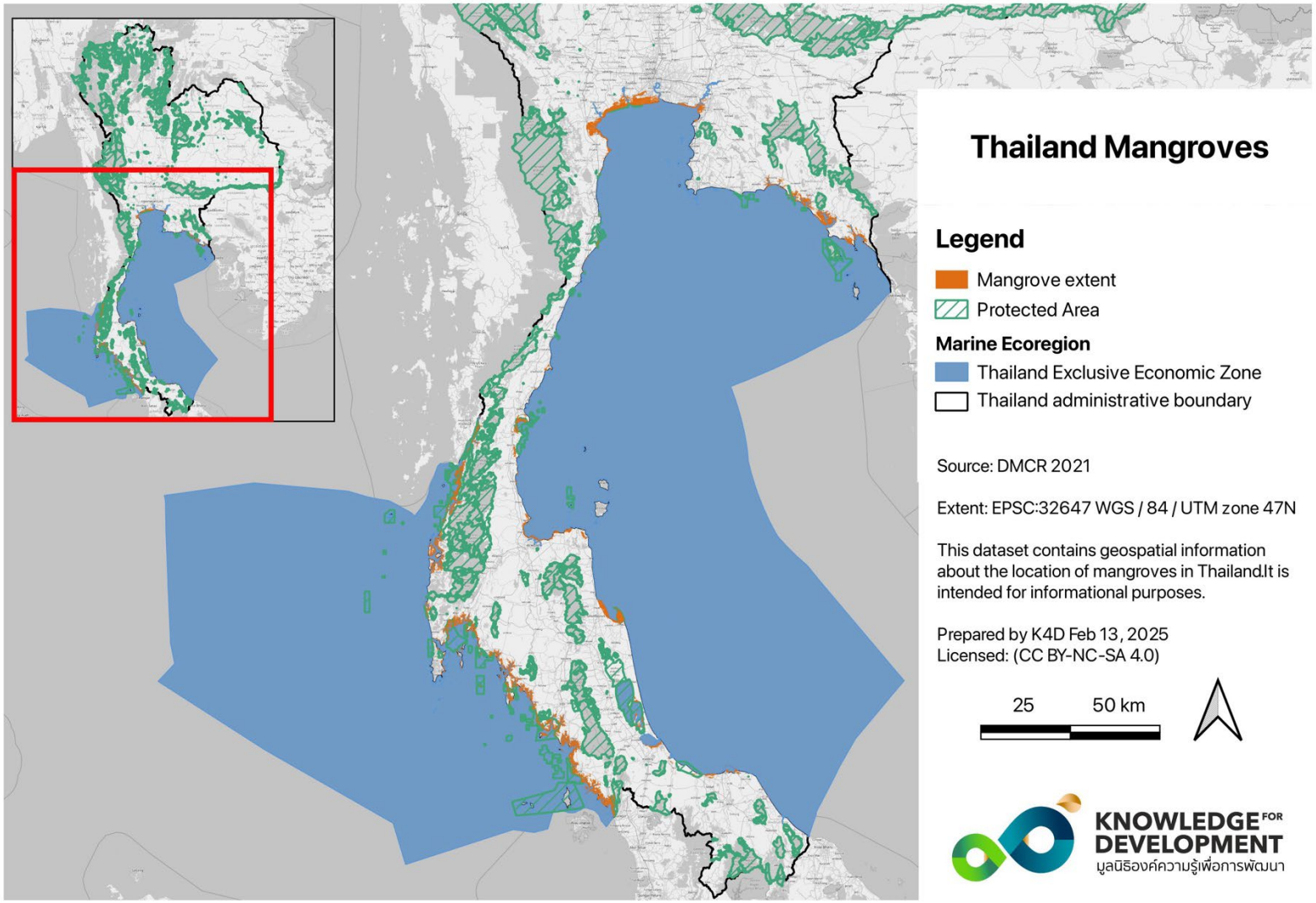

Figure 1: Map of mangrove extent across the Thailand coastline.

Causes of the decline of mangroves

In Thailand, the early drivers of mangrove decline include charcoal concessions and shrimp agriculture. The current drivers are industrial and tourist development and poor approaches to mangrove restoration.

- **Charcoal concessions** were responsible for a huge loss of mangroves prior to the embargo in 1998 where no new concessions were issued with the final concessions expiring in 2003. In response to the loss of mangroves due to these concessions, the government took a monoculture plantation approach to restoring mangroves resulting in a loss of biodiversity.

- **Shrimp aquaculture** was a boom-and-bust industry involving clear cutting of mangrove forests based upon individual concessions. They only benefitted individual concession holders while communities and the nation lost mangrove ecosystem services.

- **Industrial and tourism development.** In the last few decades, the population in the coastal provinces has grown rapidly and a significant proportion of the ecosystem has been degraded or converted to other land uses. New construction of tourist facilities, deep-sea port infrastructure, marinas, and residential construction have all caused a reduction in mangrove habitat.

- **Poor mangrove restoration methodology resulting in loss of biodiversity**. Mangrove restoration initiatives driven by the government and project implementers across Thailand have focused on monoculture plantation approaches which has contributed to mangrove decline. Establishing only single-species habitats rather than restoring biodiverse and multi-species mangrove forests has seen low success rates in establishing viable mangrove ecosystems. The plantations are often found on mudflats, salt flats and even seagrass beds which are not traditional mangrove habitats.

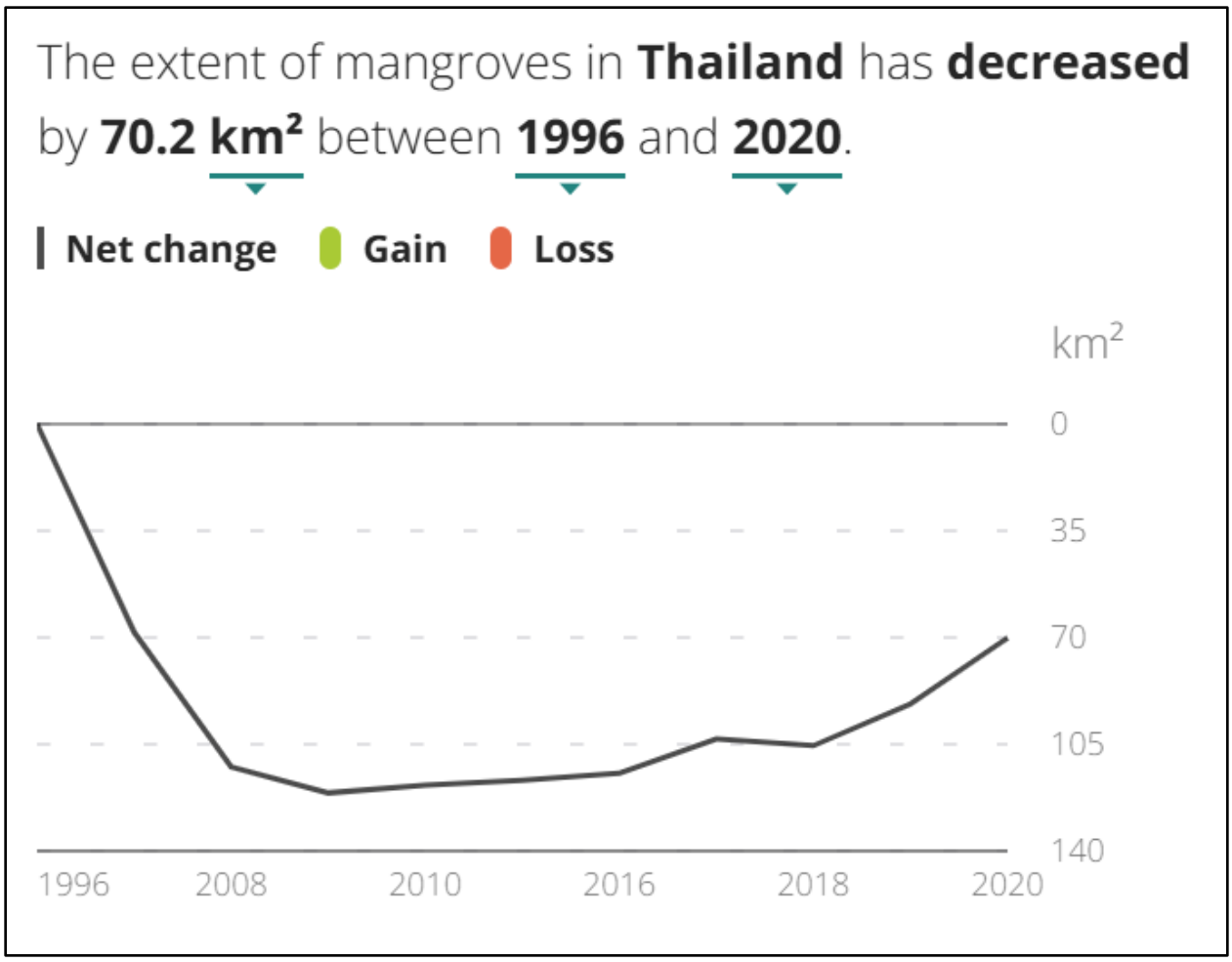

Figure 2: Global change in extent of mangroves for select years from 1996 to 2020 (1996, 2007, 2008, 2009, 2010, 2015, 2016, 2017, 2018, 2019, 2020), from Global Mangrove Watch.[9]

In Thailand, most commercially caught fish, close to 75%,[10] have inhabited mangroves at some point in their lifecycle. This makes mangroves a critical component of the coral reef ecosystem, providing complex habitat structure for many juvenile fish species. Therefore, mangroves are highly important for coastal fishing livelihoods within coastal communities in Thailand. The loss of mangroves will directly affect food security for local communities, impact the global seafood market, and reduce the climate resilience of coastal environments.

Coastal communities have managed mangrove forest protection for generations and have valuable knowledge about their environments; however, in Thailand, significant knowledge gaps exist among communities regarding their legal access and resource rights. This limited understanding of their rights as the legislative

[9] Data from: Bunting P., Rosenqvist A., Lucas R., Rebelo L-M., Hilarides L., Thomas N., Hardy A., Itoh T., Shimada M. and Finlayson C.M. (2018). The Global Mangrove Watch – a New 2010 Global Baseline of Mangrove Extent. Remote Sensing, 2018, 10, 1669; doi:10.3390/rs10101669

[10] IUCN. (2018). Ecological and socio-economic values of Mangrove ecosystems in tsunami affected areas: Rapid ecological-economic-livelihood assessment of Ban Naca and Ban Bangman in Ranong Province, Thailand. Available at: https://data.opendevelopmentmekong.net/library_record/ecological-and-socio-economic-values-of-mangrove-ecosystems-in--tsunami-affected-areas-rapid-ecolog

frameworks governing them can present challenges in multiple dimensions that are detrimental to both individuals, their collectives and overall human and environmental rights, such as:

- **Land tenure security:** Mangrove communities still lack clear land tenure rights. This uncertainty limits their ability to make decisions to protect and sustainably manage mangrove ecosystems.
- **Natural resource rights:** Due to insecure tenure, communities are often in precarious positions when it comes to clarity of their rights to access and utilize mangrove resources.
- **Governance of mangrove ecosystems:** Exclusion of coastal communities within governance structures limits their ability to engage in decision-making. Limited provisions for participation and community awareness about how to engage can limit their participation within governance over mangrove conservation and development projects.
- **Communicating importance of mangroves:** Villagers who have lived with mangroves for generations understand their importance. Yet they do not articulate the specific ecological services, such as shoreline protection, biodiversity conservation, or carbon sequestration, in ways that reflect mainstream language and understanding.
- **Diversification of economic benefits:** Sustainable mangrove management, including ecotourism and fisheries, are opportunities for revenue generation that are challenging to establish under existing government regulations. Communities may need further assistance understanding these regulatory frameworks to use them to their advantage.

Livelihood and economic opportunities

Mangrove conservation is not limited to ecological significance, it is also an important livelihood and economic resource. Mangroves provide nursery grounds for fish and shellfish species which are sustainably harvested as well as timber and non-timber products for both subsistence and commercial use. Ecotourism opportunities exist that benefit local communities, and their conservation is critical to ensure sustained revenue generation for the people who depend on them.

However, agricultural and aquaculture activities, particularly shrimp farming, have expanded recently. Coastal infrastructure development and palm oil are the new threats, significantly leading to mangrove deforestation. The expansion of these sectors poses a significant threat to the sustainability of mangrove ecosystems.

Government Initiatives

In May 2024, the Department of Marine and Coastal Resources (DMCR) celebrated National Mangrove Forest Day to raise awareness about the importance of mangroves and encourage conservation efforts through the Thailand Mangrove Alliance, which is a collaborative public-private partnership aiming to bring 30% of

Thailand's mangroves under effective management by 2030 (30x30).[11] However, meeting this objective may be limiting as well as challenging to ensure both economic growth and environmental protection. It will require a new approach for Thailand. Most importantly, the balance to ensure responsible practices to include both nature and local communities concerns within management is critical to achieve the long-term health and sustainability of its valuable mangrove ecosystems.

Legal frameworks and policies

Thailand's current Constitution, B.E. 2560 (2017) includes several provisions that provide for community rights in the preservation of natural resources and the environment. For example, Section 58:

The State shall:

1. Conserve, revive and promote local wisdom, arts, culture, traditions and good customs at both local and national levels, and provide a public area for the relevant activities including promoting and supporting the people, community and a local administrative organisation to exercise the rights and to participate in the undertaking.

2. Conserve, protect, maintain, restore, manage and use or arrange for utilisation of natural resources, environment and biodiversity in a balanced and sustainable manner, provided that the relevant local people and local community shall be allowed to participate in and obtain the benefit from such undertaking as provided by law.

Among other provisions, this language obliges the State to conserve Thailand's biodiversity, including mangrove forests. It also sets out a framework that recognizes traditional community rights in this endeavour. Since Thailand was transformed into a constitutional monarchy in 1932, many laws have been passed to preserve Thailand's forests, but community rights to manage these forests had not been formally recognized until the Community Forest Act was passed in 2019. Despite the lack of legislation on the matter, the rights granted in the Constitution apply to all Thai citizens.

Thailand mangrove conservation laws and policies

In March 2015, the Cabinet enacted the Promotion of Marine and Coastal Resource Management Act of B.E. 2558, which established the Department of Marine and Coastal Resources (DMCR)—the main agency responsible for mangroves—to collaborate with coastal communities and other stakeholders in marine and coastal resource management, planning, restoration, conservation and maintenance. The primary goal of the Act is to promote sustainable management and conservation of

[11] Department of Marine and Coastal Resources. (2013). https://www.dmcr.go.th/detailLib/8227

marine and coastal resources. The Act emphasises community involvement, allowing communities to contribute towards management of their traditional land and resources. Implementation of the Act remains inconsistent as it requires synergy from all stakeholders of varying power and influence. The unequal power dynamics and lack of transparency—as shown in our case studies examples below—has led to a lack of free-prior and informed consent (FPIC) as well as resource insecurity and subsequent conflict. This reiterates the necessity for FPIC in order to secure land tenure through the traditional rights of coastal communities and maintain communities' interest in sustainable resource utilisation and co-management in mangrove resource conservation.

Additionally, in 2022, a legal framework for community forest management was created. The DMCR established formal protocols allowing villagers to create Community Forests (CF), providing them with ten-year management authority. This presents an opportunity for communities to attain resource access rights and be the drivers of decision making. A Community Forest agreement is the basis of tenure over mangroves and can be subsequently renewed beyond the initial ten years.

Prior to the establishment of these protocols, all mangrove forests were state-owned resources. Under this legislation, 68,559 rai (10,969 hectare) areas of national forest could be provided to communities for ten years if they applied and demonstrated capacity to manage these forests. Subject to meeting these requirements, the granting of approval of a Community Forestry agreement remained very much subject to the discretion of the relevant government department. Until the 2022 protocols allowing mangroves to become community forests, the law had effectively applied only to terrestrial forests.

In 2023, in response to the Kunming-Montreal Global Biodiversity Framework (CBD COP15), Thailand contributed to global biodiversity conservation efforts by identifying potential areas for the Other Effective area-based Conservation Measures (OECMs). While the OECMs implementation in Thailand is still in its early stages, mangrove forests could potentially be classified under the OECMs program, including community mangrove forests and mangrove areas managed by individuals, foundations, and the private sector. However, it is necessary to have a clear definition and recognition of OECMs in Thailand's legal and a policy framework for their effective implementation. Building the capacity of local communities, government agencies, and non-government organisations (NGOs) to manage and monitor OECMs is crucial. Whilst incorporating climate change adaptation strategies into OECMs planning and management will ensure the long-term resilience of mangrove ecosystems.[12]

The following legislation can be identified as relating to the conservation of Mangroves in Thailand: National Reserved Forest Act. B.E. 2507 (1964), Commercial

[12] IUCN, Thailand. (2024). A study of potential areas on the other effective area-based conservation measures (OECMs), development of spatial data and policy recommendation to support post 2020 GBF. “(Document in Thai)”, Unpublished Draft Report.

Forest Plantation Act, B.E. 2535 (1992), Enhancement and Conservation of The National Environmental Quality Act, B.E. 2535 (1992), Forest Act, B.E. 2484 (1941), National Park Act B.E 2504 (1961), National Park Act B.E. 2562 (2019), Marine and Coastal Resources Management Act of 2015, Community Forest Act, The Enhancement and Conservation of the National Environmental Quality Act, B.E. 2535, and The 11th National Economic and Social Development Plan.

Carbon financing schemes

Mangroves have a high capacity to absorb CO^2 and lock up carbon. A hectare of mature mangrove forest sequesters 6 to 8 metric tonnes of carbon per year with a potential storage on average of 937 tonnes of carbon per hectare.[13] As such mangroves are highly efficient carbon sinks, storing significant amounts of carbon in their biomass and soils. This makes them valuable in mitigating climate change through carbon offset projects. Several initiatives in Southeast Asia focus on leveraging this potential. For example, the Blue Carbon Initiative promotes the conservation and restoration of coastal ecosystems, including mangroves, to enhance carbon sequestration.[14]

This has resulted in carbon credit schemes being promoted as pivotal in mitigating climate change by providing economic incentives for reducing greenhouse gas emissions. These schemes have gained momentum in Southeast Asia, driven by the region's significant carbon sequestration potential through diverse ecosystems such as mangroves, forests, and agricultural lands. Carbon credit schemes in Southeast Asia are evolving rapidly, driven by voluntary market mechanisms and regulatory frameworks.

Thailand is no exception; the climate crisis has accelerated Carbon Financing mechanisms and schemes in the country. Rapidly fuelled by the ambitious Nationally Determined Contributions (NDC) Thailand has designed a carbon financing scheme called the Thailand Voluntary Emission Reduction (T-VER) initiative. Under this initiative, corporations can offset their Greenhouse Gas (GHG) emissions by purchasing carbon credits generated by environmental conservation projects. The Department of Marine and Coastal Resources (DMCR) has targeted mangrove restoration activities to create carbon credits for trade under the T-VER initiative.

Currently the T-VER initiative operates on the voluntary carbon market in Thailand. The requirement for initiating a project is based upon a size quotation of sequestering a minimum of 1,000 tCO_2 eq/year for afforestation and restoration projects. This amount of carbon sequestration also needs to demonstrate ‘additionality’ that proves that the project is adding to carbon offset upon normal operations.[15] The standards for additionality are set by the Thailand government and are based upon international standards. The Thailand government is the only

[13] Alongi, D. M. (2012). Carbon sequestration in mangrove forests. *Carbon management*, 3(3), 313-322.
[14] Carbon International. (2019). https://www.thebluecarboninitiative.org/. Accessed October 2024.
[15] Greenhouse gas mitigation mechanism: T-VER. https://ghgreduction.tgo.or.th/en/what-is-t-ver/what-is-t-ver.html

authority allowed to certify carbon credits prior to trading and currently is only operating within Thailand as it is yet to start floating carbon credits upon the global voluntary carbon market for trading.

Under the mangrove T-VER initiative, the DMCR facilitates agreements between communities and corporations. To date, the DMCR has facilitated agreements under this scheme through a Memorandum of Understanding (MOU) signed in partnership with some of the largest Thailand corporations (see Annex I) and ninety-nine mangrove communities (see Annex II).

While these mangrove communities have signed agreements covering an area of 162,590 Rai (26,014 hectare), our research finds that the communities do not understand the terms of the agreements they have signed. It is unclear if communities had any real negotiation power to influence the terms of the MOU, as most of the rights and benefits seem to fall solely towards the companies' benefit. Many questions have been raised by communities and local stakeholders regarding the equitability of the initiative.

Although the opportunities are vast for carbon offset projects, from providing financial incentives to mangrove conservation and restoration, challenges exist. The implementation of these projects necessitates the need for securing funding, ensuring accurate measurements and verification of carbon sequestration, and addressing land tenure issues.

Implementing Carbon Financing Schemes in Thailand

Case studies from three communities in Thailand

The *Knowledge for Development (K4D)* undertook research in southern Thailand across three mangrove communities: Nai Nang, Klong Prasong, and Bang Khang Kao. The research examined the level of engagement and implications of the carbon financing schemes upon these communities. The areas chosen are characterised by biologically diverse and extensive mangrove areas that are heavily relied upon for both commercial and subsistent livelihoods. These observations, although yet to be finalised, represent three different circumstances of these villagers' engagement with the T-VER initiative. While there are perceived benefits to carbon financing, the potential for inequity in carbon financing in Thailand can be significant, due to the economic and social disparities across these different villages.

Power and influence

Within each of the three villages K4D examined how stakeholders engaged within decision-making regarding the CCS implementation. While the power dynamics of each village differs, four main groups of stakeholders emerged: (i) government authorities (local to national); (ii) corporations; (iii) NGOs; and (iv) community

members. Within each stakeholder group different power levels are at play, varying depending on the strength of community organizing. We asked communities to represent the stakeholders in Venn diagram activity designed to determine who the pivotal stakeholders were in decision making regarding the implementation of the CCS.

In Nai Nang, community representatives described themselves as the drivers of decision-making within their community, with local authority respecting their participation and contributions. In the case of the CCS, the company and the DMCR made an agreement to undertake the initiative without consulting with the communities. The Apiculture Group was approached first by the DMCR and presented with a contract (MOU) which informed them of the initiative. It was presented to them in a positive light, and it was assumed that they would agree to the initiative and enter into the agreement with the company. Upon reflection, this group felt that they were coerced into signing the agreement. Other groups—including community-based tourism groups, fishing groups, and the food processing group—were informed in later rounds of communications. In this community, there were distinct differences in the way power is observed by men and women. While men identified the sub-district officer and village headman as having the least power in the carbon credits scheme, women pointed to villagers and religious leaders as having the least power. This distinction could be rooted in traditional values, being of a minority Muslim culture, or gender discrepancy norms whereby women engage less with administrative matters of the community.

Representatives of the Klong Prasong community identified the village headman and community leaders as key decision-makers in their village. The DMCR, the company, the village headman (from Klong Prasong village), and the Coastal Resources Volunteer Conservation group nominated by the DMCR were identified as key stakeholders who jointly made the decision regarding the CCS. This was then later shared with the sub-district administrative officer, village headmen, and the village headman's relatives. Established village committees, such as the religious and fisherfolks committees, were later informed; however, despite the villagers representing 80% of the population, they were not consulted but simply informed of the decisions.

In contrast, the Bang Khang Khao community has yet to sign onto the CCS initiative. Representatives acknowledged that the sub-district officers have the greatest decision-making power. The villagers foresee that if the company and the DMCR agree to initiate the CCS they would firstly inform the sub-district officer. Once it is finalised, they will likely inform other groups, including the village committee, villagers, sub-district administrative officers, and the school principal.

Although there are some variances in the power analysis for each village, the government, ultimately the DMCR, and the company hold the highest decision-making power. They are jointly determining the terms of the CCS initiative, who they communicate with, what information they share, and how the benefits of the CCS project are distributed. Local communities have historically served as the guardians of the mangroves and maintained strong cultural ties through traditional practices

to these ecosystems. However, in all instances, there was no attempt to engage them in free, prior, and informed consent before agreements were made and formalised. As such, while the local communities represent a significant population, they lack sufficient representation in high-level decision-making processes. The findings also showed that NGOs, particularly K4D in this context, play a key role as mediators during dialogue discussions and raising awareness on the CCS initiatives to address the gaps in community knowledge.

Equitable benefit, access and participation

Among the multiple challenges of carbon financing schemes, one recurrent issue is the inequality in benefits, access, and participation. Smallholder farmers and local communities often lack the technical knowledge and financial resources to participate in carbon credit schemes. The initial project development, monitoring, and verification costs can be prohibitively high for these groups.[16] Moreover, there is often a lack of accessible information about carbon credit opportunities and their benefits, preventing marginalised communities from engaging in these schemes.

In all the communities we surveyed there was no free-prior and informed consent sort from the DMCR or company prior to determining the terms of the contract and initiating the CCS. The contracts (MOU's) themselves are made between the company and the communities; the DMCR have no visible function within the contract except as administrators. The benefit sharing structure within the agreements outline a 70-20-10 percent share between the company, community and DMCR respectively. In Nai Nang, communities were verbally told that they would receive the larger share of profits (80%) but when presented with the contract the details were changed to the 70-20-10 division of benefits. During their consultations with the DMCR they raised their concerns however felt pressured by the government representatives to sign the agreement, which they now reflect was under this duress. It is unclear why and how these proportions have been determined and neither the company nor DMCR has justified these calculations to the communities.

Thailand's economic disparities amplify the risk of financial gains from carbon credits disproportionately favouring large corporations or foreign investors. In the case of T-VER multinational companies involved in carbon projects along the Gulf of Thailand are capturing the greater proportion of financial benefit without transparently communicating why they should be the largest beneficiary. This leaves mangrove communities with a small portion of compensation. These communities, who bear the brunt of environmental costs and climate vulnerability, are being tasked with the restoration efforts of mangroves yet are receiving little in return for their contributions as well as remaining in precarious states of land and resource tenure security regardless of if the initiative is profitable or not.

[16] Duangklad, Patchar. (2024) https://earthjournalism.net/stories/evaluating-carbon-credits-in-thai-community-forests. Accessed December 2024.

Community engagement

Across the three mangrove communities we surveyed there were insufficient consultations and Free, Prior, and Informed Consent (FPIC) regarding carbon financing projects directly impacting their lands and livelihoods. This lack of engagement is particularly pronounced in southern provinces like Krabi and Trang, where language differences, complex bureaucratic processes, and misaligned corporate priorities hinder meaningful dialogue. Women, in particular, whose traditional knowledge are often neglected in natural resource management efforts faced additional barriers to participating in carbon credit schemes. These existing gender inequalities limit their ability to; engage in consultative processes, leadership positions and thus influence decision making that would benefit them.

The absence of inclusive consultation increases the mistrust and resistance to projects among communities as exemplified in Klong Prasong village. The DMCR and company in this village only approached the village headman to sign off on the agreements to initiate the CCS. There were no open or transparent consultations held with the community at large. The village headman also did not make these agreements public and upon signing the MOU received a small amount of capital for undertaking the restoration initiatives. As members of the community have become aware of this there has been increasing division amongst them. It is also not clear how the funds received by the village headman have been utilised.

Additionally, on November 29, 2023, K4D, community representatives from Klong Prasong and NGO partners initially engaged the Director of the DMCR office #10 to express their desire to formulate a CF for their village. Subsequently K4D, along with representatives from Klong Prasong Community Forest Committee, demarcated the intended area of mangrove and met with the DMCR deputy director to present their community forest boundary maps and management plans. The DMCR announced that they would visit the community in May 2024 to assess the maps and participate in a community meeting. On June 21, 2024, a DMCR officer informed participants that currently Klong Prasong is registered as CF covering three communities of Ban Koh Klang, Klong Prasong and Ban Klong Gam and that dividing the existing community forest by village was not permitted. This information was not provided to the communities on all previous meetings prior to the submission.

This news was unexpected and disappointing to the communities. This highlights a significant gap between national policies and local implementation and reiterates that in practice, many local communities face bureaucratic barriers when trying to engage in decision-making. Even though the regulations emphasize participatory engagement and management conflicts arise as demonstrated above.

Cultural and environmental impact

In Thailand, there is an intricate link between mangroves and local cultural heritage. Mangrove ecosystems in areas like Samut Songkhram hold deep spiritual and traditional significance for nearby communities. Carbon projects that focus solely on economic gains risk disrupting these cultural ties leading to social animosity and

loss of traditional knowledge systems and culture. Additionally, they could inadvertently harm local biodiversity, undermining the very sustainability goals they aim to achieve. In the case of Nai Nang, communities here have been proactively protecting their mangroves for generations and feel that they are best placed to continue to protect and safeguard their mangroves under existing cultural practices.

Capacity building and empowerment

The three rural communities we engaged struggled to comprehend the carbon credit schemes' objectives due to technical carbon jargon, financial resource limitations, and a lack of influence in the decision-making processes. The complexity of the certification and verification requirements further hinders participation. Capacity-building initiatives are essential to address these barriers and ensure more equitable participation. Cases like in Nai Nang communities highlight the uneven distribution of benefits, where initial promises of fair shares were revised in favour of companies and government bodies. This highlights the need for building capacities and empowering communities to actively engage in negotiations, for fair and transparent benefit-sharing agreements.

Community management of mangroves

Local communities often have traditional knowledge and a vested interest in maintaining healthy mangrove ecosystems.[17] Thus community involvement in governance is essential for the sustainable management of mangrove forests. Community-based management projects have seen success in various parts of Southeast Asia. For instance, in Vietnam, the collaboration between local communities and authorities has led to the successful restoration and management of mangroves, improving both environmental and socio-economic outcomes.[18]

The benefits of community management include enhanced local livelihoods through sustainable use of resources, increased resilience to natural disasters, and improved conservation outcomes. However, challenges remain, such as securing long-term funding, providing adequate training and resources, and ensuring equitable distribution of benefits.[19]

Some projects in Thailand have successfully involved local communities, ensuring that they benefit from carbon credits. Examples include community-led restoration projects in the Pred Nai Community Forestry Group in southeastern Thailand,[20] the

[17] Walters, B. B. (2004). Local management of mangrove forests in the Philippines: Successful conservation or efficient resource exploitation? Human Ecology, 32(2), 177-195.
[18] Rönnbäck, P., Crona, B., & Ingwall, L. (2003). The return of ecosystem goods and services in replanted mangrove forests: Perspectives from local communities in Kenya. Environmental Conservation, 30(4), 484-496.
[19] Datta, D., Chattopadhyay, R. N., & Guha, P. (2012). Community based mangrove management: A review on status and sustainability. Journal of Environmental Management, 107, 84-95.
[20] On-prom, S. (2014). Community-based mangrove forest management in Thailand: key lesson learned for environmental risk management. Sustainable living with environmental risks, 87-96.

Nernkhor Sub-district of Rayong Province,[21] and in Trang Province.[22] In Pred Nai, in the 1980s, a logging concession overlapped with the conservation area, resulting in a conflict with the local community. Dikes constructed to prevent saline from entering the logging area resulted in the deterioration of the mangroves. The local community attempted to remove these dikes, which resulted in an armed confrontation. An intervention by the local military resulted in the removal of the dikes and subsequent changes to regulations regarding mangrove forests. Initiatives such as restrictions on crab harvesting, saw a dramatic increase in the number of crabs.[23] However, these examples are relatively rare, and many projects still struggle with issues of participation and benefit-sharing.

Community-based conservation

While Community Forests certification of mangrove is a significant step forward in enabling Community-Based Forest Management (CBFM),[24] they may not be the only legal framework available. Other mechanisms, such as co-management agreements with government agencies or traditional forest management practices, could also be recognized and supported. However, Community Forest certification secures tenure use rights for a 10-year period, after which the community must renew the registration with the DMCR. This renewal process involves meeting specific DMCR criteria, which may include requirements to reconstitute a new Community Forest Committee. This periodic renewal is crucial to ensure effective and equitable management of mangrove resources and ecosystems.

The core idea is to empower local communities to play a central role in managing and conserving mangrove forests. Coastal villages have a long history of managing and protecting mangrove forests with the use of their traditional knowledge and practices to contribute to the conservation of these ecosystems. For instance, in 2012-2018 the Mangrove Action Project (MAP) collaborated with local communities to promote sustainable livelihoods and mangrove conservation, such initiatives as the Nai Nang Honey project in Krabi Province.

In recognition of this, the K4D has been working in three pilot sites in Southern Thailand to support the communities in obtaining their community forestry (CF) certifications. Through this support, K4D places emphasis on a community-based participatory approach which provides technical support to collaborative planning, demarcation through mapping and tracking community progress and natural

[21] Janmaimool, P. (2016). The establishment of a community-based mangrove Forest management plan: Lessons learned from mangrove Forest conservation in the Nernkhor sub-district, Rayong Province, Thailand. Applied Environmental Research, 38(3), 59-76.
[22] Sudtongkong, C., & Webb, E. L. (2008). Outcomes of state-vs. community-based mangrove management in southern Thailand. Ecology and Society, 13(2).
[23] United Nations Development Programme. 2012. Pred Nai Mangrove Conservation and Development Group, Thailand. Equator Initiative Case Study Series. New York, NY. https://www.equatorinitiative.org/wp-content/uploads/2017/05/case_1348164059.pdf
[24] CBFM is a broader concept that emphasizes community involvement and sustainable forest management. Community Forests are a specific tool or mechanism within the CBFM framework which provides a legal framework for community rights.

resources. Villagers are then able to organise themselves to apply for mangrove protection under the CF mechanism.

Additionally, local coastal communities are actively involved in mangrove conservation through ecotourism or community-based tourism that promote sustainable tourism in mangrove areas throughout the country. These projects provide alternative livelihoods for local communities and generate income for mangrove conservation efforts. An example is the “People's Forest for Thai Happiness", an initiative from the DMCR. The project aims to promote coexistence with forests and increase the number of trees in urban areas. Between 2018 and 2022, a total of 33 urban mangrove forests covering 25,440 rai (4,070 Hectare) in 18 provinces were established, including Chonburi, Rayong, Chanthaburi, Chachoengsao, Samut Sakhon, Samut Songkhram, Phetchaburi, Prachuap Khiri Khan, Surat Thani, Nakhon Si Thammarat, Songkhla, Pattani, Ranong, Phang Nga, Phuket, Krabi, Trang, and Satun.[25]

Community Actions Against Mangrove Destruction

Coastal communities in Thailand are taking steps to protect their mangroves. Such initiatives include local conservation groups established to monitor and track changes in mangrove health and report illegal activities like encroachment, logging, and pollution. These groups are crucial in safeguarding and ensuring their long-term sustainability. Villagers often form patrols to deter illegal activities and report suspicious behaviour to the DMCR. These initiatives tend to be most effective in combination with existing conservation efforts such as in Pred Nai Village in Trat Province, where the villagers reversed ecologically damaging practices. This included the sustainable harvesting of mud crabs, the removal of a sea gate, and the education of the younger members of the community.[26]

Pollution and waste disposal have been two major threats to Thailand’s coastal and mangrove areas. Collaboration between local and international NGOs has led to clean-up campaigns and waste reduction initiatives. However, there is still a need for systemic change to improve public waste reduction and disposal as well as education and outreach programs to raise awareness about the harmful effects of pollution.

Collective action and Networking

The DMCR has recognised and registered local coastal communities in Thailand that are actively involved in mangrove conservation efforts. The intended purpose of

[25] Department of Marine and Coastal Resources. (2022). https://dmcrth.dmcr.go.th/manpro/detail/11698/
[26] United Nations Development Programme. 2012. Pred Nai Mangrove Conservation and Development Group, Thailand. Equator Initiative Case Study Series. New York, NY. https://www.equatorinitiative.org/wp-content/uploads/2017/05/case_1348164059.pdf

community registration is to promote participation and support coastal communities in the conservation, restoration, management, and sustainable use of marine and coastal resources. These communities receive training, resources, and support from the government to implement their conservation projects. Some examples of these government-supported initiatives include community-based fisheries management in which communities work together to establish sustainable fishing practices such as fishing season restrictions, imposing a strict no-fishing zone three miles within the shore, and permitting the use of traditional equipment only. In addition to government-recognized communities, there are informal networks of individuals and groups who are passionate about mangrove conservation. These networks are often initiated and led by NGOs and volunteers.

Recommendations

The dynamics of mangrove conservation within Thailand are complex. Coupling that with the need to achieve sustainable development goals and national climate objectives has made the introduction of carbon financing an added convolution.

Working alongside and collaborating closely with local communities is essential for both the immediate and long-term success and sustainability of mangrove ecosystems. K4D, alongside its network and community partners, is leading and developing effective strategies and model projects that drive meaningful and local impact. While significant progress has been made with the involvement of multiple actors, growing challenges and pressures require further attention. To ensure that solutions are fully realized, continued support and investment are critical. The following recommendations are for consideration in future programming:

I. Land Tenure rights: The lack of secure land tenure rights and formal recognition undermines the communities' efforts to sustain livelihoods and strengthen their stewardship roles. This marginalisation limits their ability to access and participate equitably in the CCS. Therefore, it is crucial to establish mechanisms that grant communities clear rights to access, manage, and benefit from natural resources, ensuring their active and equitable participation in mangrove conservation and CCS.

Recommendations to NGOs, CSOs and Communities:

- **Strengthen collaboration:** Leveraging legal frameworks to secure community land rights, promote inclusive governance, and ensure equitable resource distribution in mangrove management.

Recommendation to the company and government agencies:

- **Critical leadership:** Both companies and state agencies play a critical leadership role in addressing the inequities at hand. It is essential to assess whether agreements with local communities foster truly co-beneficial partnerships, as this is key to ensuring long-term sustainability and strengthening relationships. A balanced and genuine partnership approach is

necessary. Communities serve as the long-term stewards of these ecosystems, contributing invaluable restorative work, traditional knowledge, and acting as local ambassadors for mangrove conservation.

II. Free Prior and Informed Consent (FPIC): Consultation meetings are crucial to ensuring that community members understand the program's implications, that they have access to all relevant information, and can make informed decisions regarding their consent. Upholding the FPIC principles from the outset are essential to addressing early disagreements, minimising long-term disputes, and ensuring alignment with ethical resource management principles.

Recommendations for company and government agencies:

- **Public disclosure, transparency, and accountability:** The full and public disclosure of all initial projects should be disclosed by the State and corporations investing in Carbon Credit Schemes (CCS). Addressing knowledge and communication gaps is essential to ensure transparency, mutual understanding, and informed participation. Providing culturally appropriate information, such as infographics, enhances accessibility and empowers communities to engage effectively in CCS discussions and decision-making.
- **Community consultation workshops:** Conduct regular community consultation workshops to discuss project plans, share information, and gather feedback. These workshops should be conducted in a participatory manner, using culturally appropriate methods.
- **Community information centres:** Establish community information centres where local residents can access information about CCS projects, carbon markets, and their rights and responsibilities.
- **Community communication plans:** Develop and implement community communication plans that outline clear channels for information sharing, feedback mechanisms, and grievance redress procedures.
- **Language Access for Community Engagement**: To guarantee that all community members can access information and fully participate in project-related decision-making. All community members can access project information through user friendly document formats (infographics, videos and interpreted meetings consultations. Qualified facilitation, familiarity with local dialects and cultural sensitives are needed to ensure language access.
- **Use of local media:** Utilise local media channels, such as community radio, newsletters, and social media platforms, to disseminate information and engage with the community.

Recommendations for Civil Society:

- **Facilitate stakeholder engagements:** Civil society actors such as K4D and the extended mangrove networks across southern Thailand have a pivotal role to play in hosting neural and safe spaces for communities to express their concerns as well as host open dialogue forums between stakeholders to ensure effective and transparent communications are facilitated.

- **Hold corporations and governments accountable:** NGOs and community networks can act as a watchdog that functions to ensure that corporations and governments are upholding their requirements to not only comply with local regulations but ensure FPIC is respected and hold them accountable should redress of violations be required.

III. Understand the power dynamics: The internal dynamics within the community vary across different aspects. Therefore, an analysis of local power structures should be conducted at the initial stage to gain a comprehensive understanding of the communities' socio-political contexts and to pre-emptively deter conflicts from the start of the project. It is essential to establish mechanisms that intentionally ensure the inclusion of those traditionally excluded from decision-making, such as women, youth, widows, ethnic and religious minorities, elders, and other marginalized groups, so they can participate fully.

Recommendations to government agencies:

- **Conduct Power Dynamics and Gender Assessment:** The analysis should explore the interconnection between gender roles and power dynamics that shape access to resources, opportunities, and influence over conservation efforts. The study should identify gender-specific needs and barriers faced by women in participating in mangrove conservation and propose solutions to address these issues. Engagement strategies should be developed based on the findings from the assessment.
- **Gender-Responsive Mechanisms:** Develop specific strategies to track and measure the impact of conservation efforts, including monitoring women's participation, access to resources, and leadership roles, as well as assessing changes in women's social and economic status. Additionally, develop programs that enable women to economically benefit from conservation activities, ensuring their active involvement and equitable participation in conservation outcomes.
- **Ethics-based Benefit-sharing in the Initiative:** The agency should adhere to benefit-sharing in the initiative that is ethical, transparent, and inclusive, providing fair opportunities for community members, especially women and marginalized groups, to have fair access to benefit from conservation activities. Ensuring that local knowledge, needs, and priorities are reflected, and women are central in designing and managing benefit-sharing schemes.

IV. Gender equality and inclusivity: Women should be seen as vital contributors to information sharing and decision-making. Their active involvement not only enhances inclusivity but also strengthens community resilience and the effectiveness of mangrove forests and resource management efforts. Additionally, livelihood groups have shown the potential for women to shift power dynamics through capacity-building initiatives, fostering stronger unity and collective voices.

Recommendations to NGOs and CSOs:

- **Empowerment and Leadership in Resource Governance:** Establish leadership training programs for women to equip them with the skills and confidence needed to actively contribute to discussions and decision-making processes in resource governance focusing on team building, public speaking, feminist participatory action research (FPAR), negotiation, campaign, and policy advocacy.
- **Women's leadership training:** Organise leadership training programs specifically for women to enhance their advocacy skills focusing on the utilization of digital tools such as GIS mapping and environmental monitoring tools. As well as provide Feminist Participatory Action Research (FPAR) that supports women-led research to address systemic inequalities and promotes gender equality and social change.
- **Knowledge Exchange and Climate Change Resilience:** Facilitate networking among women's organizations and different communities engaged in mangrove conservation, as well as knowledge sharing on natural resource governance and climate change adaptation and mitigation practices.
- **Supporting livelihood and economic initiative:** Provide small grants to women in conservation for income-generation activities, such as mangrove honey production, community-based aquaculture, and eco-friendly and homemade products that meet market demands to balance their livelihood and conservation activities.

Recommendation to the community:

- **Supporting their efforts in system change:** Develop gender quotas policy in natural resource management committees to ensure women's active representation and participation in the decision-making process. Establish a platform or safe place to exchange information and amplify women's voices. Initiate FPAR research that supports strategic, evidence-based advocacy to claim their rights, shift power dynamics, promote gender equality, and challenge structural change through collaboration and collective action.

Recommendation to the company and government agencies:

- **Inclusion and meaningful participation:** Establish mandatory gender quotas requiring a minimum of 40-50% women's participation in all community engagement processes including monitoring and complaint mechanisms. Organize consultation and engagement meetings with flexible schedules and safe spaces without social, cultural, economic, and language barriers.

Annex I: List of the Allocation of Area for the Mangrove Forestation Project for Carbon Credit Benefits (B.E.2565) (2022)

Source: https://projects.dmcr.go.th/miniprojects/192/news/346/detail/49795

Seventeen Corporations initially applied to the Department of Marine and Coastal Resources (DMCR) to engage in the CCS, fourteen approved firms were confirmed.

No.	Name of Corporations
1	PTT Global Chemical Public Company Limited
2	Visut Consultants Company Limited
3	Siam TC Technology Company Limited
4	PTT Exploration and Production Public Company Limited
5	SCG Chemicals Public Company Limited
6	Thai Oil Public Company Limited
7	BCPG Public Company Limited
8	Products and Construction Materials Company Limited
9	Ratch Group Public Company Limited
10	World View Climate Foundation
11	Thai Union Group Public Company Limited
12	Dow Thailand Group
13	Regal Jewellery Manufacturer Company Limited
14	International Society for Mangrove Ecosystems (ISME)

Annex II: List of Registered “Green Carbon Mangrove Forests” by Province.

Source: https://thecitizen.plus/node/87673

Krabi Province

1. Ban Klong Yang Community, Moo 2, Klong Yang Sub-district, Koh Lanta District, area: 2,229-3-74 Rai
2. Ban Khok Yung Community, Moo 3, Klong Yang Sub-district, Koh Lanta District, area: 3,110-2-07 Rai
3. Ban Nai Nang Community, Moo 3, Khao Khram Sub-district, Mueang Krabi District, area: 771-0-87 Rai
4. Ban Tha Thonglang Community, Moo 6, Khao Thong Sub-district, Mueang Krabi District, area: 1,141-3-94 Rai
5. Ban Khao Lom Community, Moo 1, Ao Luek District, area: 568-3-90 Rai
6. Ban Nam Ron Community, Moo 3,8,9, Huai Nam Khao Sub-district, Klong Thom District, area: 894-0-15 Rai
7. Ban Tha Pradu Community, Moo 4, Huai Nam Khao Sub-district, Klong Thom District, area: 912-1-48 Rai
8. Ban Klong Yire Community, Moo 13, Klong Phon Sub-district, Klong Thom District, area: 660-0-00 Rai
9. Ban Musa, Moo 5, Klong Phon Sub-district, Klong Thom District, area: 600-0-00 Rai
10. Ban Tham Suea, Moo 5, Ao Luek Tai Sub-district, Ao Luek District, area: 2,001-0-75 Rai
11. Ban Klong Suk, Moo 6, Ao Luek Tai Sub-district, Ao Luek District, area: 2,103-1-54 Rai
12. Ban Khao Fak, Moo 1, Klong Yang Sub-district, Koh Lanta District, area: 1,000-0-11 Rai
13. Ban Thung Krok, Moo 11, Klong Phon Sub-district, Klong Thom District, area: 2,400-0-00 Rai
14. Ban Thai, Moo 4, Klong Yang Sub-district, Koh Lanta District, area: 1,300-0-00 Rai
15. Ban Tha Kuan, Moo 6, Klong Yang Sub-district, Koh Lanta District, area: 1,100-0-11 Rai
16. Tambon Taling Chan, Moo 1,2,3,5, Taling Chan Sub-district, Nuea Klong District, area: 1,000-0-00 Rai
17. Ban Thung Prasan, Moo 2, Pakasai Sub-district, Nuea Klong District, area: 770-0-00 Rai
18. Ban Laem Kruat, Moo 8, Klong Kanan Sub-district, Nuea Klong District, area: 1,000-0-00 Rai
19. Ban Thung Yo, Moo 12, Klong Phon Sub-district, Klong Thom District, area: 1,060-0-00 Rai

20. Ban Klong Khrai, Moo 10, , Klong Phon Sub-district, Klong Thom District, area: 1,680-0-00 Rai
21. Ban Khuan O, Moo 5, Ao Luek Noi Sub-district, Ao Luek District, area: 1,010-0-00 Rai
22. Ban Bagan, Moo 2, Ao Luek Noi Sub-district, Ao Luek District, area: 1,118-0-00 Rai
23. Ban Khao Thong, Moo 1,4,5, Khao Thong Sub-district, Mueang Krabi District, area: 1,013-0-00 Rai
24. Ban Klong Prasong, Moo 1,2,3, Klong Prasong Sub-district, Mueang Krabi District, area: 2,761-0-00 Rai
25. Ban Wang Hin, Moo 6, Klong Thom Tai Sub-district, Klong Thom District, area: 3,069-0-00 Rai
26. Ban Tai, Moo 7, Klong Thom Tai Sub-district, Klong Thom District, area: 1,024-0-00 Rai
27. Ban Tha Ruea, Moo 7, Phela Sub-district, Klong Thom District, area: 1,073-0-00 Rai
28. Ban Thung Samet, Moo 2, Huai Nam Khao Sub-district, Klong Thom District, area: 3,054-0-00 Rai
29. Ban Khuan Tai, Moo 6, Huai Nam Khao Sub-district, Klong Thom District, area: 1,445-0-00 Rai
30. Ban Lang Sot, Moo 5, Klong Yang Sub-district, Koh Lanta District, area: 1,023-0-00 Rai
31. Ban Ton Thang, Moo 7, Klong Yang Sub-district, Koh Lanta District, area: 807-0-00 Rai
32. Ban Klong Ping, Moo 4, Klong Phon Sub-district, Klong Thom District, area: 1,050-0-00 Rai
33. Ban Klong Khrai Tai, Moo 14, Klong Phon Sub-district, Klong Thom District, area: 1,997-0-00 Rai
34. Ban Huai Phlu Nang, Moo 3, Sai Khao Sub-district, Klong Thom District, area: 2,930-0-00 Rai
35. Ban Thung Kha, Moo 5, Sai Khao Sub-district, Klong Thom District, area: 5,040-0-00 Rai
36. Ban Phru Phi, Moo 7, Sai Khao Sub-district, Klong Thom District, area: 1,197-0-00 Rai

Phang-nga Province

1. Ban Tha Sanuk Community, Moo 3, Marui Sub-district, Thap Put District, area: 1,191-3-60 Rai
2. Ban Koh Khiam Community, Moo 5, Bang Toei Sub-district, Mueang Phang-nga District, area: 1,056-1-79 Rai
3. Ban Klang Community, Moo 6, Bang Toei Sub-district, Mueang Phang-nga District, area: 3,436-4-87 Rai
4. Ban Bang Phat Community, Moo 8, Bang Toei Sub-district, Mueang Phang-nga District, area: 2,782-3-64 Rai

5. Ban Tai Community, Moo 9, Bang Toei Sub-district, Mueang Phang-nga District, area: 2,106-0-80 Rai
6. Ban Koh Mai Phai Community, Moo 3, Koh Panyee Sub-district, Mueang Phang-nga District, area: 1,690-2-07 Rai
7. Ban Thung Rak Community, Moo 6, Mae Nang Khao Sub-district, Khura Buri District, area: 4,614-1-30 Rai
8. Ban Bang Wa, Moo 9, Khura Sub-district, Khura Buri District, area: 2,494-2-66 Rai
9. Tambon Koh Yao Noi, Moo 1,2,3,4,5,6,7, Koh Yao Noi Sub-district, Koh Yao District, area: 1,339-0-41 Rai
10. Ban Tha Din Daeng, Moo 4, Lam Kaen Sub-district, Thai Mueang District, area: 2,540-2-73 Rai
11. Ban Tha Chut, Moo 3, Bang Nai Si Sub-district, Takua Pa District, area: 3,360-1-00 Rai
12. Ban Pak Koh and Ban Thung Tuek, Moo 3,4, Koh Kho Khao Sub-district, Takua Pa District, area: 2,817-0-15 Rai
13. Ban Bang Yai, Moo 4, Bang Nai Si Sub-district, Takua Pa District, area: 3,482-3-25 Rai
14. Ban Bang Niang, Moo 5, Koh Kho Khao Sub-district, Takua Pa District, area: 2,734-1-52 Rai
15. Ban Mueang Mai, Moo 1, Koh Kho Khao Sub-district, Takua Pa District, area: 3,426-1-88 Rai
16. Ban Bang Nai Sang, Moo 5, Bang Nai Si Sub-district, Takua Pa District, area: 4,762-0-84 Rai
17. Ban Bang Nai Si, Moo 6, Bang Nai Si Sub-district, Takua Pa District, area: 5,498-0-25 Rai
18. Ban Thung Noi, Moo 1, Bang Muang Sub-district, Takua Pa District, area: 1,556-0-41 Rai
19. Ban Nok Na, Moo 2, Koh Kho Khao Sub-district, Takua Pa District, area: 1,564-3-36 Rai
20. Ban Hin Lat, Moo 3, Khura Sub-district, Khura Buri District, area: 2,863-3-36 Rai
21. Ban Bang Dad, Moo 7, Mae Nang Khao Sub-district, Khura Buri District, area: 3,121-2-21 Rai
22. Ban Ya Mi, Moo 3, Koh Yao Yai Sub-district, Koh Yao District, area: 1,551-2-79 Rai
23. Ban Khong Sonram, Moo 7, Bang Wan Sub-district, Khura Buri District, area: 1,432-0-12 Rai

Satun Province

1. Ban Panchu Ramluek, Phiman Sub-district, Mueang Satun District, area: 480-0-00 Rai
2. Ban Khok Phayom, Moo 4, Klong Khut Sub-district, Mueang Satun District, area: 1,000-0-00 Rai
3. Ban Hua Thang, Moo 3, Klong Khut Sub-district, Mueang Satun District, area: 1,000-0-00 Rai

4. Ban Tha Hin, Moo 6, Khuan Khan Sub-district, Mueang Satun District, area: 700-0-00 Rai
5. Ban Wang Dong, Moo 4, Na Thon Sub-district, Thung Wa District, area: 1,658-0-00 Rai
6. Ban Tha Phayom, Moo 7, Pak Nam Sub-district, La-ngu District, area: 1,030-1-36 Rai
7. Ban Koh Nok (west side), Moo 3, Klong Khut Sub-district, Mueang Satun District, area: 893-0-00 Rai
8. Ban Koh Nok (poker chip venus clam conservation), Moo 3 Klong Khut Sub-district, Mueang Satun District, area: 615-0-00 Rai
9. Ban Klong Nam Wian, Moo 3, Klong Khut Sub-district, Mueang Satun District, area: 515-0-00 Rai
10. Ban Tanyong Kaboi, Moo 2, Puyu Sub-district, Mueang Satun District, area: 819-0-00 Rai
11. Ban Puyu, Moo 3, Puyu Sub-district, Mueang Satun District, area: 623-0-00 Rai
12. Municipal 4, Phiman Sub-district, Mueang Satun District, area: 500-3-92 Rai
13. Ban Khao Chin, Moo 1, Klong Khut Sub-district, Mueang Satun District, area: 565-0-00 Rai
14. Tha Nai Nao, Phiman Sub-district, Mueang Satun District, 733-0-00 Rai
15. Ban Kalan Batu, Moo 3, Tam Malang Sub-district, Mueang Satun District, area: 656-0-00 Rai
16. Ban Tam Malang Nuea, Moo 2, Tam Malang Sub-district, Mueang Satun District, area: 625-0-00 Rai
17. Ban Rai Thon, Moo 3, Tha Ruea Sub-district, Tha Phae District, area: 900-0-00 Rai

Trang Province

1. Ban Phru Chud, Moo 2, Bo Hin Sub-district, Sikao District, area: 1,508-3-26 Rai
2. Ban Tase, Moo 4, Tase Sub-district, Hat Samran District, area: 662-0-00 Rai
3. Tambon Suso, Moo 1,4, Suso Sub-district, Palian District, area: 465-0-00 Rai
4. Ban Nong Samet, Moo 2,3, Klong Chi Lom Sub-district, Kantang District, area: 1,630-0-00 Rai
5. Ban Hua Hin, Moo 6, Bo Hin Sub-district, Sikao District, area: 501-1-86 Rai
6. Ban Pak Klong, Moo 9, Bo Hin Sub-district, Sikao District, area: 1,004-2-44 Rai
7. Ban Na Lae, Moo 7, Mai Fat Sub-district, Sikao District, area: 702-3-42 Rai
8. Ban Khuan Tung Ku, Moo 3, Bang Sak Sub-district, Sikao District, area: 865-0-00 Rai

Ranong Province

1. Ban Bang Rin Community, Moo 1,2,6, Bang Rin Sub-district, Mueang Ranong District, area: 1,881-0-24
2. Ban Tha Chang-Ban Lang Community, Moo 3,4, Ngao Sub-district, Mueang Ranong District, area: 863-3-52 Rai

3. Ban Koh Lao, Moo 6, Pak Nam Sub-district, Mueang Ranong District, area: 4,035-2-94 Rai
4. Ban Sai Daeng, Moo 1,4, Sai Daeng Sub-district, Mueang Ranong District, area: 2,230-3-04 Rai
5. Ban Bang Man, Moo 1, Na Kha Sub-district, Suk Samran District, area: 2,377-3-96 Rai
6. Ban Dan, Moo 1,3,8, Kapoe Sub-district, Kapoe District, area: 1,520-1-07 Rai

Surat Thani Province

1. Ban Klong Rang, Moo 2, Lilet Sub-district, Phunphin District, Surat Thani, area: 1,500-0-00 Rai
2. Ban Sai Ngam, Moo 7, Lamet Sub-district, Chaiya District, area: 1,500-0-00 Rai
3. Ban Than Nam Ron, Moo 1, Khao Than Sub-district, Mueang Surat Thani, area: 1,500-0-00 Rai
4. Ban Tha Pikun, Moo 4, Tha Chang Sub-district, Tha Chang District, area: 1,000-0-00 Rai

Chumphon Province

1. Ban Nam Lod, Moo 12, Bang Nam Chuet Sub-district, Lang Suan District, area: 500-0-00 Rai
2. Ban Khuan Din, Moo 6, Tako Sub-district, Thung Tako District, area: 500-0-00 Rai

Phuket Province

1. Ban Bang Rong, Moo 3, Pa Khlok Sub-district, Thalang District, area: 728-0-00 Rai

Nakhon Si Thammarat Province

1. Bao Ao Thong Kham Tha Sala, Moo 5,6,7,14, Tha Sala Sub-district, Tha Sala District, area: 2,300-0-00 Rai

Trat Province

1. Ban Tha Had/Ban Tha Sao, Moo 2,10, Saen Tung Sub-district, Khao Saming District, area: 2,160-0-00 Rai