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# Transitioning to Net-Zero: The Development of a Waterway-Centric Community Economy in Thailand

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**Abstract:** This study explores the practices and strategies that drive sustainability in a local community economy in Thailand. The researchers used a mixed-methods approach to examine adaptive measures local communities are implementing to promote more sustainable and environmentally-friendly economic models. Findings indicated a growing commitment towards sustainability, evidenced by initiatives focused on waste management, local sourcing of materials, and greenhouse gas mitigation. The researchers developed and tested a model to integrate community engagement with eco-friendly innovations in waterway activities, such as the adoption of electric boats, the use of renewable resources for energy in local attractions and integration of VR and AR. The implementation of these practices led to measurable reductions in carbon footprints across the studied communities, showcasing practical steps towards achieving net-zero emissions. It was clear that governmental agencies and local organizations play a significant role in fostering environmental responsibility among all stakeholders. It is hoped that this study provides insights for the sustainable development of regional waterway economies.

**Keywords:** *Creative Community Economy, Net-Zero, Local Development, Waterways*

## Introduction

The COVID-19 pandemic had a profound impact on the global economy, especially in Thailand. According to the World Tourism Organization (UNWTO), the crisis led to a considerable decline in the Gross Domestic Product (GDP) worldwide; the decline in Thailand was estimated at as much as 6% (Ahmad and Saqib 2022; Laiphrakpam et al. 2022). Prior to the pandemic, Thailand's economy was thriving. In 2019, the country welcomed nearly 40 million international tourists, a 4.24% increase from the previous year, and generated tourism income of 1.93 trillion baht, a rise of 3.05% compared to the preceding year (Klinsrisuk and Pechdin 2022). In the domestic sector, Thailand saw 166.84 million local tourists, contributing to an income of 1.08 trillion baht (Katpiyarat 2022). However, due to the pandemic, international arrivals plummeted, and domestic tourism experienced a similar fate (Hwande and Phumchusri 2020). The depreciation of the tourism sector had a substantial influence on the national economy, yet despite the

significant adverse effects of the COVID-19 crisis, there was a dramatic recovery of natural resources throughout the country (Israngkura 2022; Pongsakornrungrasit et al. 2022; Virakul et al. 2022). Natural resources are vital to Thailand's post-pandemic revival.

Thailand's diverse and unique resources, characterized by varying geographical conditions and cultural traditions, have positioned the country as a leading destination in Asia. The numerous streams and canals, which historically have been integral to Thai people's livelihood, have a particularly large potential to be leveraged for community-based economic activities (Prakruiwan 2016; Vajirakachorn 2011). The current government policy regarding local economic growth emphasizes conservation and restoration alongside tourism development. This policy focuses on showcasing the historical value, culture, tradition, and lifestyle of river-dependent communities through various activities (Yodsurang et al. 2022). A key approach is to implement community management for conservation, rehabilitation, and development, especially in the environmental conservation dimension.

Given the significant role of community activities on local waterways, it is crucial to undertake research studies to expand local economies while aligning with the principles of net-zero carbon emissions. Accordingly, this study asks: How can community-based tourism in Thai waterway communities be developed and managed to reduce greenhouse gas emissions while sustaining local livelihoods, cultural identity, and environmental conservation? In this study, the term net-zero is used to denote a pathway toward achieving net-zero emissions, rather than an immediately verified state of full carbon neutrality. Specifically, it refers to the systematic reduction of greenhouse gas emissions through low-carbon and renewable practices, combined with locally appropriate compensatory measures (such as tree planting), progressing toward a balance between emissions produced and emissions removed. While the analysis incorporates elements of low-carbon development and carbon mitigation, the emphasis is on transition-oriented net-zero governance at the community scale, rather than full lifecycle carbon neutrality. This definition is applied consistently throughout the manuscript to frame net-zero as an achievable, incremental objective guiding sustainable tourism transformation in post-pandemic Thai waterway communities. Framed this way, the research guides development towards balance and sustainability, ultimately leading to a healthier and more resilient community economies in a post-pandemic world.

## **Literature Review**

This literature review is structured in three interconnected stages to establish the conceptual and policy foundations of the study. It begins by outlining the core concepts of creative tourism and its role in sustainable community development, emphasizing participation, cultural value, and experiential learning. The review then progresses to discussions of

creative industries, the creative economy, and creative community-based tourism, situating creative tourism within broader frameworks of sustainable economic development and highlighting the managerial and governance approaches required to operationalize these concepts at the local level. Finally, the review contextualizes these theoretical and managerial perspectives within Thailand's Bio-Circular-Green (BCG) Economy policy framework, which provides a national strategic lens for low-carbon and transition-oriented net-zero tourism development. This progression—from conceptual foundations, to management approaches, to policy alignment—clarifies the rationale for examining Thai waterway communities as sites where creative tourism and net-zero pathways can be practically integrated.

Creative tourism is widely recognized for its significant contribution towards fostering sustainable community development. As outlined by Richards and Raymond (2000), this approach allows tourists to tap into their creative potential through engaging activities and authentic local learning experiences. Duxbury and Richards (2019) suggest that creative tourism is characterized predominantly by small-scale experiences curated by creative entrepreneurs with the intent to stimulate creative productions. The concept is acknowledged by global organizations such as UNESCO, which in 2006, provided its own extensive definition of creative tourism, framing it as an expedition aimed at nurturing truly engaging experiences through participatory learning in the arts, heritage, or the unique attributes of a location, while fostering connections with local inhabitants (Wurzburger et al. 2009).

Creative tourism plays a large role in community development, which Espinoza (2011), Duxbury et al. (2020), and Dias, González-Rodríguez and Patuleia (2021) have all conceptualized as a development mechanism that accentuates community participation, local cultural appreciation, and environmental stewardship. The strategy leads to the development of networks and partnerships that bring together local people, government institutions, NGOs, and private entrepreneurs to capitalize on tourism as a stimulant for the economic and social development of local communities. Additionally, Raymond (2007) proposed that creative tourism enables tourists to explore their own creative capacity. This is further echoed by Duxbury and Richards (2019), who emphasize the opportunity for mutual knowledge exchange and creative potential development between tourists and locals. Therefore, creative tourism functions as an essential tool for sustainable tourism development, enhancing community appreciation, and fortifying the potential for future sustainability.

### Creativity and Sustainable Economic Development

The notion of creative tourism stems from the evolution of three interrelated themes: creative industries, creative cities, and the creative economy, each of which arose as an answer to global economic transitions (Richards 2020). Initially, the term creative industries

gained prominence after Australia's 1994 Creative Nation Report, steering the country's policy towards developing a cultural industry aligning with Commonwealth nations' focus on cultural identity as an economic development cornerstone (Rowe et al. 2016). These creative industries, defined as sectors that produce goods and services through creativity, intellectual capital, and knowledge-based activities, have become significant drivers of global economic and trade growth, generating both tangible products and intellectual property (Wisutthilak 2015). The concepts of creative cities and the creative economy subsequently emerged. The former was initiated by UNESCO's 2004 Creative Cities Network project following the 2001 Universal Declaration of Cultural Diversity, aiming to nurture creative industry development and spawn new tourism opportunities (Arcos-Pumarola et al. 2023). The project's focal point was fostering a connection between visitors and locals through firsthand experiences of tangible and intangible cultural elements, leading to the identification of seven creative city categories (Wisutthilak 2015). The creative economy was introduced slightly earlier in 2001 and further elaborated by subsequent creative economy reports by the United Nations Conference on Trade and Development (UNCTAD) (Howkins 2001; Pratt 2021). The creative economy encompasses economic, cultural, social, intellectual property, and tourism dimensions, all anchored by creative industries, and, within Thailand, the aim is to transition from a value-added economy to a value creation economy (Wisutthilak 2015; Wattanacharoensil and Schuckert 2016). Consequently, creative tourism, a vital constituent of Thai creative industries and the creative economy, bolsters socio-cultural diversity and economic development, harnessing the creative cities network to cultivate social and cultural pride, and facilitating sustainable economic growth and societal resilience (Fakfare et al. 2022; Richards 2021; Somnuxpong 2020).

In the 2008 Creative Economy Report, (UNCTAD) expanded on the definitions of creative industry and creative economy, encompassing a broad range of activities, from artistic endeavors to economic operations producing symbolic products linked to intellectual property (De Beukelaer 2014). Laddawan Thongbai (2018) later detailed five forms of creative tourism: Cultural Heritage, Arts, Lifestyles, Media, and Creative Works. These encompass various aspects of cultural and social life, visual and performing arts, everyday livelihoods of local communities, large-scale communication, and creative product or service design. However, a critical counterpoint arises when considering the comprehensive participation in tourism management across cultural levels, as the higher the cultural level, the lesser the participation.

Creative tourism presents a distinct departure from conventional tourism models through its emphasis on skill enhancement, experience-based products, the valorization of intangible cultural resources, engagement with everyday culture, and active community participation (Richards 2013). While sustainable tourism broadly promotes environmental responsibility, creative tourism offers a more operational framework for carbon reduction

because it foregrounds community agency, localized resource use, and low-intensity, place-based experiences. These characteristics enable tourism activities to be designed around short supply chains, renewable or locally available materials, reduced transport dependence, and participatory practices that embed environmental responsibility within everyday community life. In waterway contexts, such features create opportunities to substitute high-emission activities with community-led innovations—such as non-motorized or electric transport, locally sourced food and materials, waste-to-resource practices, and digitally mediated experiences—thereby directly contributing to greenhouse gas mitigation. Moreover, creative tourism's focus on interaction between hosts and visitors across multiple cultural levels—heritage, popular culture, and everyday practices—supports behavioral change and environmental awareness among tourists, extending sustainability impacts beyond the immediate visit. Although critics have questioned the commercial viability or environmental rigor of creative tourism, this study argues that its participatory and adaptive nature makes it especially suitable as a transition pathway toward net-zero tourism at the community scale. Importantly, existing literature has rarely examined how creative tourism principles can be systematically applied to generate measurable economic, environmental, and social sustainability outcomes. Addressing this gap, the present study investigates how the core characteristics of creative tourism are operationalized within Thai waterway communities to achieve quantifiable reductions in carbon emissions, while simultaneously strengthening local economies, cultural identity, and social resilience.

### Management Guidelines for Sustainable Local Development

Building on the creative economy and creative tourism frameworks discussed above, management approaches for sustainable local development translate cultural creativity, community participation, and value creation into practical governance mechanisms that organize tourism activities, distribute benefits equitably, and align local innovation with long-term social and environmental sustainability. The rise of creative tourism, driven by tourists' evolving preferences towards active participation in local cultures and lifestyles, has necessitated innovative approaches to tourism management. Lekhakula et al. (2021) proposed a five-step process for managing creative tourism that focuses on identification, value addition, differentiation, innovation, and community benefit. Each step highlights the uniqueness of each community, emphasizing a sense of authenticity and engagement among tourists. However, there's a challenge in balancing the promotion of unique cultural experiences with ensuring fair distribution of economic returns, which necessitates careful management. Instead, Maneerat Sukkasem (2018) recommends an integrated approach focusing on host, visitor, tourism mechanism, and service quality dimensions to enhance the overall experience and forge deeper connections with the local community.

Preserving and promoting the rich heritage of Thai waterway communities necessitates careful planning and development, emphasizing cultural heritage conservation principles.

This includes zoning areas appropriately, developing necessary infrastructure, facilities, and services in line with urban development and archaeological conservation principles, and the ability to support tourism across physical, economic, social, and environmental aspects. The roles of public, private, and civic sectors are pivotal in this context, emphasizing systematic management of commercial tourism. However, the balance between economic development and preservation of cultural heritage requires delicate handling, and there may be potential conflict between various stakeholders' interests, especially when the environment becomes a factor in the discussion.

### The Bio-Circular-Green Economy and Thai Waterways

Taken together, the conceptual foundations of creative tourism and the associated management approaches for sustainable local development point to the need for an enabling policy framework that can institutionalize community participation, support low-carbon innovation, and align local tourism practices with national sustainability goals—conditions that are explicitly addressed through Thailand's Bio-Circular-Green (BCG) Economy Model. Creative community-based tourism (C-CBT), as a blend of community-based tourism (CBT) and creative tourism principles, promotes sustainable growth and income distribution to local communities, preserving their natural resources, traditions, and cultures. It is currently the go-to approach in tourism studies of Southeast Asia, with scholars trying to balance social capital and environmental sustainability by working with local people to innovate strategies for continuous and holistically beneficial tourism management (Arkarapoti Wong and Chindapol 2023; Promkan, Pariyattimedhi and Girdwichai 2019; Suttipisan 2014; Tinakhat and Nontakatragoon 2021). Tourist perceptions, or the image of tourism, play a crucial role in its success, emphasizing the importance of promotional activities by tourism organizations (Kaewnuch 2019). This is especially true in Thai waterway communities, where the growth of tourism focusing on local history, archaeology, art, culture, lifestyles and environmental conservation illustrates the increasing demand for systematic community participation in tourism development (Ramarn et al. 2018). While the concept prioritizes local community benefits and sustainability, its successful implementation requires robust collaborative frameworks involving all stakeholders. The continued function of these networks depends heavily on the preservation of the local ecosystem, and consequently any development initiatives must consider environmental protection as paramount to their success. Herein lies the research gap: few studies examine how creative tourism approaches can simultaneously achieve economic, cultural, and carbon-reduction outcomes in waterway contexts.

The Bio-Circular-Green Economy (BCG) Model is one such approach that has become instrumental in driving the transition towards net-zero or carbon-neutral tourism in Thailand (Sirilertworakul 2021). This was created by the Thai Government as a strategy for

national development and economic recovery after the Covid pandemic (The Secretariat of the Cabinet 2021). By focusing on bioeconomy, circular economy, and green economy, it creates avenues for turning biodiversity and culture into competitive advantages, a strategy successfully implemented in Thai industry (Fakfare et al. 2022). The model promotes equitable income distribution, community empowerment, and environmental stewardship. This theoretical framework aligns with the shift towards low-carbon tourism, and offers huge potential for sustainable tourism development. The carbon footprint of tourism is substantial and complex, encompassing travel, accommodation services, construction of tourist facilities, food and beverage production, and production of goods for tourist consumption. Notably, travel accounts for almost half of the sector's carbon emissions, with air travel contributing the majority. However, in local Thai waterways, environmental sustainability is becoming an increasing concern in tourism research (Ichikawa and Denpaiboon 2017). Considering these dimensions of the carbon footprint - human, product, and organizational - is essential to devise effective mitigation strategies. Several countries, such as Brazil, Peru, Mozambique, and now Thailand, have taken initiatives to promote carbon-neutral tourism (Legrand et al. 2012). These international cases demonstrate the importance of integrating community participation, natural resource stewardship, and policy support in reducing tourism-related emissions, while also highlighting contextual differences in governance capacity, market scale, and infrastructural readiness when compared with Thailand. In contrast to these cases, Thailand's BCG Model provides a nationally coordinated policy framework that enables localized adaptation of net-zero strategies within community-based tourism systems, particularly in waterway contexts. In Thailand, these efforts are concentrated on fostering net-zero carbon approaches in the tourism industry and increasing public awareness about climate change (Fakfare and Wattanacharoensil 2023).

Tourism management theories underline the significance of a network, where individuals or organizations voluntarily share information and participate in joint activities, maintaining their autonomy. Creative community-based tourism network management is potentially an effective approach in sustaining local traditions and cultures, generating income from tourism, and facilitating knowledge sharing and understanding within and between communities, all the while creating awareness of sustainable practices and preserving the local environment (Pongsakornrunsilp et al. 2022). The research suggests the growing inclination towards incorporating carbon management strategies and sustainable practices in tourism, underlining the importance of transitioning towards low-carbon and carbon-neutral tourism.

## **Research Methodology**

This study of sustainable tourism management employed an integrative multi-step research methodology, combining both qualitative and quantitative techniques to evaluate the

potential of community-based, net-zero carbon tourism. The researchers first conducted an exhaustive literature review to identify key concepts in the field, and used these findings to design tools for primary data collection in the purposively sampled communities. These communities were specifically chosen for their links to waterway tourism resources and distinct river tourism identity, according to the following criteria:

- The community possesses a tourism resource base connected to a waterway.
- The community has been organizing multiple groups for community-based tourism management for over three years.
- The community maintains a unique identity in waterway tourism, which can be expanded to encompass creative tourism.
- The community is strategically situated in a tourism area that focuses on promoting water-based tourism.
- The community boasts experience in fostering tourism development, utilizing research mechanisms for support.
- The community holds the potential to advocate for net-zero carbon tourism marketing.
- The community displays readiness and interest in contributing to the evolution of net-zero carbon tourism.

Consequently, following digital consultations with relevant partner agency representatives, four riverside communities in Thailand - Maha Sawat Canal, Damnoen Saduak Canal, Khung Bang Krachao, and Roi Sai Canal - were selected as the research area. Khung Bang Krachao replaced the initial choice of Pathum Thani Canal due to the latter's lack of community-based tourism management.

Data was collected during field visits to these areas from March-May 2022, which aimed at assessing the potential for net-zero carbon community-based tourism. Simultaneously, data was gathered to compute the Carbon Footprint of activities in line with net-zero carbon tourism guidelines. Insights into the evolution of tourism activities conducive to a net-zero carbon approach were garnered through comprehensive interviews with academic scholars and professionals in the field. Furthermore, collaborative discussions were held with representatives from government bodies, private sector entities, and local community members to consider tourism network management and the potential for community-based tourism.

To foster community involvement, workshops were conducted with representatives from the areas, enabling co-development of tourism activities that are compatible with the net-zero carbon model. Following this, the newly formulated models were tested and evaluated for their alignment with the net-zero carbon approach, involving a diverse range of stakeholders, including researchers, community representatives, government bodies, and private sector participants. The implementation and monitoring phase was conducted following the co-design workshops, corresponding to one active tourism cycle in each

community, rather than multiple full annual seasons. Carbon footprints of these activities were computed, facilitating a comparative analysis between tourism activities before and after the adoption of the net-zero carbon approach. Monitoring was carried out at specific, structured intervals—during pilot activity implementation and immediately after completion—rather than through continuous long-term observation. Based on this data-driven model for net-zero carbon tourism activities, the researchers formulated guidelines for managing tourism networks following a net-zero carbon approach. While the monitoring duration was sufficient to capture immediate operational changes and emission reductions associated with redesigned activities, it did not fully encompass seasonal variations in tourism demand; consequently, the findings should be interpreted as indicative of transition-stage outcomes rather than long-term equilibrium effects.

The field study culminated in a summary forum, where research findings were presented to relevant network partners, fostering discussions on potential application to other areas. The study population comprised key tourism stakeholders involved in community-based tourism within four pilot Thai waterway communities, including community tourism leaders, government agencies, private sector tourism organizations, academics and experts, and tourists. The purposive sample included 80 community representatives (20 from each pilot community), no fewer than 15 government officials, no fewer than 15 private sector tourism representatives, and at least 5 tourism academics or experts, yielding a total sample of a minimum of 115 participants. Data collection was conducted in multiple phases aligned with community tourism activity cycles, including preliminary field visits, participatory workshops for co-designing net-zero tourism activities, and post-implementation evaluation. Qualitative data were gathered through semi-structured interviews, focus groups, and workshops, while quantitative data were collected to calculate greenhouse gas emissions associated with tourism activities. Monitoring occurred at defined intervals during pilot implementation rather than continuous long-term observation, providing reliable before-and-after comparisons while acknowledging that seasonal variation was only partially captured. Semi-structured interview forms and questionnaires were used for recording community member responses, potential assessment, carbon emissions quantification, and to facilitate subsequent discussions in small group meetings and workshops. All data was validated using methodological triangulation to determine whether data collected via different methods yielded consistent results. The validated findings were then analyzed by a dual process of analytical induction and typological analysis. The findings are presented below as a descriptive analysis.

## **Results**

### Net-Zero Potential of the Four Selected Communities

The first objective of the study was to examine both the current alignment of waterway communities with net-zero tourism principles and their potential capacity to evolve into hubs for net-zero carbon tourism in Thailand. After reviewing academic literature and consulting with representatives from related sectors and stakeholders in the four selected communities, the research team concluded the potential of each community to be a hub for net-zero carbon tourism (Table 1).

Table 1. The potential of net zero carbon emissions in the four research communities

| Community   | Potential  | Unique Identity  | Environmental Management   | Market Connection to Net Zero Carbon Emissions   |
|---|--|--|--|--|
| Damnoen Saduak Canal Community, Ratchaburi Province | The community has notable historical and cultural attractions, such as the Damnoen Saduak Canal, King Rama V's historical route, and the Lao Tak Luk Floating Market.  | The community has a distinctive identity tied to the river, rich in history and culture, with floating markets that are emblematic of Thailand.                      | The community actively promotes natural resource and environmental conservation, with initiatives like converting traditional boats to electric ones powered by solar cells. | The community is keen on and prepared for establishing connections to net zero carbon tourism marketing, both with local and external tourism operators. |
| Maha Sawat Canal Community, Nakhon Pathom Province  | The community boasts cultural attractions and ways of life related to the Maha Sawat Canal. It links agricultural resources to tourism activities at locations like Na Bua Lung Jam, Ban Fak Khao, Sala Din Floating Market, and Baan Maha Sawadee Museum. | This community has a distinctive identity connected to the agricultural resources and culture along the river, showcasing these through creative tourism activities. | The community manages waste and maintains the environment of the Maha Sawat Canal with the assistance of local educational institutions and government agencies.             | The community seeks connections with tour operators both locally and externally to offer tourism activities that focus on reducing carbon emissions.     |

|  |   |   |   |  |
|--|---|---|---|--|
| <p>Khung Bang Krachao Community, Samut Prakan Province</p> | <p>The community is rich in natural attractions linked to the flow of the Chao Phraya River, with a variety of tourism activities accessible to the residents of Bangkok and other tourists.</p>                                  | <p>With an area resembling a pig's stomach when viewed from above, Khung Bang Krachao is considered a lung for the capital, with abundant natural resources that absorb carbon.</p> | <p>The community has organized groups to manage areas focusing on conservation and socio-economic and environmental development, supported by the Chaipattana Foundation project.</p> | <p>The community is prepared to promote the net zero carbon tourism market in conjunction with interested tourism business operators both within and outside the area.</p>             |
| <p>Roi Sai Canal Community, Surat Thani Province</p>       | <p>The community offers remarkable biodiversity, with tourism activities reflecting local culture and way of life, including visits to local fishing areas and conservation activities in mangrove, Chak, and Lamphu forests.</p> | <p>The community's unique identity is defined by the biodiversity and the many large and small canals that connect the area, which has led to it being called "Khlong Roi Sai".</p> | <p>The community drives the management of coastal resource conservation associated with Khlong Roi Sai, promoting sustainable development of tourism resources.</p>                   | <p>The community seeks to connect with tour operators, promoting tourism activities that reduce carbon emissions and appeal to quality tourists interested in eco-friendly travel.</p> |

### Suitable Activities for Creative Community-Based Waterway Economies

In collaboration with local stakeholders, the research team developed tourism activities for creative community-based waterway tourism in the four communities. The research team visited these communities to understand their unique attributes and help formulate activities aligning with greenhouse gas reduction strategies. Existing tourism activities were innovated upon to minimize greenhouse gas emissions as much as possible. The largest emissions category, travel, was particularly scrutinized. Vehicles used for tourism activities, mostly motorboats, were reimaged under the model of creative community-based tourism development towards net zero carbon. The model focused on the *Adjust - Reduce - Compensate* concept, which enabled the transformation of regular tourism activities into low-carbon community-based activities, leading to a model of a net-zero-emission tourism community (Table 2).

Table 2. Innovations to tourism activities in the four research communities

| Community                   | Adjust   | Reduce   | Compensate   |
|-----------------------------|--|--|--|
| <b>Damnoen Saduak Canal</b> | Activities involving cooking were modified, replacing LPG gas stoves with smokeless biomass stoves. Additionally, stainless steel stewing pots were replaced with ceramic alternatives, as they retain heat longer. Fuels like coconut shells, rice husks, and charcoal were utilized. | An innovative AR application was introduced for worshipping sacred objects using mobile phones. This application also measures users' greenhouse gas reduction at Chotikaram Temple and the Shrine of Lao Tak Luk Floating Market. | Community waste like coconut fibers was used to make pots, which tourists could participate in making. Tree planting activities were also introduced within the community, including the planting of young mangroves within the community forest where applicable. |
| <b>Maha Sawat Canal</b>     |  | An AR application was implemented for sacred object worship. The Canal also has activities making paper from weeds like water hyacinth, abundant in the canal. This paper is then utilized in community art techniques.            |  |
| <b>Roi Sai Canal</b>        | Cooking and grilling activities were modified, as above. Tourist travel along the Khlong Lee Led route was transformed from long-tailed boats to sub-boards. Additionally, canal cruises were made electric.   | Garbage collection activities were introduced during visits to the Walk Way at Khlong Lee Led.   |  |
| <b>Khung Bang Kachao</b>    | Cooking activities were modified to include smokeless biomass stoves. Activities like making paper from tree hips and preparing herbal foot baths were introduced.   | Garbage collection activities were implemented in the Klong Pae area.  |  |

Despite adjusting, reducing, and compensating in these four pilot areas, the research team identified issues that persisted within the tourism community. Solutions proposed include modifying boat designs to reduce fuel consumption, replacing cooking gas stoves with biomass stoves, creating a local low-energy food menu, designing waste-to-pot activities, creating a mascot for each area, and preparing tourist routes with carbon reduction activities.

Stakeholders agreed that the development of activities to reduce the potential for greenhouse gas emissions for riverside tourism communities should aim to reduce the use of fossil fuels. The focus should be on utilizing environmentally friendly renewable energy, reducing steps in activities, selecting efficient replacement equipment, and planning tree planting activities. Building a network and linking various networks will drive creative

change, providing a strong force for change and a stable direction for different development practices. This will contribute to achieving net-zero tourism in a sustainable way.

### Comparative Analysis of Activities Before and After Development

We analyzed and compared the state of tourism activities before and after their development to better accommodate community-based tourism in Thai waterway communities. This was done in an attempt to move towards net-zero carbon tourism, which is crucial in the face of global warming and climate change. The Thailand Greenhouse Gas Management Organization (TGO) has established standards for calculating the carbon footprint, following international standards like ISO 14064-1 (International Organization for Standardization, 2018), GHG Protocol (World Resources Institute, 2003), and incorporating some elements from ISO/TR 14069 (International Organization for Standardization 2013), but adapted to fit Thailand's specific context (TGO 2020).

In our study, we proposed evaluation guidelines that are appropriate for the local context and straightforward enough for the community to comprehend, so they become more aware of greenhouse gas emissions. This understanding is vital for driving the development of river tourism towards net-zero carbon tourism. The calculation of the carbon footprint was therefore estimated by the formula:

$$\text{Ton CO}_2 = \text{Activity data} \times \text{Emission factor}$$

Here, activity data refers to quantified information on activities that generate greenhouse gas emissions, while the emission factor is a coefficient used to convert these activity data into equivalent emission values. This approach provides an approximation of emissions based on measurable activity data and standardized emission factors, rather than a comprehensive lifecycle assessment. Primary and secondary data were collected, including electricity consumption (kilowatt-hours), waste generation (kilograms or tons), vehicle fuel use (liters), and travel distance (kilometers), to estimate emissions from key tourism-related activities. In accordance with the GHG Protocol, full carbon accounting for certification purposes would require the inclusion of Scope 1 (direct emissions), Scope 2 (indirect emissions from purchased energy), and Scope 3 (other indirect emissions across the value chain); however, this study does not claim to capture all such scopes comprehensively. The simplified method was intentionally adopted to ensure transparency, ease of understanding, and practical applicability for community stakeholders, supporting awareness-building and local monitoring, while acknowledging that the reported figures may not represent the complete lifecycle carbon footprint of tourism activities. The results of the comparative analysis of Greenhouse Gas (GHG) emissions before and after the development initiatives are presented in Table 3 below.

Table 3. Comparative analysis of GHG emissions before and after innovations

| Community         | Before Innovation (KgCO <sub>2</sub> eq per trip) |                            | After Innovation (KgCO <sub>2</sub> eq per trip) |                            | Amount of Greenhouse Gases Reduced (KgCO <sub>2</sub> eq per trip) |
|-------------------|---|----------------------------|--|----------------------------|--|
|                   | <i>With additional stops included</i>             | <i>No additional stops</i> | <i>With additional stops included</i>            | <i>No additional stops</i> |  |
| Damnoen Saduak    | 230.24  | 167.64                     | 179.65   | 117.05                     | 50.59  |
| Khung Bang Kachao | 153.67  | 216.27                     | 153.53   | 114.43                     | 101.84   |
| Maha Sawat        | 255.37  | 192.77                     | 221.95   | 159.35                     | 33.49  |
| Roi Sai           | 273.00  | 210.4                      | 145.69   | 208.29                     | 64.71  |

Following assessment and simulations, it was found that the annual reduction of GHG emissions for each community varied:

- Damnoen Saduak: 2.98 to 3.49 tonCO<sub>2</sub>eq per year.
- Khung Bang Kachao: 6.01 to 7.03 tonCO<sub>2</sub>eq per year.
- Maha Sawat: 1.97 to 2.13 tonCO<sub>2</sub>eq per year.
- Roi Sai: 3.82 to 4.46 tonCO<sub>2</sub>eq per year.

These communities host tourism activities throughout the year.

Our research team has initiated various developmental activities within these communities:

1. Smokeless Biomass Stove: Replacing LPG cooking gas with biomass stoves, using locally-sourced natural fuels. This can lead to considerable reductions in greenhouse gas emissions and lower the cost of living.
2. Augmented Reality (AR) Incense Burning: This technology reduces incense burning, a source of greenhouse gases. The use of 3D imagery on mobile phones allows for a modern adaptation of traditional spiritual practices.
3. Electric Motor-Controlled Sightseeing Boat: Transitioning from gasoline engines to electric motors, powered by solar cells, reduces carbon emissions and noise pollution.
4. Waste Reduction: A campaign to reduce solid waste and food waste has been initiated. This includes promoting recycling and establishing a community database of reusable items.

5. Residual Heat Energy: The heat generated during biochar burning is utilized for activities requiring heat, such as boiling water and food preparation.
6. Tree Planting: We promote tree planting to absorb greenhouse gases, enhancing the overall health of the community environment.

The research team has applied the Product Category Rules of Tourism from the Thailand Greenhouse Gas Management Organization to assess greenhouse gas emissions for travel, accommodation, food, and waste along the river ways. This net-zero approach for community-based tourism on the waterways is summarized in Table 4.

Table 4. Summary of GHG emissions from activities in the waterway communities of Thailand

| Type   | Duration of use (hours) | EF value (Kg.CO2eq) | Kg.CO2eq per trip/time | TON.CO2eq per year from experts | TON.CO2eq per year from simulation |
|--|-------------------------|---------------------|------------------------|---------------------------------|------------------------------------|
| Cooking activities / activities using fuel stoves        | 1                       | 3.1133              | 3.1133                 | 0.30                            | 0.18                               |
|  | 2                       | 3.1133              | 6.2266                 | 0.60                            | 0.37                               |
|  | 3                       | 3.1133              | 9.3399                 | 0.90                            | 0.55                               |
| Creative activities from natural waste in the community  | 5                       | 2.32                | 11.6                   | 1.11                            | 0.68                               |
|  | 10                      | 2.32                | 23.2                   | 2.23                            | 1.37                               |
|  | 15                      | 2.32                | 34.8                   | 3.34                            | 2.05                               |
|  | 20                      | 2.32                | 46.4                   | 4.45                            | 2.74                               |
| AR digital incense selection activities (shrine incense) | 3                       | 0.00416             | 0.012                  | 0.0012                          | 0.0007                             |
|  | 5                       | 0.00416             | 0.021                  | 0.0020                          | 0.0012                             |
|  | 7                       | 0.00416             | 0.029                  | 0.0028                          | 0.0017                             |
|  | 9                       | 0.00416             | 0.037                  | 0.0036                          | 0.0022                             |

|  |   |         |       |        |        |
|--|---|---------|-------|--------|--------|
| AR digital<br>incense<br>selection<br>activities<br>(general<br>incense) | 3 | 0.00080 | 0.002 | 0.0002 | 0.0001 |
|  | 5 | 0.00080 | 0.004 | 0.0004 | 0.0002 |
|  | 7 | 0.00080 | 0.006 | 0.0005 | 0.0003 |
|  | 9 | 0.00080 | 0.007 | 0.0007 | 0.0004 |

*Note: For the EF value (Kg.CO2eq) of the incense utilization activity, the researchers used data from Lee and Wang (2004).*

### Assessment of Greenhouse Gas Emissions from River Tourism Transportation

Understanding the greenhouse gas emissions from river tourism transportation is crucial. These emissions are generated by operators within the community during river-based tourism activities. The data serves as a significant indicator, assisting in establishing effective management guidelines aimed at reducing these emissions. In our study, we focused on the fuel consumption rates of boat engines commonly used in canal transportation. The data for this investigation is presented in Table 5.

Table 5. Fuel consumption rates of boat engines commonly used in canal transportation in Thailand.

| Vehicle Type                           | Engine Size  | Consumption Rate (Km / L) |
|--|--|---------------------------|
| Long-tailed boats used in small canals | Gasoline engine, 4 stroke, 13 horsepower, maximum 6 passengers | 0.340                     |
| Long-tailed boats used in large canals | Gasoline engine, 4 stroke, 13 horsepower, maximum 6 passengers | 0.241                     |

*Note: These measurements consider transportation in calm canal waters, with no high winds or waves.*

### Guidelines for the Development of Net-Zero Creative Community-Based Waterway Economies

Following research in four pilot communities, and in collaboration with local stakeholders, the researchers propose the following six guidelines for net-zero creative community-based tourism in the waterway communities of Thailand. Each guideline is grounded in observed practices from the case-study communities, illustrating how abstract principles were operationalized in real-world settings.

**1. Shared Vision and Goals:** The establishment of a shared vision and collective goals is essential for steering community tourism toward net-zero outcomes. In all four communities, shared visions were developed through participatory workshops involving community tourism leaders, local residents, government representatives, and tourism operators. For example, in Maha Sawat Canal, discussions initially revealed tension between income generation and environmental protection; these were resolved through facilitated dialogue that reframed net-zero tourism as a means of sustaining agricultural livelihoods rather than restricting tourism growth. The resulting shared vision emphasized *low-impact tourism rooted in canal-based lifestyles*, articulated through agreed activity redesigns (e.g., reduced fuel use and waste-to-resource initiatives). Similar processes occurred in Damnoen Saduak, Khung Bang Krachao, and Roi Sai, where consensus-building transformed diverse stakeholder priorities into actionable, community-owned sustainability goals.

**2. Collective Awareness and Understanding:** Building a common understanding of net-zero tourism was achieved through knowledge-sharing sessions, demonstrations, and pilot activities. Across the four communities, collaboration with academic institutions and agencies such as TGO and DASTA enabled participants to understand greenhouse gas sources associated with tourism and the rationale for mitigation. In Khung Bang Krachao, for instance, practical demonstrations of electric boats and biomass stoves proved more effective than abstract training, increasing community acceptance and participation. These experiences highlight that awareness-building is most effective when technical concepts are translated into tangible, locally relevant practices.

**3. Mutual Benefits:** Mutual benefits were operationalized not primarily through immediate financial returns, but through shared economic and environmental gains. For example, replacing LPG stoves with smokeless biomass stoves reduced both emissions and household fuel costs, while waste-based creative activities generated supplementary income for community members. Although carbon credit trading was discussed as a potential incentive, none of the study communities had yet accessed formal carbon markets, and benefits were instead realized through cost savings, enhanced tourism appeal, and strengthened community cohesion.

**4. Participation in Network Management:** Effective participation was achieved by establishing informal but clearly defined roles within community tourism networks. In Roi Sai Canal, conservation groups, boat operators, and youth volunteers were assigned distinct responsibilities for activity delivery, waste collection, and visitor engagement. This decentralized structure enhanced accountability and ensured that net-zero practices were embedded across tourism operations rather than confined to a single coordinating body.

**5. Knowledge Building and Innovation Linkages:** Innovation emerged through sustained interaction between communities, researchers, and supporting institutions. For instance, AR-based incense offerings in Damnoen Saduak were co-developed with academic partners to reduce emissions while preserving ritual meaning. Such initiatives demonstrate

how creative tourism characteristics—experimentation, storytelling, and everyday cultural practices—can be mobilized to support measurable emission reductions. Continuous knowledge exchange was critical, as communities required iterative feedback rather than one-off training.

**6. Continual Interaction and Information Exchange:** Regular interaction among network members supported learning and adaptation. Communities relied on periodic meetings, site visits, and digital communication platforms to share progress and challenges. Cross-community exchanges allowed successful practices, such as electric boat prototypes or waste-to-resource activities, to be adapted rather than replicated wholesale, reinforcing locally appropriate net-zero pathways.

## **Conclusion**

In answer to the research question, this study found that community-based tourism along waterway routes in Thailand can be effectively transformed to adhere to net-zero carbon principles through strategic integration of sustainable practices and innovative models. The study highlighted the successful implementation of eco-friendly innovations such as electric boats and renewable energy sources, which significantly reduced the carbon footprint of tourism activities. Moreover, the development of suitable tourism activity models aligned with net-zero goals showed a measurable improvement in both environmental management and community participation. The continued application of these models, coupled with guidelines for managing a network of community-based tourism, can ensure that sustainability extends beyond mere conservation to include economic and social benefits for the local communities.

## **Discussion**

This investigation encouraged the transition towards sustainable, creative community-based tourism in four waterway communities of Thailand. The guidelines presented will help maintain the communities' unique identity while adhering to the net-zero goal of sustainable tourism. In the face of the COVID-19 pandemic, community-based tourism initiatives in Thailand underwent profound changes (Ahmad and Saqib 2022; Virakul et al. 2022), yet they have shown resilience and adaptation, as revealed in this study's empirical findings. Although some sustainability-oriented practices and creative tourism ideas existed prior to the pandemic, the interventions examined in this study were largely accelerated and reconfigured in response to pandemic-induced disruptions rather than coincidental to them. The concept of creative tourism has been increasingly foregrounded, building upon the inherent cultural resources and creative industries available in local communities (Richards and Raymond 2000; Richards 2020; Arcos-Pumarola et al. 2023; Dias et al. 2021). Sharp declines in visitor numbers, temporary suspension of mass tourism activities, and

heightened economic pressure on local livelihoods prompted communities to reassess tourism models and prioritize low-cost, locally controlled, and environmentally restorative practices. Given the pre-existing vulnerabilities of Thailand's tourism sector to global shocks, the pandemic necessitated a rethink of tourism management practices (Fakfare et al. 2022). As Pongsakornrunsilp et al. (2022) also observed, there was a shift towards models that are not just sustainable, but also resilient. The case studies in the present research demonstrate the value of this transformation, as the case communities have leveraged their unique local assets to create value for tourists. In parallel, observable environmental recovery during periods of reduced tourism activity reinforced local awareness of ecological limits and motivated the adoption of low-carbon and net-zero-oriented interventions. Furthermore, these communities have embraced the concept of the creative economy (Howkins 2001; Rowe et al. 2016; Pratt 2021), positioning themselves as producers of creative experiences, rather than mere providers of accommodation or sightseeing opportunities. This shift is crucial for reducing economic vulnerability and enhancing community resilience (De Beukelaer 2014). Such a creative turn in Thai community-based tourism aligns with broader transformations in the field of tourism studies, which has seen a move from culture to creativity (Richards 2013). These changes also resonate with emerging discourse on creative tourism development models and their potential to contribute to sustainable and regenerative tourism (Duxbury et al. 2020).

The findings in Thai waterway communities show that one critical success factor for the creative turn in community-based tourism is community involvement in crafting and delivering the tourism product (Promkan, Pariyattimedhi and Girdwichai 2019; Kaewnuch 2019). Community engagement enhances the authenticity of the tourist experience, perceived or actual, which is a significant draw for the contemporary tourist (Richards 2021; Tinakhat and Nontakatragoon 2021). However, the COVID-19 pandemic highlighted the need for further sustainability transitions (Fakfare and Wattanacharoensil 2023). In particular, there must be greater attention to environmental sustainability, given the broader policy context emphasizing the importance of a low-carbon and sustainable model (Thailand Greenhouse Gas Management Organization 2020). The findings here reinforce this point, as the local communities increasingly recognized the value of their natural heritage and the necessity of preserving it for future generations.

The present findings also resonate with the broader policy shift towards the Bio-Circular-Green Economy (BCG Model) at a national level in Thailand (The Secretariat to the Cabinet 2021; Sirilertworakul 2021). The BCG Model emphasizes the need for innovative practices that support environmental sustainability, economic viability, and social inclusivity, and the four case studies here demonstrate how community-based tourism can contribute to these objectives. The behavioural shift within the communities—marked by the transition from Liquefied Petroleum Gas (LPG) to smokeless biomass stoves—was facilitated by a combination of economic incentives, environmental awareness,

and participatory learning processes, including hands-on demonstrations and training workshops conducted during the co-design phase. The stoves aligned closely with local cooking practices and fuel availability, reduced household operating costs, and were socially reinforced through collective adoption within tourism activity groups, resulting in substantial reductions in greenhouse gas emissions. These biomass stoves were developed to match the local lifestyle, supporting community activities, and cooking for tourists. The creative design process used in these activities, focusing on storytelling, atmosphere, and community style, raised awareness about net-zero tourism and also holds the potential for creating more memorable experiences for tourists. It was observed that most communities still rely on boats powered by diesel fuel. In contrast, the development of a prototype electric boat in the Roi Sai area emerged from a combination of rising fuel costs, heightened community awareness of environmental impacts during periods of reduced tourism, and collaborative experimentation supported by local technical knowledge and external advisory input. The electric boat was co-developed through iterative testing to ensure suitability for local water conditions and tourism use, and its adoption was further encouraged by its quieter operation, lower operating costs, and alignment with conservation-oriented tourism narratives, thereby enhancing the visitor experience while reducing greenhouse gas emissions. Significant greenhouse gas emissions stem from tourist travel, especially by airplanes and personal cars. Therefore, transitioning to an electric system is an effective way to reduce the carbon footprint.

## **Suggestions**

The study's results highlight several essential recommendations for policymakers and relevant stakeholders in Thailand's tourism industry. These include governmental organizations like the Department of Tourism and Tourism Authority of Thailand, as well as local community leaders. Firstly, these bodies should foster a greater understanding of environmental responsibility amongst tourism business operators, tourists, and related stakeholders. This could be achieved by disseminating information via online social media platforms, organizing community-based tourism training, and collaborating with service providers. Importantly, the communication should be accessible, incorporating local dialects to ensure the message is well-understood. Secondly, the promotion of tree-planting initiatives could help in mitigating the impacts of greenhouse gases generated from tourism activities. It would be beneficial to incorporate these initiatives into the tourism activities themselves, selecting regionally appropriate trees, and committing to their ongoing care. This approach could be further extended to other participatory eco-activities, like creating seedling pots for tourists to plant, bolstering the touristic appeal while fostering environmental sustainability.

Thirdly, to accelerate sustainable innovation in tourism, there should be a concerted effort to forge partnerships between tourism-related government agencies and various sector networks, such as the Ministry of Commerce, Ministry of Industry, and Office of National Innovation. This cross-sector collaboration could spark transformative ideas for sustainable tourism practices. In practice, such engagement need not occur directly with central ministries, as communities can access these agencies through provincial or regional offices and existing government programs related to tourism development, innovation, and small enterprise support. Moreover, local government organizations—such as Subdistrict Administrative Organizations and municipalities—can act as intermediaries and coordinators, facilitating communication, proposal submission, and partnership formation on behalf of community groups. Local government organizations should also champion sustainability measures within their communities, including waste reduction, fuel and electricity conservation, plastic use reduction, and shifting to locally sourced food materials to limit greenhouse gas emissions. The ultimate aim should be to foster a zero-net-carbon tourism community. To support waste management within communities, knowledge dissemination and training are critical. Waste reduction, reuse, recycling, composting, and waste-to-energy initiatives should be encouraged.

Finally, local government organizations and communities should develop a shared community database for reusable items or materials. This system could aid in operational cost reduction, greenhouse gas emission reduction, and community-wide sharing, and it could also serve as an educational tool for tourists, fostering sustainable practices and awareness among visitors. In practical terms, this database could be implemented using a simple digital platform—such as an Excel or Google Spreadsheet—hosted and overseen by the local Subdistrict Administrative Organization or municipality, rather than a bespoke mobile application requiring advanced technical capacity. Responsibility for maintaining and updating the database could be assigned to a designated community committee or local administrative staff, with periodic verification during community meetings. To ensure accessibility for members with limited digital literacy, information could be contributed or accessed through multiple channels, including in-person reporting at community offices, printed summaries displayed at tourism hubs, or assistance from youth volunteers or local coordinators. The technical and financial requirements are minimal, relying primarily on existing devices, basic internet access, and administrative coordination, making the system feasible for small-scale communities. Such an approach may draw on established models of community sharing and resource pooling already operating in Thailand—such as community waste banks or cooperative equipment-sharing schemes—as adaptable templates rather than introducing entirely new systems.

The researchers acknowledge limitations of this study, which relied on case studies in Thailand that may limit the generalizability of the findings to other geographical and cultural contexts. However, the data gathered from these specific cases provides valuable

insights into the dynamics of community-based tourism in the face of a global crisis. Another limitation is the reliance on self-reported data, which could be subject to social desirability bias. Despite these limitations, this study presents a significant contribution to the body of knowledge around community-based tourism's adaptive practices during crises and paves the way for more expansive, comparative studies in the future.

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### **Informed Consent**

This study was conducted with the informed consent of all participants. Participants were informed of the study's purpose, procedures, potential risks and benefits, and their right to withdraw at any time without penalty. Written consent was obtained from all participants.

### **Conflict of Interest**

The authors declare that there is no conflict of interest.

### **Author Contribution Statement**

All named authors were responsible for conceptualization, data collection, analysis, writing and proofreading of the manuscript. All named authors have approved this paper for submission and publication.

## **REFERENCES**

Ahmad, Mokbul Morshed and Shahab Saqib. 2022. “Pandemic in the Land of the Smile: The Case of COVID-19 Outbreak in Thailand in 2020”. *Pandemic Risk, Response, and Resilience: COVID-19 Responses in Cities Around the World* (pp. 41-49), edited by Rajib Shaw and Indrajit Pal. London: Elsevier.

- Arcos-Pumarola, Jordi, Alexandra Georgescu Paquin, and Marta Hernández Sitges. 2023. "The Use of Intangible Heritage and Creative Industries as a Tourism Asset in the UNESCO Creative Cities Network." *Heliyon* 9 (1): e13106. <https://doi.org/10.1016/j.heliyon.2023.e13106>.
- Arkarapotiwong, Piyadech, and Sumavalee Chindapol. 2023. Creative Community-Based Tourism Management Model in Thai Villages around Sukhothai World Heritage and Associated Historic Towns. *Kasetsart Journal of Social Sciences*, 44(1): 83-94. <https://so04.tci-thaijo.org/index.php/kjss/article/view/264452>.
- De Beukelaer, Christiaan. 2014. "Creative Industries in 'Developing' Countries: Questioning Country Classifications in the UNCTAD Creative Economy Reports". *Cultural Trends*, 23(4): 232-251. <https://doi.org/10.1080/09548963.2014.912043>.
- Dias, Álvaro, Maria Rosario González-Rodríguez, and Mafalda Patuleia. 2021. "Developing Poor Communities through Creative Tourism". *Journal of Tourism and Cultural Change* 19 (4): 509-529. <https://doi.org/10.1080/14766825.2020.1775623>.
- Duxbury, Nancy, Fiona Eva Bakas, Tiago Vinagre de Castro, and Sílvia Silva. 2020. "Creative Tourism Development Models towards Sustainable and Regenerative Tourism". *Sustainability* 13 (1). <https://doi.org/10.3390/su13010002>.
- Duxbury, Nancy and Greg Richards. 2019. *A Research Agenda for Creative Tourism*. Cheltenham: Edward Elgar.
- Espinoza, S. Molina. 2011. *Turismo Creativo: el Fin de la Competitividad [Creative Tourism: The End of Competition]*. Santiago, Chile: Escritores.
- Fakfare, Pipatpong, Jin-Soo Lee, and Heesup Han. 2022. "Thailand Tourism: A Systematic Review". *Journal of Travel & Tourism Marketing*, 39(2): 188-214. <https://doi.org/10.1080/10548408.2022.2061674>.
- Fakfare, Pipatpong, and Walanchalee Wattanacharoensil. 2023. "Low-Carbon Tourism: Determining Domestic Tourist Perception from Thailand - Tourism Agenda 2030". *Tourism Review*, 78(2): 496-516. <https://doi.org/10.1108/TR-12-2021-0537>.
- Howkins, John. 2001. *The Creative Economy: How People Make Money from Ideas*. London: Penguin.
- Hwandee, Ontheera, and Naragain Phumchusri. 2020. "Forecasting International Tourist Arrivals from Major Countries to Thailand". *Advances in Electronics Engineering: Proceedings of the ICCEE 2019, Kuala Lumpur, Malaysia (pp. 115-125)*, edited by Zahriladha Zakaria and Rabiah Ahmad. Singapore: Springer.
- Ichikawa, Takanori, and Chawewan Denpaiboon. 2017. "Analyzing the Floating Market System in Thailand for Sustainability". *Journal of Architectural/Planning Research and Studies (JARS)*, 14(2): 127-142. <https://so02.tci-thaijo.org/index.php/jars/article/view/116263>.
- International Organization for Standardization. 2013. *ISO/TR 14069:2013 - Greenhouse Gases - Quantification and Reporting of Greenhouse Gas Emissions for Organizations -*

- Guidance for the Application of ISO 14064-1* [Online]. Available at: <https://www.iso.org/standard/43280.html>.
- International Organization for Standardization. 2018. *ISO 14064-1:2018 - Greenhouse Gases - Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals* [Online]. Available at: <https://www.iso.org/standard/66453.html>.
- Israngkura, Adis. 2022. "Marine Resource Recovery in Southern Thailand during COVID-19 and Policy Recommendations". *Marine Policy*, 137: 104972. <https://doi.org/10.1016/j.marpol.2022.104972>.
- Kaewnuch, Kanokkarn. 2019. Influencing Factors on Tour Program Design in Creative Community Based Tourism. *WMS Journal of Management*, 8(2): 49-59. <https://so06.tci-thaijo.org/index.php/wms/article/view/184368>.
- Katpiyarat, Piyapong. 2022. "The Adaptation Dynamics of Agritourism Destination: A Case Study of Ban Sala Din Community, Mahasawat Canal, Phutthamonthon District, Nakhon Pathom Province". *Warasarn Boriharn Turakit Settsart Lae Karnseusarn [Journal of Business Management, Economics and Communication]*, 17(2): 74-83. <https://so02.tci-thaijo.org/index.php/BECJournal/article/view/244997>.
- Klinsrisuk, Ratchaphong, and Watchara Pechdin. 2022. "Evidence from Thailand on Easing COVID-19's International Travel Restrictions: An Impact on Economic Production, Household Income, and Sustainable Tourism Development". *Sustainability*, 14(6): 3423. <https://doi.org/10.3390/su14063423>.
- Laiphrakpam, Meena, Sayam Aroonsrimorakot, and Warit Paisantanakij. 2022. "Socio-Economic Impact of COVID-19 (Novel Coronavirus SARS-CoV-2) in Thailand and India: A Brief Review". *Journal of Community Development Research (Humanities and Social Sciences)*, 15(2): 1-14. <https://doi.org/10.14456/jcdr-hs.2022.11>.
- Lee, Shun-Cheng and Bei Wang. 2004. "Characteristics of Emissions of Air Pollutants from Burning of Incense in a Large Environmental Chamber". *Atmospheric Environment*, 38(7): 941-951. <https://doi.org/10.1016/j.atmosenv.2003.11.002>.
- Legrand, Willy, C. Simons-Kaufmann and Philip Sloan. (Eds.). 2012. *Sustainable Hospitality and Tourism as Motors for Development: Case Studies from Developing Regions of the World*. London: Routledge.
- Lekhakula, Jirapat, Niramol Khwakhong, Danai Liswadiratanakul, and Sudsan Suttipisan. 2021. "Integration of Sufficiency Economy and Creative Tourism for Tourist Attraction Development in Thailand". *Journal of the Association of Researchers*, 26 (1): 188-201. <https://so04.tci-thaijo.org/index.php/jar/article/view/248279>.
- Pongsakornrungsilp, Pimlapas, Siwarit Pongsakornrungsilp, Akawut Jansom and Sydney Chinchanchokchai. 2022. "Rethinking Sustainable Tourism Management: Learning from the COVID-19 Pandemic to Co-Create Future of Krabi Tourism, Thailand". *Sustainability*, 14(18): 11375. <https://doi.org/10.3390/su141811375>.

- Prakruiwan, Tinikan. 2016. "Cultural Tourism Route of Thai Way of Life along Bangkok Canal". *NAJUA: Architecture, Design and Built Environment*, 31: 135-135. <https://so04.tci-thaijo.org/index.php/NAJUA-Arch/article/view/78995>.
- Pratt, Andy C. 2021. "The Creative Economy and Sustainable Development". *City, Culture and Society* 25: 100393. <https://doi.org/10.1016/j.ccs.2021.100393>.
- Promkan, Rattiya, Phrathep Pariyattimedhi and Naiyana Girdwichai. 2019. "Factors Influencing Creative Community-Based Tourism Management". *Journal of Humanities and Social Sciences Surin Rajabhat University*, 21(1): 13-28. <https://so03.tci-thaijo.org/index.php/jhssrru/article/view/200146>.
- Ramarn, Tueanta, Tuannurahan Kubaha, Kanjana Ohsay, and Preeyalak Konongbua. 2018. "Suitable Creative Tourism Activities for Upstream Community, Pha Payom Canal, Phattalung Province". *Parichart Journal, Thaksin University*, 31(3): 103-111. <https://so05.tci-thaijo.org/index.php/parichartjournal/article/view/147380>.
- Raymond, Crispin. 2007. "Creative Tourism New Zealand: The Practical Challenges of Developing Creative Tourism". *Tourism, creativity and development* (pp. 167-180), edited by Greg Richards and Julie Wilson. London: Routledge.
- Richards, Greg and Crispin Raymond. 2000. "Creative Tourism". *ATLAS News*, 23(8): 16-20. <https://doi.org/10.17605/OSF.IO/YWEG7>.
- Richards, Greg. 2013. "Tourism Development Trajectories: From Culture to Creativity? In *The Routledge Handbook of Cultural Tourism* (pp. 297-303), edited by Melanie Smith and Greg Richards. London: Routledge.
- Richards, Greg. 2020. "Designing Creative Places: The Role of Creative Tourism". *Annals of Tourism Research*, 85, 102922. <https://doi.org/10.1016/j.annals.2020.102922>.
- Richards, Greg. 2021. "Business Models for Creative Tourism". *Journal of Hospitality & Tourism*, 19(1): 1-13. <https://johat.org/wp-content/uploads/2021/09/1-Greg-180721.pdf>.
- Rowe, David, Greg Noble, Tony Bennett, and Michelle Kelly. 2016. "Transforming Cultures? From Creative Nation to Creative Australia". *Media International Australia*, 158 (1): 6-16. <https://doi.org/10.1177/1329878X16629544>.
- Sirilertworakul, Narong. 2021. *BCG Model: Fostering Sustainable Development in Thai Economy*. Bangkok: International Institute for Trade and Development.
- Somnuxpong, Suprapa. 2020. "Chiang Mai: A Creative City using Creative Tourism Management". *Journal of Urban Culture Research*, 20: 112-132. <https://doi.org/10.14456/jucr.2020.8>.
- Sukkasem, Maneerat. 2018. "Guidelines for the Development of Tourism: The Potential and Limitations of the Upper Central Plains Provinces". Doctoral Dissertation, Graduate School, Prince of Songkhla University.
- Suttipisan, Sutsan. 2014. "Creative Community-Based Tourism: An Integrated Tourism Management Approach in Thailand". Paper presented at ICADA 2014: Toward

## JOURNAL TITLE

- ASEAN Development Administration. Bangkok: National Institute Development Administration.
- The Secretariat to the Cabinet. 2021. *Declaration of Bio-Circular-Green Economy (BCG Model) National Agenda*. Bangkok: Office of the Prime Minister.
- Thailand Greenhouse Gas Management Organization (TGO). 2020. *Low Carbon and Sustainable Business Index (LCSI) Assessment Guideline* [Online]. Available at: <http://www.tgo.or.th/2020/index.php/en/post/TGO200100031>.
- Thongbai, Laddawan. 2018. "Karntongtiaw Cheung Sangsan Gab Karnpattanagarn Tongtiaw Doy Chumchon" ["Creative Tourism and Community-Based Tourism Development"]. *EAU Heritage Journal Social Science and Humanities*, 8(2): 103-112. <https://so01.tci-thaijo.org/index.php/EAUHJSocSci/article/view/130769>.
- Tinakhat, Phisunt, and Athip Nontakatragoon. 2021. "Logistics and Creative Community Based Tourism as a Tool for Sustainable Local Development: A Case Study of Plai Phong Phang Thai Style House Ecotourism Village, Samut Songkram Province". *NIDA Case Research Journal*, 13(1). <https://so04.tci-thaijo.org/index.php/NCRJ/article/view/252644>.
- Vajirakachorn, Thanathorn. 2011. "Determinants of Success for Community-Based Tourism: The Case of Floating Markets in Thailand". Doctoral Dissertation, Texas A&M University, College Station, Texas.
- Virakul, Busaya Chartchai Na Chiangmai and Kalayanee Senasu. 2022. "Thailand and COVID-19 Pandemic: Lessons Learned, Challenges, and the Silver Linings". *Community, Economy and COVID-19: Lessons from Multi-Country Analyses of a Global Pandemic* (pp. 505-530), edited by Clifford J. Shultz, II, Don R. Rahtz and M. Joseph Sirgy. Cham: Springer International Publishing.
- Wattanacharoensil, Walanchalee and Markus Schuckert. 2016. "Reviewing Thailand's Master Plans and Policies: Implications for Creative Tourism?" *Current Issues in Tourism*, 19(10): 1045-1070. <https://doi.org/10.1080/13683500.2014.882295>.
- Wisutthilak, Suddan. 2015. *Knowledge of Creative Tourism: Manuals and Guidelines*. Bangkok: Faculty of Sociology and Anthropology, Thammasat University.
- World Resources Institute. 2003. *The GHG Protocol for Project Accounting* [Online]. Available at: [https://ghgprotocol.org/sites/default/files/standards/ghg\\_project\\_accounting.pdf](https://ghgprotocol.org/sites/default/files/standards/ghg_project_accounting.pdf).
- Wurzburger, Rebecca, Sabrina Pratt, and Alex Pattakos (Eds.). 2009. *Creative Tourism, A Global Conversation*. Santa Fe: Sunstone Press.
- Yodsurang, Patiphol, Asadaporn Kiatthanawat, Pega Sanoamuang, Aracha Kraseain, and Wandee Pinijarasin. 2022. "Community-Based Tourism and Heritage Consumption in Thailand: An Upside-Down Classification Based on Heritage Consumption". *Cogent Social Sciences*, 8(1): 2096531. <https://doi.org/10.1080/23311886.2022.2096531>.

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