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Preliminary geotourism study of laterite attractions in Kamphaeng Phet Province, northern Thailand

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Abstract

A UNESCO World Heritage Site in Kamphaeng Phet Province represents stunning architecture built from laterite with rich cultural traditions (e.g., temples, pagodas, and city walls). There are multiple laterite quarries in the vicinity of these sites, which are thought to have been utilized in their construction. Laterite architectures have scientific and historical importance, positioning them as potential geoarchaeological tourism destinations. This research focuses on geotourism development for geological features in the vicinity of laterite attractions in Kamphaeng Phet Province. For this study, seven laterite attractions were selected and guidelines for geotourism development were analyzed for these sites: (1) Kamphaeng Phet Historical Park within the city walls, (2) Kamphaeng Phet Historical Park in the Aranyika region, (3) Nakhon Chum Historical Site, (4) Wat Nong Pling, (5) Blue Pond Kamphaeng Phet, (6) Tham Nang Thong Archaeological Site, and (7) Wat Khanathi Si Wachiraram. The classification and assessment results show that Kamphaeng Phet Historical Park (1, 2) and Nakhon Chum Historical Site (3) have high geoheritage values. Furthermore, a SWOT analysis was performed in the development of geotourism to establish management priorities for each site. Finally, a tourist route map connecting seven laterite attractions and laterite geological features sites was generated, providing information and knowledge about the history and geology of laterites in Kamphaeng Phet Province. This study can be used to support the conservation of geoarchaeological sites in the area.

Keywords: Kamphaeng Phet Geoheritage, SWOT analysis, Geodiversity, Travel route, Geoconservation

1. Introduction

Geotourism is a type of tourism focusing on promoting and appreciating the geological and geomorphological features of a particular region or destination, involving the study, exploration, and enjoyment of the geological heritage (e.g., landforms, rocks, minerals, fossils, and other natural features) (Dowling, 2011; Newsome et al., 2012; Ruban, 2015). Geotourism aims to educate and attract tourists to the geological aspects of a place, enhancing their understanding of Earth's history and the processes that have shaped its landscape. (Dowling, 2011; Newsome & Dowling, 2018; Newsome et al., 2012; Ruban, 2015). Geodiversity includes a diverse array of geological attributes and stands as a

fundamental element of natural environments, serving as a testament to the geological heritage and multifaceted history of specific areas (Newsome & Dowling, 2018). The appreciation and preservation of geodiversity hold significance from both environmental and cultural perspectives, offering invaluable glimpses into the past of Earth and playing a pivotal role in the promotion of sustainable land and resource management (Đurović & Đurović, 2010; Ólafsdóttir & Tverijonaite, 2018; Ruban, 2015).

Over the past decade, geotourism has gained popularity in many countries around the world (Ruban, 2015). In several geotourism destinations worldwide, not only the outcrop but also the soil layer (regolith) is a geotourism attraction (Newsome et al., 2021). For Thailand, Kamphaeng Phet Province is a region with many archaeological sites primarily built from laterite (a type of soil). These sites are part of the former Sukhothai Kingdom, spanning over 700 years. Today, they stand as the most significant historical tourist attractions in Thailand and have earned the distinction of being a United Nations Educational, Scientific, and Cultural Organization (UNESCO) World Heritage Site known as the Historic Town of Sukhothai and Associated Historic Towns (Treasury Department, 2019). Laterite, a vital building material for the construction of archaeological sites in Kamphaeng Phet area, can be found in numerous temples, walls, pagodas, ponds, and monuments (Figure 1) (Fine Arts Department, 2021).

During the COVID-19 lockdown, agencies and organizations in Thailand have been promoting virtual tourism in historical park areas of Thailand. This initiative aims to showcase and promote tourism while also providing historical knowledge and information about access routes. However, there is still no study on geotourism perspectives of laterite attractions in Kamphaeng Phet Province. Thus, this study aims to develop geotourism perspectives of laterite attractions and geological features sites in Kamphaeng Phet region (Figure 3) based on their geodiversity and scope.

Figure 1 (a) Phi Gate in the city wall area of Kamphaeng Phet Historical Park, showing walls and a gate built from laterite at Nai Mueang Sub-District. **(b)** Wat Phra That in Kamphaeng Phet Historical Park shows a pagoda built from laterite at Nai Mueang Sub-District. **(c)** Thung Setthi Old Fortification at Nakhon Chum Historical Site showing walls built from laterite at Nakhon Chum Sub-District. **(d)** Tham Nang Thong Archaeological Site built from laterite located at Nang Thong Mountain in Tham Kratai Thong Sub-District **(e)** Wat Nong Pling temple built from laterite located at Nong Pling Sub-District. **(f)** Blue Pond Kamphaeng Phet showing laterite profile along a water reservoir in Nong Pling Sub-

District. **(g)** Wat Khannathi Si Wachiraram temple built from laterite at Thep Nakhon Sub-District.

2. Geological setting

Based on geomorphological and geological maps of the Department of Mineral Resources (DMR) of Thailand, Kamphaeng Phet area has a diverse range of geological materials, including various sediments, sedimentary rocks, metamorphic rocks, felsic to intermediate volcanic rocks and felsic to mafic plutonic rocks (Figure 4). Those rock units vary in age from the Precambrian to Quaternary (Department of Mineral and Resources, 2012). Moei Fault zone, an active fault, is located on the northwestern side of the Kamphaeng Phet Province and oriented in a northwest - southeast direction. The various rocks exhibit fractures in two main directions: northeast – southwest and southeast – northwest, as shown in Figures 3 and 4 (Department of Mineral and Resources, 2012). The faults and fractures can create pathways for the movement of mineralizing fluids (Dezayes et al., 2021).

The sediments comprise Quaternary fluvial and terrace sediments. Ping River flowing through the Kamphaeng Phet area significantly influences the distribution and accessibility of rocks, sediments, and laterite. Most of the central and eastern areas of the Province is primarily composed of fluvial depositional systems. These sediments have contributed to the formation of distinctive landforms, particularly alluvial fan deposits. (Chaiwongsaen et al., 2019). At present day, laterite deposits can be found in Lan Dokmai Tok and Nong Pling along the Ping River and in Phran Kratai, and Nong Hua Wua areas (Figure 3).

The movement of solutions by groundwater can lead to changes in the chemical and physical properties of rock and soil. The iron-bearing minerals undergo chemical weathering within the bedrock through the hydrolysis process, and the iron solution is subsequently washed out from the rocks. Consequently, the iron solution dissolves into the groundwater. When the upper water table encounters the air (oxygen), an oxidation reaction leads to the formation of iron oxide minerals in the laterite (Bourman & Ollier, 2002; Santha Kumar et al., 2022).

Terrace deposits on the western side of Kamphaeng Phet appear as mounds. The upper layer of the terraces consists of sandy soils interbedded with laterite. Locally, the laterite layer is mixed with gravel, consisting of red sandstone and mudstone. The laterite is distributed along the western foothills, sloping eastward, and along the mountain side of the province. The laterite profiles also exhibit rock fragments, core stones, and bedrock underlying the laterite layers. In certain areas, there are laterite layers in the topsoil (Department of Mineral and Resources, 2012).

3. Laterite attractions

Kamphaeng Phet Historical Park

Kamphaeng Phet Historical Park, along with Sukhothai Historical Park and Si Satchanalai Historical Park, was declared a UNESCO World Heritage Site on December 12, 1991 (Fine Arts Department, 2021). Kamphaeng Phet Historical Park consists of an archaeological city located in Mueang Kamphaeng Phet District. This area is situated within a river basin, which the Ping River flows through. Based on geography, it was an ideal location for establishing an ancient community since the prehistoric era. This site allowed for easy communication with communities in the plains and served as a storage hub, facilitating transportation from the plains to the mountainous regions. During historical times, the area around Kamphaeng Phet held significant strategic importance in warfare. It served as a connecting point between the Sukhothai, Ayutthaya, and Lanna kingdoms

(Fine Arts Department, 2021). Archaeological evidence found in Kamphaeng Phet exhibits characteristics related to all three regions and represents the development of artistic styles. The Kamphaeng Phet features a trapezoidal city plan parallel to the Ping River. Initially, the city wall consisted of an embankment and a moat. Later, the inner-city wall was constructed using laterite. The upper rampart is designed in the shape of a Sema leaf and features gate towers (Fine Arts Department, 2021).

The current boundary of the historical park covers a total area of 3.34 km^2 divided into two areas. The first is the city wall area (represented by the yellow number symbols in Figure 3 from numbers 24-33 and Table 1), situated on the east side of the Ping River, enclosed by a moat and a laterite city wall (Figure 1a). The second area is the Aranyika region (a forested area; represented by the yellow number symbols in Figure 3 from numbers 4-17 and Table 1), located on a laterite mound outside the northern city wall area (Figure 2).

Nakhon Chum Historical Site

Nakhon Chum Historical Site (Figure 1c), an archaeological community and antiquities, is located on the west of the Ping River. In the past, Nakhon Chum had numerous temples and monks. According to the 8th stone inscription (Khao Sumanakut Stone Inscription), the city of Nakhon Chum was called Nakhon Phra Chum (a city associated with monks). Nowadays, Nakhon Chum retains its identity as an archaeological community with a history spanning more than 700 years, as supported by archaeological sites (e.g., Wat Phra Borommathat Nakhon Chum, Wat Chedi Klang Thung, Wat Mong Ka Le, Wat Nong Lang Ka, and Pom Thung Setthi) (Kamphaeng Phet Provincial Office of Buddhism, 2023). These archaeological sites were constructed using bricks and laterite represented by the yellow number symbols in Figure 3 from numbers 18-22 and Table 1.

Tham Nang Thong Archaeological Site

Tham Nang Thong (Figure 1d) is situated in the city of Bang Phan and located on Nang Thong Mountain. Along the length of the hilltop is a large pagoda resembling a lotus bud or a cluster of rice. The base of the pagoda (12 m^2) was constructed from laterite (the yellow number symbols in Figure 3, number 1 and Table 1). Adjacent to the large pagoda are smaller pagodas and temples. On the north side of the mountain stands a rectangular building. It is believed that the laterite in the area was transported from the plains by elephants (Fine Arts Department, 2023).

Wat Nong Pling

Wat Nong Pling (Figure 1e) was established on April 10, 1997. This area originally served as a location for martial arts training, specifically for practicing the sword dance and dance of King Naresuan the Great and King Taksin the Great. It also functioned as an outpost town known as Mueang Noen Thong. Currently, Wat Nong Pling serves as a meditation center. The temple comprises three large buildings. The highlight of Wat Nong Pling is the laterite temple represented by the yellow number symbols in Figure 3, number 2, and Table 1 (Kamphaeng Phet Provincial Office of Buddhism, 2023).

Blue Pond Kamphaeng Phet

Blue Pond Kamphaeng Phet (Figure 1f) is in Nong Pling Sub-District, Mueang District. It is a large pond, previously a laterite quarry (the yellow number symbols in Figure 3, number 3, and Table 1). The water in the pond exhibits a beautiful turquoise color. It has now become a water reservoir with a serene atmosphere and stunning views, bringing excitement to those who visit. The entire path in the vicinity is made of laterite. The blue color of the water is assumed to be a result of the rain washing in minerals and some elements from the soil profile, causing the water to change color based on the type of minerals and

elements, ultimately creating a more beautiful hue.

Wat Khanathi Si Wachiraram

Wat Khanathi Si Wachiraram (Figure 1g) is a royal temple constructed from laterite. It is situated in Thep Nakhon Sub-District, Mueang Kamphaeng Phet District (represented by the yellow number symbols in Figure 3, number 23, and Table 1).

Figure 2 Bo Sam Saen located at a laterite mound in Wat Awat Yai, Aranyika region of Kamphaeng Phet Historical Park, showing walls of a pond built from laterite at Nong Pling Sub-District.

Table 1 Location of laterite attractions in Kamphaeng Phet Province, Thailand, according to the yellow number symbols in Figure 3.

No.		Laterite attraction	Sub-District	District	Location
1		Wat Khao Nang Thong	Tham Kratai Thong	Phran Kratai	16°35’35’’N, 99°35’55’’E
2		Wat Nong Pling	Nong Pling	Mueang Kamphaeng Phet	16°31’45’’N, 99°29’52’’E
3		Blue Pond Kamphaeng Phet			16°31’60’’N, 99°30’50’’E
4		Wat Awat Noi			16°30’42’’N, 99°31’26’’E
5		Wat Awat Yai			16°30’08’’N, 99°30’47’’E
6		Wat Chang Rob			16°30’10’’N, 99°30’35’’E
7		Wat Sing			16°30’09’’N, 99°30’51’’E
8		Wat Phra Si Ariyabot			16°30’05’’N, 99°30’53’’E

9		Wat Phra Non	Nong Pling	Mueang Kamphaeng Phet	16°29’56’’N, 99°30’53’’E
10		Wat Chedi Klom			16°30’09’’N, 99°31’02’’E
11		Wat Khu Si Hong			16°30’15’’N, 99°31’07’’E
12		Wat Kampaeng Ngam			16°30’13’’N, 99°30’54’’E
13		Wat Pekaram			16°30’18’’N, 99°30’49’’E
14		Wat Ta Baek Ku			16°30’19’’N, 99°30’45’’E
15		Wat Kongchai			16°30’01’’N, 99°30’59’’E
16		Wat Ma Khlet			16°30’23’’N, 99°30’56’’E
17		Wat Ma Khok			16°30’27’’N, 99°30’56’’E
18		Thung Setthi Old Fortification	Nakhon Chum		16°28’26’’N, 99°30’11’’E
19		Wat Phra Bormmathat			16°28’44’’N, 99°30’37’’E
20		Wat Nong Yai Chuai			16°28’09’’N, 99°30’52’’E
21		Wat Nong Langka			16°28’08’’N, 99°30’40’’E
22		Wat Chedi Klang Thung			16°28’20’’N, 99°30’52’’E
23		Wat Khanathi Si Wachiraram	Thep Nakhon		16°21’53’’N, 99°37’44’’E
24		Phi Gate	Nai Mueang		16°29’34’’N, 99°30’42’’E
25		Fort At Corner of City Wall			16°29’36’’N, 99°30’35’’E
26		Hua Muang Gate			16°29’33’’N, 99°30’33’’E
27		Phom Chow Indra (Fortress)			16°29’17’’N, 99°30’54’’E
28		Phet Fortress			16°29’33’’N, 99°30’48’’E
29		Wat Phra Kaeo			16°29’18’’N, 99°31’05’’E
30		Front and Gate to Wat Chang			16°29’26’’N, 99°31’20’’E
31		Chao Chan Fortress			16°29’12’’N, 99°31’04’’E

32		Wat Phra That			16°29’15’’N, 99°31’13’’E
33		Siva Shrine			16°29’12’’N, 99°31’27’’E
Symbols: - temple, - natural site, - archaeological site, - wall and gate					

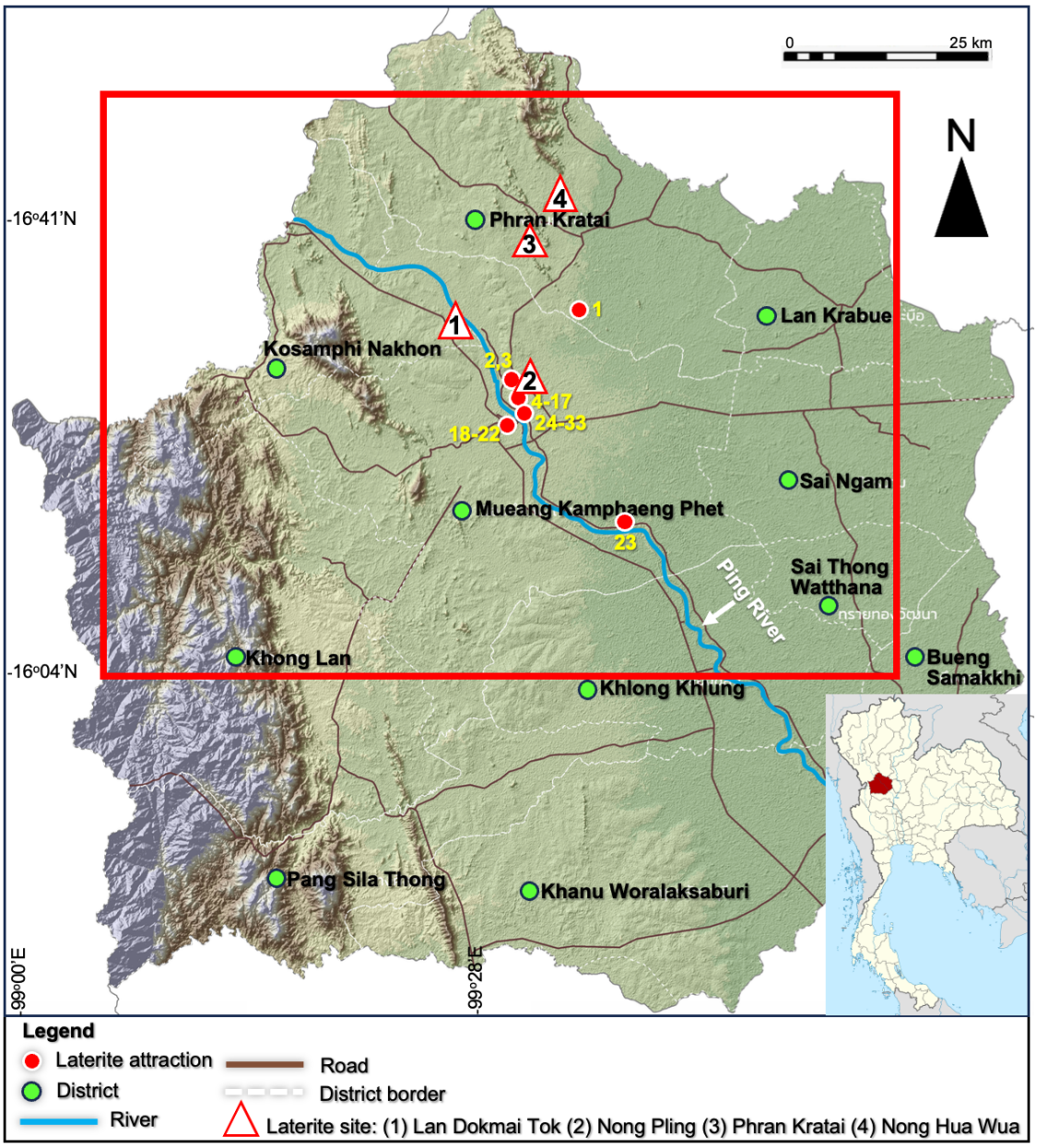
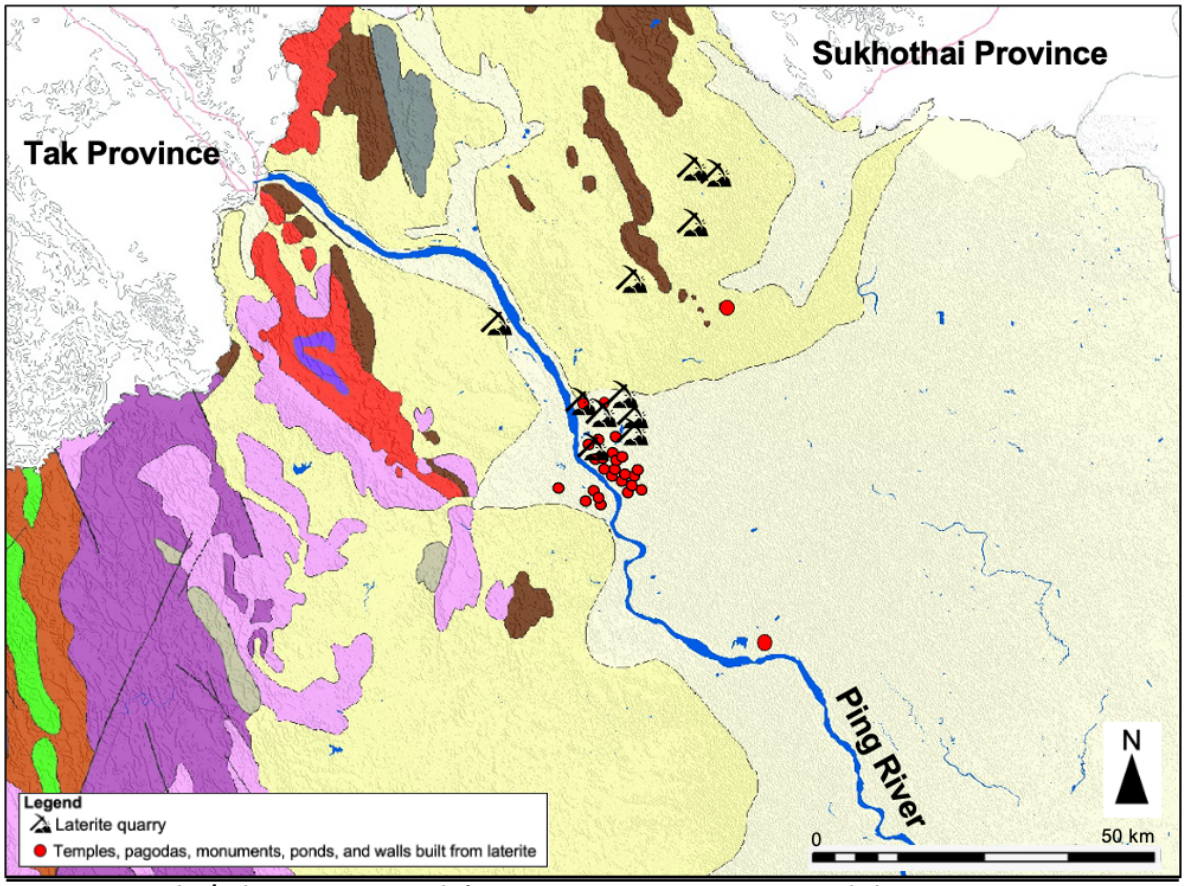


Figure 3 A topographic map of Kamphaeng Phet Province, Thailand showing the locations of laterite sites (red framed white triangle) and main transportation (brown line). The digital elevation models (DEMs) are sourced from Sentinel-2 data, accessible at https://sentinel-hub.com/explore/eobrowser/ (accessed 12.05.2022).



Formation/Unit	Period	Description
Fluvial deposits	Quaternary	Gravel, sand, silt, clay, and laterite
Terrace deposits		Sand, silt, clay, and laterite
Phratat Formation	Triassic	Purplish red to brownish red sandstone, siltstone, shale, and conglomerate
Khanu Chert Formation	Permian	Black to gray laminated radiolarian limestone, slate, and quartz schist with phyllite, chert interbedded with tuff
Lan Hoi Formation	Permian to Carboniferous	Pyroclastic sandstone, reddish-brown arkosic sandstone, calcareous siltstone, and reddish-brown shale
Khao Khieo Formation	Devonian to Silurian	Argillaceous limestone, greywacke, sandstone, slate, tuffaceous phyllite, quartz tuff, andesitic tuff, lithic tuff, and agglomerate
Suan Mark Limestone Formation	Ordovician	Pale to dark gray laminated argillaceous limestone
Pong Nam Ron Quartzite Formation	Cambrian	Thin- to thick-bedded arkosic sandstone, and yellowish-brown quartzite
Lansang Gneiss Complex Formation	Precambrian	Orthogneiss, paragneiss interbedded with calc-silicate
Felsic to mafic volcanic rocks	Jurassic to Permian	Dark gray to black vesicular and amygdaloidal basalt, with phenocrysts and megacrysts of olivine, pyroxene, and spinel locally; andesite, rhyolite, agglomerate, and andesitic basalt
Felsic to intermediate plutonic rocks	Triassic	Biotite granite, tourmaline granite, granodiorite, biotite muscovite granite, muscovite tourmaline granite, and biotite tourmaline granite

Figure 4 A geological map, zoomed in from the red frame in Figure 3, shows the locations of laterite quarries, along with temples, pagodas, monuments, ponds, and walls built from laterite. The rock units are modified from the geological map of Department of Mineral and Resources (2012).

4. Methodology

The research methodology employed in this study was adapted from Nazaruddin (2020), Newsome et al. (2021), Paungya et al. (2020), and Singtuen and Phajuy (2020). The methods consist of inventory, characterization, assessment, and evaluation of selected geological sites in Kamphaeng Phet Province. Before the field survey, an inventory was created by identifying and selecting important laterite attractions (Table 1). Based on the field survey, information about the laterite attractions was analyzed and categorized into groups of geological features in ABC components (A: abiotic elements—soil, water, and/or sand; B: biotic elements—plant and/or animal; C: culture—art, lifestyle of people, and/or history), and tourism activities for characterization (Gray, 2004; Newsome et al., 2012). The characterization was conducted through detailed field observation and description of the sites and features. The geographical location, accessibility, geological description, and/or most remarkable geological features were described.

The qualitative assessments focus on geoheritage, educational, aesthetic, recreational, cultural, economic, functional, and other values. The levels of significance of the sites determined in the assessments comprise *international* (the best example of a feature occurring globally), *national* (the best example of a feature occurring nationally, while it may be present elsewhere globally), *regional* (the best example of a feature occurring in a region, while it may be present elsewhere globally or nationally), *state* (the best example of a feature occurring in a state, while it may be present elsewhere globally, nationally, or regionally), and *local* (the feature is important only to the local community in an area).

For the combination of assessment and evaluation, SWOT analysis is employed in the development of geotourism assessment:

(1) Strengths (**S**: internal positive attributes and resources) include educational value, conservation impact, unique attractions, and local community involvement.

(2) Weaknesses (**W:** internal factors) include niche market, infrastructure challenges, weather dependence, and limited accessibility.

(3) Opportunities (**O:** external factors in the environment) include sustainable tourism, collaboration, cultural integration, technological advancements

(4) Threats (**T**: external factors that could pose a risk or challenge to the organization) include environmental impact, competition, natural disasters, and regulatory challenges.

After evaluation, travel routes to laterite attractions and laterite sources in Kamphaeng Phet area were also generated to enhance knowledge and support the conservation of geological resources and geoarchaeological sites in the area.

5. Results and Discussion

Geotourism classification and assessment

Seven laterite attractions (Table 2; Figure 1) have been characterized based on geological features; (1) Kamphaeng Phet Historical Park within the city walls (2) Kamphaeng Phet Historical Park in the Aranyika region (3) Nakhon Chum Historical Site (4) Wat Nong Pling (5) Blue Pond Kamphaeng Phet (6) Tham Nang Thong Archaeological Site and (7) Wat Khanathi Si Wachiraram. Only Tham Nang Thong (6), a volcanic rock mountain, is a structural site. All seven sites were grouped into hydrological and geomorphological sites, which are characterized by criteria related to hydrology, water resources, and geomorphological settings. The Ping River is one of Thailand's magnificent rivers, characterized by a variety of fluvial features, including oxbow lakes, meandering scars, swamps, floodplains, natural levees, and terraces. Particularly in the Mueang Kamphaeng

Phet District, both sides of the Ping River have numerous laterite attractions.

Regarding scale (Table 2), Kamphaeng Phet Historical Park within the city walls and in the Aranyika region, and the Nakhon Chum Historical Site are within the mesoscale level (coverage of 1x1 km or larger). Meanwhile, present-day temples and natural tourist attractions are classified as microscale level (coverage of 10x10 m or larger).

A qualitative assessment has been conducted to evaluate the sites based on various values (Table 3). This assessment reveals that the geosites surrounding the laterite attractions exhibit exceptional geoheritage values, particularly Kamphaeng Phet Historical Park within the city walls and in the Aranyika region, and Nakhon Chum Historical Site. These sites possess more comprehensive and valuable attributes, along with a higher level of significance compared to Wat Nong Pling, Blue Pond Kamphaeng Phet, Tham Nang Thong Archaeological Site, and Wat Khanathi Si Wachiraram.

The combination of assessment and evaluation (SWOT analysis) is expected to serve as a potent tool for establishing management priorities (Figure 5). Sites with a higher value should be given top priority, although conservation and development efforts can be implemented across all these sites.

Geotourism potential

Beyond the preservation of biodiversity, it is equally crucial to protect geological landforms and features (geodiversity) (Nazaruddin, 2020). In addition to the outcrop, the soil layers also have potential for geotourism. The term geoconservation holds particular significance, as it encompasses geodiversity and geoheritage resources, which comprise valuable features and processes worthy of conservation. These resources are susceptible to disturbance and destruction and can rapidly deteriorate without meticulous management (Sharples, 2002). Therefore, areas with laterite formations near archaeological sites built using laterite and possessing historical value can serve as prime locations for geotourism and geoconservation. In this study, a tourism route map connecting laterite attractions and laterite sources in Kamphaeng Phet was produced, along with insights into the laterite resources (Figure 6).

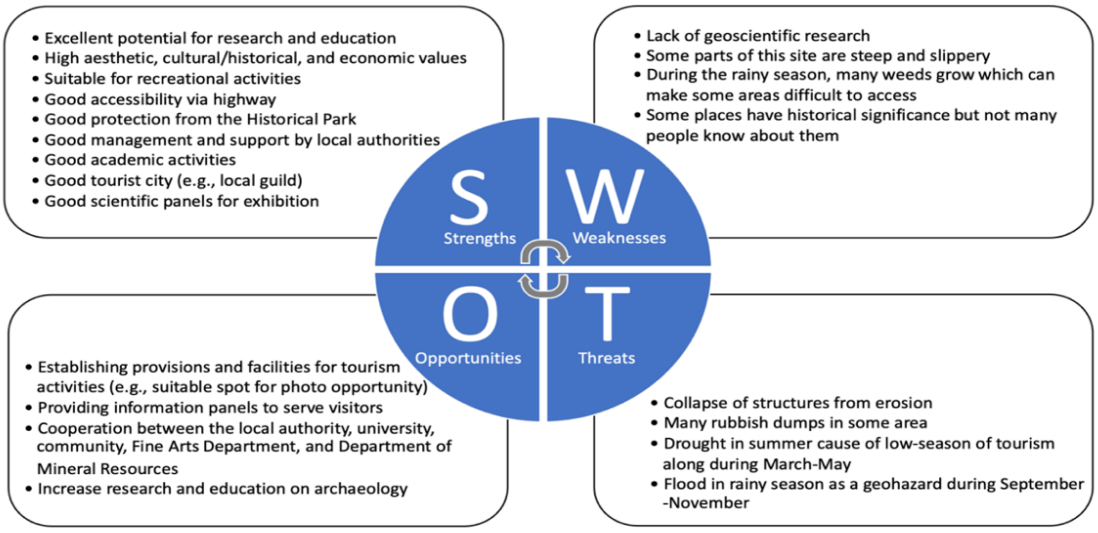


Figure 5 SWOT analysis related to the geoheritage and geotourism development of laterite attractions in Kamphaeng Phet Province, Thailand.

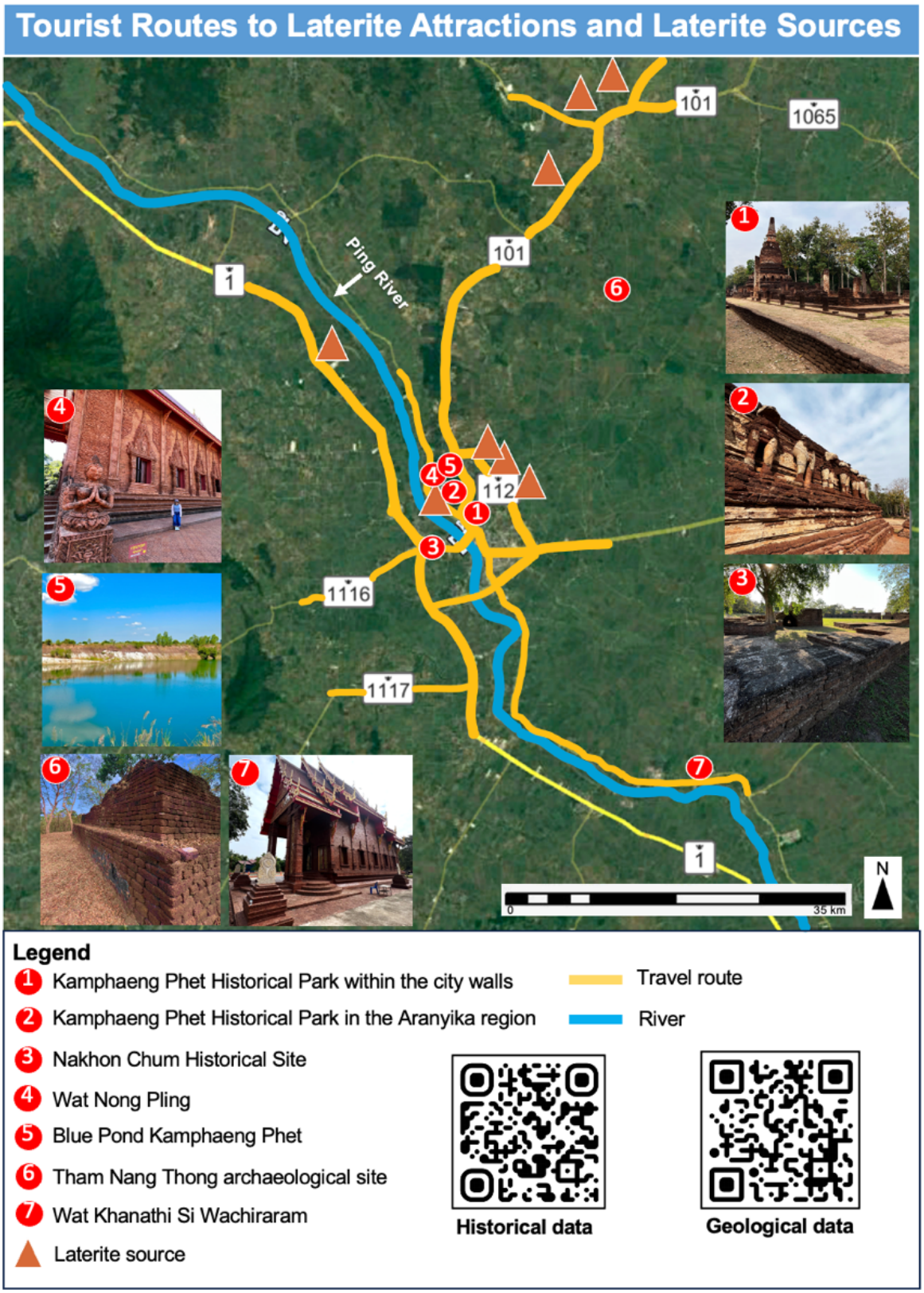


Figure 6 Travel route for laterite attractions and laterite sites in Kamphaeng Phet Province, Thailand.

Table 2 Classification of geosites around laterite attractions in Kamphaeng Phet Province, Thailand.

Area	Geological feature	Geodiversity[1]							Scope[2]	Scale[2]
		Rock	Mineral	Fossil	Landform	Landscape	Process	Other Resources		
Kamphaeng Phet Historical Park within the city walls	There are moats surrounding the attractions located on the terrace and near the Ping River	-	-	-	✓	✓	✓	S, W	Gm, Hd	Mesoscale
Kamphaeng Phet Historical Park in the Aranyika region	Located on a laterite mound and near the Ping River	-	✓	-	✓	✓	✓	La	Gm, Hd	Mesoscale
Nakhon Chum Historical Site	Located in the terrace area and near the Ping River	-	-	-	✓	✓	✓	S, W	Gm, Hd	Mesoscale
Wat Nong Pling	Located in the terrace area and near the Ping River	-	-	-	✓	✓	✓	S, W	Gm, Hd	Microscale
Blue Pond Kamphaeng Phet	Water reservoir	-	✓	-	✓	✓	✓	La, W	Gm, Hd	Microscale
Tham Nang Thong archaeological site	Located on mountain rocks of andesite, rhyolite, agglomerate, and andesitic basalt	✓	✓	-	✓	✓	-	-	Gm, Hd, St	Microscale
Wat Khanathi Si Wachiraram	Located in the terrace area and near the Ping River	-	-	-	✓	✓	✓	S, W	Gm, Hd	Microscale

Note: S – sand, La – laterite, W – water, Gm – geomorphological site, Hd – hydrogeological site, St – structural site.
[1](Gray, 2005); [2](Brocx & Semeniuk, 2007; Đurović & Đurović, 2010)

Table 3 Qualitative assessment of geosites around laterite attractions in Kamphaeng Phet Province for geoheritage, geoconservation, and geotourism.

Area	Scientific value	Educational value	Aesthetic value	Recreational value	Cultural value	Economic value	Functional value	Level of significance
Kamphaeng Phet Historical Park within the city walls	Excavation of soil by archaeologists and the age of the sites	Location for teaching and learning	Archeological site built from laterite	Photo opportunity, worship at the temple	Sukhothai Kingdom/ associated Towns	Income generation through the entrance fee and donations	Department of the Fine Arts of Thailand	International
Kamphaeng Phet Historical Park in the Aranyika region	Excavation of soil by archaeologists and the age of the sites	Location for teaching and learning	Archeological site built from laterite	Photo opportunity, worship at the temple	Sukhothai Kingdom/ associated Towns	Income generation through the entrance fee and donations	Department of the Fine Arts of Thailand	International
Nakhon Chum Historical Site	Excavation of soil by archaeologists and the age of the sites	Location for teaching and learning	Archeological site built from laterite	Photo opportunity, worship at the temple	Sukhothai Kingdom/ associated Towns	Donations	Department of the Fine Arts of Thailand	International
Wat Nong Pling	-	-	Red temple built from laterite	Photo opportunity, worship at the temple	Buddhist	Donations	Abbot and monks	Regional
Blue Pond Kamphaeng Phet	Blue water and red soil	Location for fieldwork	Attractive water	Photo Opportunity and trekking	-	-	-	Local
Tham Nang Thong archaeological site	Andesite, rhyolite, agglomerate, and andesitic basalt	Location for teaching and learning	Unique landforms and features in a mountain	Photo opportunity, hiking/trekking, worship at the temple	Sukhothai Kingdom/ associated Towns	Donations	Department of the Fine Arts of Thailand	National
Wat Khanathi Si Wachiraram	-	-	Red temple built from laterite	Photo opportunity, worship at the temple	Buddhist	Donations	Abbot and monks	State

6. Conclusion

In this study, 33 laterite attractions in Kamphaeng Phet Province were inventoried and categorized into 7 laterite attraction sites based on their geological features and tourism activity. The classification, assessment, and evaluation of these sites considered hydrological and geomorphological aspects, in which the Ping River played a key role in shaping the landscape and landform. The qualitative assessment, based on various values and levels of significance, shows high significance values of geosites surrounding Kamphaeng Phet Historical Park within the city walls and in the Aranyika region, and Nakhon Chum Historical Site. SWOT analysis is used to prioritize the conservation and development of each site. Our study emphasizes the importance of geoconservation, particularly in safeguarding geodiversity and geoheritage resources, offering geotourism potential in areas rich in laterite formation. Lastly, a tourism route map was established as an output from this research, connecting 7 laterite attractions and sources, providing valuable insights into the laterite resources and their potential for geotourism and geoconservation.

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