SUSTAINABLE LANDSCAPE MANAGEMENT USING ECOSYSTEM-BASED APPROACH : A CASE STUDY OF BANG NAM PUENG SUB DISTRICT SAMUTPRAKARN PROVINCE, THAILAND

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By	Miss Panta Yongnarongdetkul
Field of Study	Environment Development and Sustainability
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ปัณณ์ตา ยงณรงค์เดชกุล : การจัดการภูมิทัศน์อย่างยั่งยืน โดยการใช้แนวทางนิเวศวิทยา : กรณีศึกษา ตำบลบางน้ำผึ้ง จังหวัดสมุทรปราการ ประเทศไทย (SUSTAINABLE LANDSCAPE MANAGEMENT USING ECOSYSTEM-BASED APPROACH : A CASE STUDY OF BANG NAM PUENG SUB DISTRICT SAMUTPRAKARN PROVINCE, THAILAND) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: รศ. ดร. สุวัฒนา ธาดานิติ, 133 หน้า.

งานวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาและวิเคราะห์การจัดการทางภูมิทัศน์ของตำบลบางน้ำผึ้ง และประยุกต์ใช้หลักการของการจัดการภูมิทัศน์อย่างยั่งยืนโดยใช้แนวทางพื้นฐานทางระบบนิเวศวิทยาเข้ากับพื้นที่ งานวิจัยนี้มีวัตถุประสงค์เพื่อเสนอข้อเสนอแนะและกลยุทธ์เพื่อการวางแผนเกี่ยวกับของการจัดการทางภูมิทัศน์ที่ยั่งยืนของพื้นที่ศึกษา เพื่อการพัฒนาอย่างยั่งยืนต่อไปในอนาคต งานวิจัยนี้เป็นการวิจัยเชิงคุณภาพโดยใช้วิธีการสัมภาษณ์เชิงลึกและสนทนากลุ่มกับประชาชนในชุมชน ผู้นำชุมชน บุคคลในองค์การบริหารส่วนตำบลบางน้ำผึ้งและผู้มีส่วนเกี่ยวข้องจากหน่วยงานและองค์กรต่างๆ รวมไปถึงการใช้วิธีการสังเกตการณ์จากมนุษย์และธรรมชาติ

ผลจากการวิจัยพบว่าระบบนิเวศของตำบลบางน้ำผึ้งมีความสำคัญและมีความหลากหลาย ซึ่งเกิดขึ้นจากการอยู่รวมกันของระบบนิเวศน้ำจืด ระบบนิเวศน้ำเค็มและระบบนิเวศระบบนิเวศน้ำกร่อย ระบบนิเวศที่มีความหลากหลายของตำบลบางน้ำผึ้งทำให้เกิดความหลากหลายทางชีวภาพ และได้ส่งผลกระทบต่อระบบนิเวศทั้งในระดับจุลภาคและในระดับมหภาค ในขณะเดียวกันตำบลบางน้ำผึ้งกำลังเผชิญกับปัญหาสิ่งแวดล้อมซึ่งเกิดขึ้นจากปัญหาน้ำเสีย ซึ่งกระทบต่อความอุดมสมบูรณ์ของดินและคุณภาพของผลผลิตทางการเกษตร ภัยคุกคามต่อระบบนิเวศและทรัพยากรธรรมชาติในตำบลบางน้ำผึ้งส่วนใหญ่มาจากการขยายตัวของเมืองกรุงเทพมหานครและการเปลี่ยนแปลงการใช้ประโยชน์ที่ดินภายในพื้นที่ตำบลบางน้ำผึ้ง การลดลงของพื้นที่ป่าชายเลนส่งผลกระทบต่อเขตอนุบาลสัตว์น้ำและพื้นที่ป้องกันการกัดเซาะชายฝั่ง รวมไปถึงภัยคุกคามจากปัญหาการรุกล้ำของน้ำเค็มซึ่งส่งผลให้สภาพดินเป็นดินเค็ม ซึ่งก่อให้เกิดการระบาดของโรคพืชและสัตว์

ในขณะที่ปัญหาด้านสิ่งแวดล้อมยังคงเพิ่มขึ้น เพื่อการรักษาขีดความสามารถในการให้บริการของระบบนิเวศและทรัพยากรทางธรรมชาติของตำบลบางน้ำผึ้ง งานวิจัยครั้งนี้จึงนำเสนอการประยุกต์ใช้หลักการของการจัดการภูมิทัศน์อย่างยั่งยืนโดยใช้แนวทางพื้นฐานทางระบบนิเวศวิทยาเข้ากับพื้นที่ และเสนอกลยุทธ์การดำเนินการที่เหมาะสมในการพัฒนาและการจัดการของตำบลบางน้ำผึ้ง การประยุกต์ใช้หลักการของการจัดการภูมิทัศน์อย่างยั่งยืนโดยใช้แนวทางพื้นฐานทางระบบนิเวศวิทยาเข้ากับพื้นที่สามารถเสริมสร้างความผสมผสานระหว่างระบบนิเวศเดิมที่มีอยู่ของพื้นที่กับการพัฒนาใหม่ที่กำลังจะเกิดขึ้น เป็นการสร้างความมั่นใจต่อพื้นที่ว่าทรัพยากรทางธรรมชาติและระบบนิเวศที่มีอยู่นั้นจะได้รับการอนุรักษ์และเสริมสร้างให้มีคุณภาพดียิ่งขึ้น สรุปได้ว่าการส่งเสริมการจัดการภูมิทัศน์อย่างยั่งยืนโดยใช้แนวทางพื้นฐานทางระบบนิเวศวิทยานั้นสามารถเสริมสร้างประสิทธิภาพการพัฒนาและการจัดการของตำบลบางน้ำผึ้ง ซึ่งนับเป็นการเสริมสร้างการทำงานร่วมกันระหว่างสังคม เศรษฐกิจและสิ่งแวดล้อม เพื่อนำไปสู่ความสำเร็จของการพัฒนาอย่างยั่งยืนของพื้นที่ตำบลบางน้ำผึ้ง

สาขาวิชา สิ่งแวดล้อม การพัฒนา และความยั่งยืน ลายมือชื่อนิสิต .....

ปีการศึกษา 2558 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

5587573520 : MAJOR ENVIRONMENT DEVELOPMENT AND SUSTAINABILITY
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PANTA YONGNARONGDETKUL: SUSTAINABLE LANDSCAPE MANAGEMENT USING ECOSYSTEM-BASED APPROACH : A CASE STUDY OF BANG NAM PUENG SUB DISTRICT SAMUTPRAKARN PROVINCE, THAILAND. ADVISOR: ASSOC. PROF. SUWATTANA THADANITI, Ph.D., 133 pp.

This research studied and analyzed the existing landscape management in Bang Nam Pueng sub district and applied the principles of sustainable landscape management using an ecosystem-based approach. The results proposed recommendations and strategies for the future planning of sustainable landscape management in the study area. Field research, in-depth interviews and focus groups including physical and human observations were used for data collection.

Results determined that Bang Nam Pueng sub district had many diverse habitats including freshwater, estuarine and brackish water ecosystems which offered biodiversity on both the micro and macro scales. Meanwhile, Bang Nam Pueng sub district is currently experiencing environmental issues from wastewater problems, the degeneration of the soil by wastewater, reducing of quality and quantity of agricultural products, the intrusion of tidal sea water, the changing of land utilization, the decreasing of mangrove forest resulting in less protection from the Militia Sea. The increased salinity has produced an alkaline soil and the brine has caused both plant and animal diseases. Plant disease has also increased from the discharge of community wastewater.

Local people and the Administration Organization of Bang Nam Pueng sub district are currently focusing their effects on wastewater treatment, but the change in the ecosystem is still ongoing. Hence, to sustain the ecosystems of Bang Nam Pueng sub district sustainable landscape management must be implemented, using an ecosystem-based approach to apply action plan strategies. The development and management of Bang Nam Pueng sub district can successfully interweave functional green infrastructure with new developments, while ensuring that the existing natural resources are retained. The functional connectivity of the area in and around the new developments will be increased by the creation of new habitats on previously ecologically denuded land. This approach could increase biodiversity and ecosystem development. The promotion of sustainable landscape management using an ecosystem-based approach for the development of Bang Nam Pueng sub district could enhance synergy between social, economic, and environmental aspects, and lead to success in sustainability.

Field of Study: Environment Development and Sustainability Student's Signature .....
Advisor's Signature .....

Academic Year: 2015

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INTRODUCTION

1.1 Background and statement of problem

One of the significant causes of climate change and environmental problems is the alteration of the landscape. We live on a dynamic and continuously evolving planet. Landscape changes directly affect biodiversity worldwide and contribute to local, regional, and global climate change (IPCC, 2012; Lovelock, 2007).). Landscape changes impact directly on the ecosystem, affecting its ability to support human needs.

Ecosystems are the very foundations of the environment, society, and economy. They provide us with the goods and services on which our quality of life depends. Caring for the health of ecosystems and ensuring they continue to deliver benefits for future generations must be considered as top priority. The conservation of biodiversity is the key to ensuring healthy ecosystems. Unless they are managed correctly to maintain a thriving biodiversity, ecosystems will malfunction and lose significant value (UNFCCC, 2011). Action is required not only in specially protected areas for wildlife habitat, but also at the ecosystem and landscape scale everywhere on our planet.

Nowadays, landscapes in Thailand are rapidly changing all the time and effect to the entire social, economic and environment aspects. The significant problem is that Thailand still lacks of sustainable landscape management, including solution and policy on landscape planning and management. With the raising of environmental problems that will effect to the health of ecosystem, sustainable development for Thailand is needed to be highly concern on the sustainable landscape management by focusing on ecosystem-based approach. However, Thailand is still lack of the study and research on sustainable landscape management and never has the study and research on sustainable landscape management by using ecosystem-based approach before. That causes the significance of this study; since, it can be concluded that sustainable landscape management using ecosystem-based approach is likely to be a suitable solution for Thailand for protection and conservation of nature and ecosystem services along with continuous development.

This study aims to propose the study area applying sustainable landscape management using ecosystem-based approach and Bang Nam Pueng sub district has been selected. Due to Bang Nam Pueng sub district has significant and distinguished ecosystems, and located in the area that considered as the largest and most important green conservation area nearby Bangkok; thus, Bang Nam Pueng sub district can highlight the value of existing ecosystems and its services on urban areas.

However, Bang Nam Pueng sub district is going to be a popular tourism place and the development plan is ongoing. Also Bang Nam Pueng sub district is a riverside and flood plains area, causing this area to be influenced by sea water during the tide. When the water passes through various canals, the area where the villagers used for agriculture will be affected by flood and alkaline soil. Current management attempts to include environmental and societal concerns although it is fragmented and does not incorporate landscape management and ecosystem-based approach resulting in unsustainable management. Hence, sustainable development is highly needed for Bang Nam Pueng sub district to sustain its value and the existing ecosystem on different scales and take the different distribution of landscape properties and values into account, to keep landscapes differ in their capacities to provide ecosystem goods and services, which are the benefits humans obtain from nature. With the raising of environmental problems that directly effect to its ecosystem and the current management that still unsustainable; therefore, sustainable landscape management using ecosystem-based approach is likely to be one of the best solutions to lead to sustainability.

1.2 Objectives of the study

This study aims to study and analyze the existing ecological system and landscape management of Bang Nam Pueng sub district, and apply the principles of sustainable landscape management using ecosystem-based approach at a landscape scale. This study also aims to provide recommendations and strategies for future planning on sustainable landscape management of the proposed study area towards sustainability.

1.3 Research Questions

1. Why ecosystem-based approach should be applied to the sustainable landscape management of the proposed study area?
2. How to apply the principles of ecosystem-based approach to the landscape management of the proposed study area to lead to its sustainability?

1.4 Expected Outcomes

The study expects to achieve the following outcomes;

1. Application of sustainable landscape management using ecosystem-based approach in proposed study area to provide a case of Thailand sustainable development planning.
2. Results from the study can increase knowledge and encourage application of sustainable landscape management using ecosystem-based approach in Thailand.

1.5 Implication of the research

1. To provide an example of sustainable landscape management using ecosystem-based approach for Thailand sustainable development on landscape planning and management.
2. Recommendations and strategies can inform planning and actions on sustainable landscape management using ecosystem-based approach applicable for Thailand.

CHAPTER II
LITERATURE REVIEW

2.1 Bang Nam Pueng sub district

Bang Nam Pueng sub district is located in Phra Pradaeng district, Samutprakarn province. It is very close to Bangkok just across the Chao Phraya River. The community is surrounded by orchards, canals, and mangrove forests. Bang Nam Pueng is located in the area which is considered to be "lung of Bangkok". This area is the agricultural zone, which is under the specific urban development regulation; therefore, a physical development could only be implemented under limitation in order to protect the green areas from the invasion of urbanization.

The community of Bang Nam Pueng covers about 1,936 Rai (765.5 Acres). It consists of 11 villages and there are 6 canals pass through the community. Because of the river, canals, and mangrove forests surround the community, the soil is fertile and it is suitable for agriculture. People in the community generally grow lemon, wax gourd, white gourd, spiny bitter gourd, banana, mushroom, passion fruit, and flowers.

Most of the villagers are Thai-Mon, whose ancestors migrated to the area over 400 years ago. The Mon culture is preserved in the community, such as Songkran Mon Festival, Saba game (traditional Mon game), and Mon traditional food. In addition, there are beautiful temples in the community which were built in the style and were preserved as national heritage. A deep-rooted community of Bang Nam Pueng is living museums showcasing villagers' lifestyles, which are deeply connected with the rivers and the mangrove palm forest. As such, they established the market as a distribution center for their local products and as a means to generate and increase income for the community.

Bang Nam Pueng sub district is under administration and management of Administration Organization of Bang Nam Pueng sub district. Administration Organization of Bang Nam Pueng sub district focuses on cooperation between local leaders and local people with supporting from government sectors and Non-governmental Organizations. At the present time, Administration Organization of Bang

sub district is promoting Bang Nam Pueng sub district as ecotourism place. With attraction from Bang Nam Pueng floating market and plenty of nature, Bang Nam Pueng sub district became very popular among both Thai and foreigner tourists.

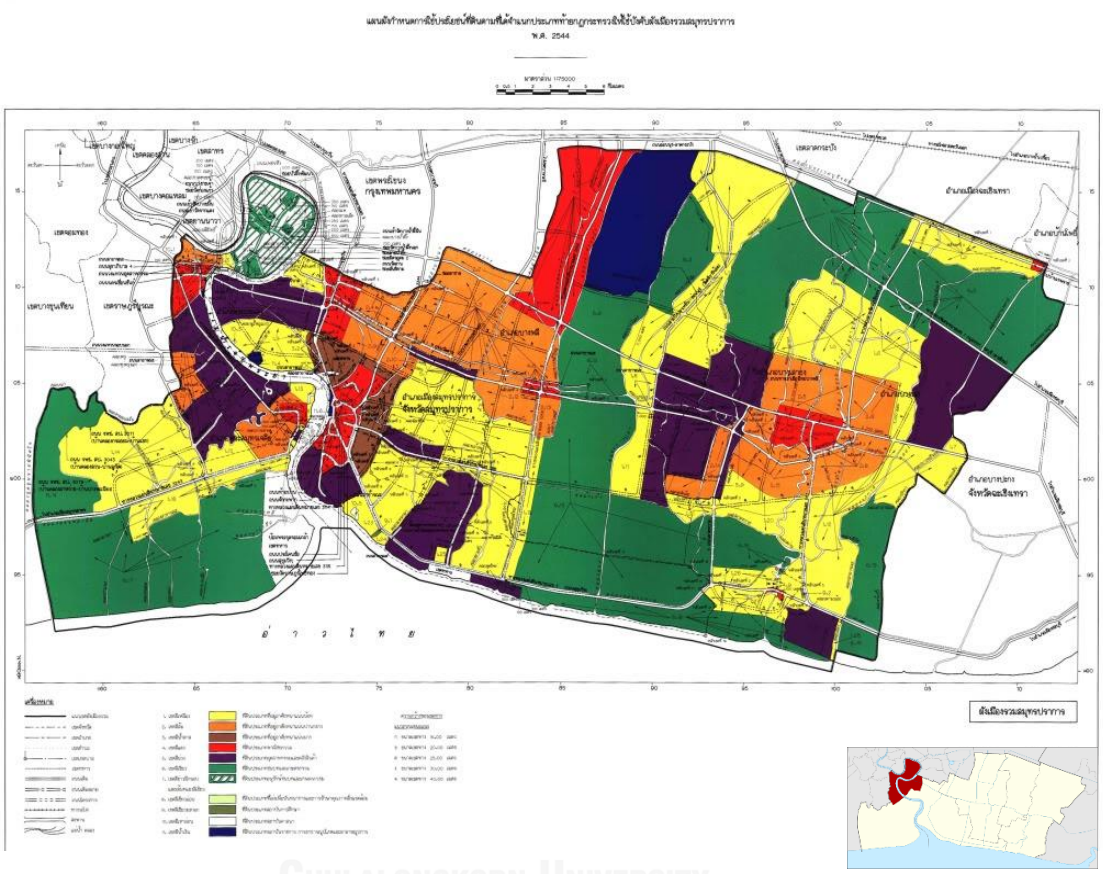


Figure 2-1 Samut Prakarn Province Map (Department of Public Works and Town & Country Planning, 2001)

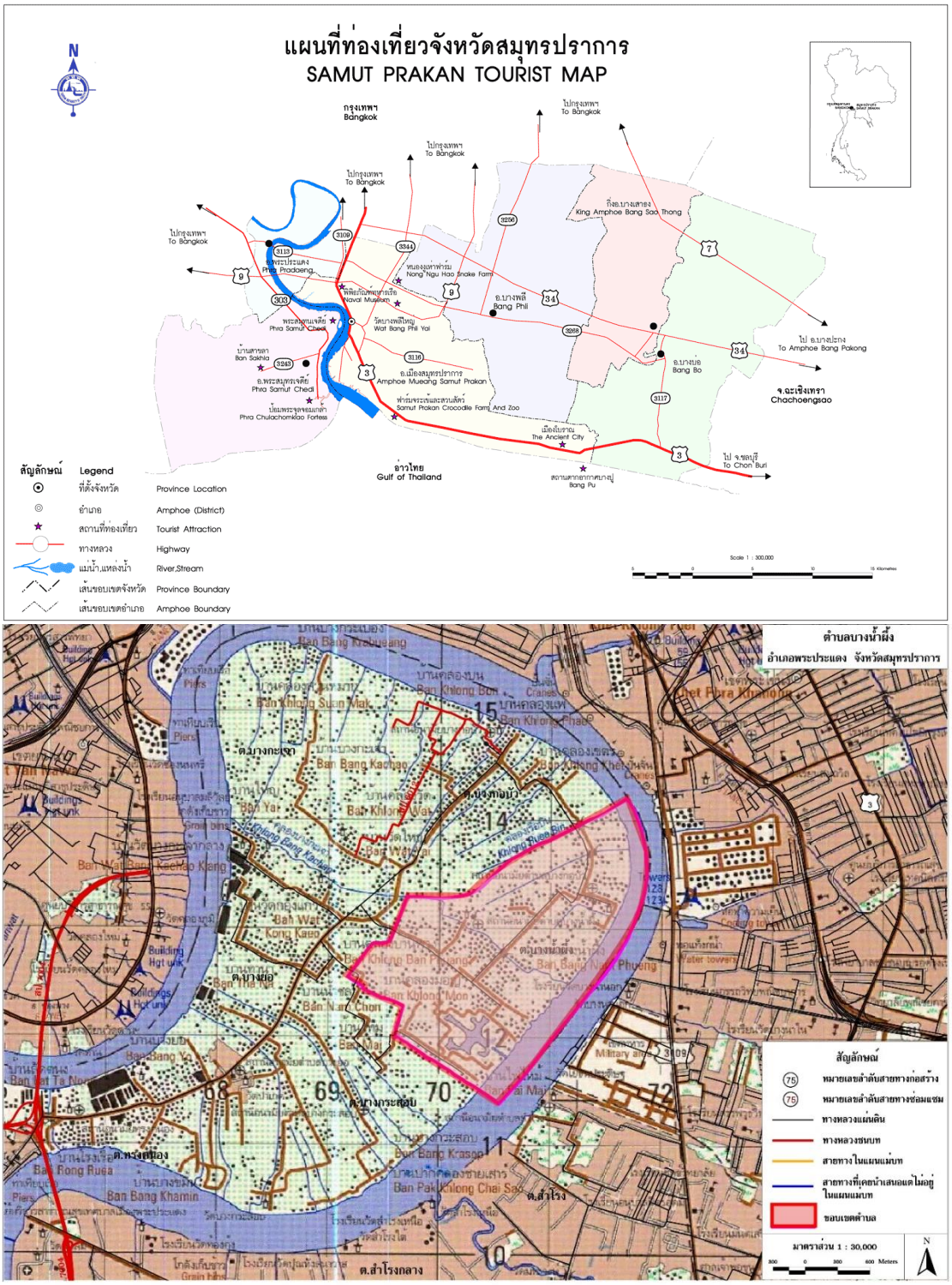


Figure 2-2 Bang Nam Pueng sub district Boundary Map (Administration Organization of Bang Nam Pueng sub district, 2011)

2.2 Meaning of Landscape

"A landscape is part of the Earth's surface that can be viewed at one time from one place. It consists of the geographic features that mark, or are characteristic of, a particular area" (NATGEO, 2013). Landscape refers to both environment surrounding human and the environment itself. Landscapes provide the essential resources for our living including aesthetic values. The concept of landscape links between people and nature and recognizing their interaction with the environment. Landscape can be defined as natural landscape and cultural landscape (UNESCO, 2009).

- ***Natural landscape***

Natural landscape is made up of a collection of landforms, such as mountains, hills, plains, and plateaus. Lakes, streams, soils and natural vegetation are other features of natural landscapes. A natural landscape is intact when all living and nonliving elements are free to move and change. The nonliving elements distinguish a natural landscape from a wilderness a natural landscape may contain either the living or nonliving or both (Irwin, 2001).

- ***Cultural landscape***

  "There exist a great variety of Landscapes that are representative of the different regions of the world. Combined works of nature and humankind, they express a long and intimate relationship between peoples and their natural environment" (UNESCO, 2009)

Cultural landscape is a landscape that people have modified. People and the plants they grow, the animals they care for, and the structures they build make up cultural landscapes. Such landscapes can vary greatly (NATGEO, 2013).

Cultural landscapes categorizes into three main categories: Operational Guidelines 2009, Annex3, (UNESCO, 2009)

1. **Clearly defined landscape designed and created intentionally by man**: This focused on landscapes that constructed for aesthetic reasons which are mostly associated with religious or other monumental buildings and ensembles.
2. **Organically evolved landscape**: This results from an initial social, economic, administrative, and religious imperative and has developed its present form by

association in response to its natural environment reflecting that process of evolution in their form and component features.

3. **Associative cultural landscape**: The inclusion of landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent.

2.3 Sustainable Landscape Management

Landscape provides the fundamental support system for life on earth. Our living environment reflects how human habits of consumption and waste also reflect human's attitudes from the past towards the landscape have resulted in its currently degenerated circumstance. Landscape shapes the spacious environment in physical, economic and social. The quality of the landscape makes the viability of life on earth. "*Every landscape embodies a range of complex, multidimensional and interdependent value and these values must be comprehensively articulated before they can be accurately assessed"* (AILA, 2007). Landscape management strategies must recognize the related of economic, social and environment and processes that involved in landscape management decision-making, and the significance of collaborative approaches to sustainable landscape management resultants.

Created landscape form has become the most common landscape that we rely on to support the majority of human needs. According to The Australian Landscape Principles (AILA, 2007) that landscape management requires an understanding of functions and actuations of the environment as a total system. It involves more than normal arrangement or maintaining trees and vegetation but it includes the impacts of human activity on soils, water, vegetation, biodiversity, ecology and energy using, as well as how we understand, value and interact with our environment. Various landscapes have the capacity of enhancing and regenerating the natural advantages and ecosystem services. Created landscapes have the potential to function as an integral of broader global life support system. The key to encourage this potential is how landscape value is managed.

According to American Society of Landscape Architects (ASLA, 2007) that the issue of environmental problem has brought a new direction of development; thus, how can we manage landscape across a range of scales and still keep the ecosystem of its existence to continuing its services along with the continuous development. There is a highly need to develop the collaborative, equitable, and long-term approaches to landscape planning and management which aim not only to minimize the damage to existing ecosystems but to maximize opportunities for enhancing and regeneration of natural resources. It considers landscape systems in more comprehensive features, including the previous disregarding of ecosystems. The challenge is to develop based on ecosystem approaches in landscape scales along with the development that regarding on sustainable outcomes in terms of economic, social and environment.

Taylor (2009) stated that sustainable landscapes management must analyze and take into account because the changes can affect the property. This designation produces the increasing of number of people that demands new infrastructures and facilities. It attracts a greater number of investors and absolutely with the new development. As a result, these can threaten the abundance of natural resources of the areas also effect to their ecosystem. It is essential to have an effective management plan that can estimate and control these changes, as well as defining the acceptable limits of the development to preserve the values and significances of the landscapes. Sustainable landscape management plans usually contain management objectives and strategies for conservation, protection and enhancing natural resource, environment and ecosystem service, including raising people awareness.

Sustainable landscape management is highly needed for sustainable development. Solutions and policies in sustainable development on landscape planning and management should base on analyzing the existing condition, using, and significances of the areas, and the sustainable management requirements of the significant components. To maintain the essential functions of the landscapes and its values that will be benefit for future generations.

Guidance for Sustainable Landscape Management (Federal Agencies on Sustainable Practices for Designed Landscapes, 2009)

According to Guidance for Federal Agencies on Sustainable Practices for Designed Landscapes (USBG, 2010), sustainable landscape management aims to create the sustainable development along with the balancing of natural resource use and affect with low impacts of environment with the maintaining of ecosystem services and its value. Therefore, the guidance for sustainable landscapes management is according to the sustainable development in three major aspects which are economic, social and environment under the sustainable landscape management framework. The best practices and performance goals for the design, construction and maintenance of sustainable landscape management are described in the Sustainable Sites Initiative (SITES, 2009). The following principles served as a foundation for the recommendations in this guidance.

Do no harm: Avoid changes to the site that will degrade the natural environment and promote reuse and improvement of sites with previous disturbance or development.

Precautionary principle: Do not create risk to human and environmental health. Examine a full range of alternatives, including no action.

Design with nature and culture: Create and implement designs that are responsive to economic, environmental, and cultural conditions at local and regional levels.

Use a decision-making hierarchy of preservation, conservation, and regeneration: Maximize and mimic the benefits of ecosystem services by preserving existing environmental features, conserving resources in a sustainable manner, and regenerating lost or damaged ecosystem services.

Use a systems thinking approach: Understand and value the relationships in an ecosystem and sustain ecosystem services; strive to re-establish the integral and essential relationship between regenerative systems (natural processes) and human activity.

Provide regenerative systems: Provide future generations with a sustainable environment supported by regenerative systems and resources.

Support a living process: Continuously re-evaluate assumptions and adapt to demographic and environmental change.

Use a collaborative and ethical approach: Encourage direct and open communication among colleagues, clients, other agencies, manufacturers, and site users to link long-term sustainability with environmental stewardship.

Maintain integrity in leadership and research: Implement transparent and participatory leadership, develop research with technical rigor, and communicate new findings that foster sustainable landscapes in a clear, consistent, and timely manner.

Foster environmental stewardship: In all aspects of site development and maintenance, foster ethic of environmental stewardship with the understanding that healthy ecosystems improve the quality of life for present and future generations.

The guidance describes goals and strategies to achieve sustainable outcomes rather than definition of solutions and technology. It intends to inspire flexibility, innovation, and culture changing; including applies to new constructions, major renovations, and existing sites and to create less impact to the existing small scale landscaping. The recommendations accommodate regional differences and can be adapted to support diverse organization's missions and policies.

2.3.1 Sustainable Landscape Management Criteria (The Dutch association for Landscape Ecology (WLO), 1997)

According to "Things to do: proactive thoughts for the 21 century" of the Dutch association for Landscape Ecology (WLO, 1997), the international concerns have motivated the development of universal criteria that establish a standard framework for the definition and evaluation of sustainable landscape management. The criterion is developed to address specific aspects of sustainable development. Whereas there is general consensus regarding many of these general criteria, developing a strong set of specific indicators is proving time consuming. The variations among the landscapes create extreme variations in how the criteria can be measured. The sustainable landscape management approach to ecosystem based management may finally result in each area that develops its own specific indicators for these generalized criteria**.**

Table 2-1 Criteria for the development of sustainable landscape management (WLO, 1997)

Quality of the (a)-biotic environment		**Quality of the social environment**		**Quality of the cultural environment**	
Environment	**Ecology**	**Economy**	**Sociology**	**Psychology**	**Physiognomy**
1.1 Clean environment 1.2 Food and fiber sufficiency and quality 1.3 Regional carrying capacity 1.4 Economic and efficient use of resources 1.5 Sustainable, site-adapted and regionally specific production systems	2.1 Biodiversity 2.2 Ecological coherence 2.3 Eco-regulation 2.4 Animal welfare	3.1 Good farming should pay-off 3.2 Greening the economy 3.3 Regional autonomy	4.1 Wellbeing In the area 4.2 Permanent education of farmers 4.3 Access to participation 4.4Accessabillity Of the landscape	5.1 Compliance to the natural environment 5.2 Good use of the landscape's potential utility 5.3 Presence of naturalness 5.4 A rich and fair offer of sensory qualities 5.5 Experiences of unity 5.6 Experienced historicity 5.7 Presence of cyclical developments 5.8 Careful management of the landscape	6.1 Diversity of landscape components 6.2 Coherence Among landscape elements 6.3 Continuity of land-use and spatial arrangement

2.4 Ecosystem-Based Approach

There is a growing awareness to sustain human uses of landscapes, its ecosystems and the plants and animals that naturally live in those ecosystems must be protected and maintained. This awareness is based on the understanding that human communities and their economies depend on the benefits and services from healthy ecosystems. To continuously sustain of benefits and services such as high-quality wood, clean water, mean that developing plans and action activities should protect or maintains natural

landscape patterns, quality and quantity of plant and animal species, and long-term ecological productivity (Silvafor, 1999).

Ecosystem-based approach integrates the management of landscape, ecosystems and biodiversity into overall strategy to help people and ecosystems adapt to the unfavorable impacts of environmental issues, such as changing climate conditions (Colls, 2009). Devisscher (2010) stated that optimum overall ecosystem-based strategies will endeavor to maintain ecological functions and services at the landscape scales in combination with multi-functional land uses and benefits. This approach depends highly on healthy and resilient ecosystems, which are able to carry ecosystem services to support adaptation and well-being of societies when facing of various pressures from the development that can be internal to the society and ecological system or external, such as extreme events in the short term or climate change in the longer term.

Vignola (2009) also stated that *"Ecosystem-based approaches and landscape can be applied to all types of ecosystems at the different landscape scales from local to continental and international scales".* The multi-scale landscapes of ecosystem-based means that this approach integrates a scope of disciplines, performers and institutions interacting at different governance levels and influencing various decision systems.

2.4.1 Ecosystem-Based Planning Principles

Ecosystem-based are necessary in order to protect and maintain ecological health and biological diversity at all scales, from small area and water ecosystems to large landscape. Human cultures and economies depend on healthy ecosystems and biological diversity. Planning human activities that protect, maintain, and restore ecosystem health and biodiversity is the basis for developing sustainable human economies and cultures. Activities are ecologically responsible, because they ensure that ecological can continue to support at the present time and for next generation. Human uses ecosystem-based planning to protect, maintain, and restore healthy ecosystems and biological diversity, and to develop diverse, as Hammond (2002) stated that *"Ecologically sustainable economy, ecosystem-based planning is a system that may be effectively apply in unmodified to highly modified landscapes, and may be used*

for a wide range of purposes from conservation area design to resource development, settlement design, and urban planning"

Ecosystem-Based Planning: Principles and Processes

According to Hammond (2002), important principles that underlie ecosystem-based approach include:

1. ***Focus on what to leave, not on what to take.*** An ecosystem-based approach leaves fully functioning ecosystems at all spatial scales through time. Biological diversity is protected, including genetic, species, community, landscape, and regional diversity. Natural composition, structures, and functioning of ecosystems are maintained, ranging from small patches of trees or wetlands, to large river basins or regions.

2. ***Recognize the hierarchical relationship between ecosystems, cultures, and economies.*** Economies are part of human cultures, and human cultures are part of ecosystems. Therefore, protecting ecosystem functioning provides for healthy human cultures, and the economies that are part of these cultures.

3. ***Apply the precautionary principle to all plans and activities.*** The precautionary principle deals with uncertainties by directing that decisions, interpretations, plans and activities must err on the side of protecting ecosystem functioning, as opposed to erring on the side of protecting resource exploitation. In other words, if you are not sure that an activity will protect, maintain, or restore ecosystem functioning, do not do it.

4. ***Ensure that the planning process is inclusive of the range of values and interests.*** Ecosystem-based planning provides for full discussion and debate of issues, based upon the best available information, by participants who represent the spectrum of values and interests that may be affected by the plan. Shared decision-making by all participants characterizes an egalitarian approach to planning.

5. ***Protect, maintain, and, where necessary, restore ecological connectivity, and the full range of composition, structures, and functioning of enduring features, natural plant communities, and animal habitats/ranges by establishing large reserves, linkages, and an interconnected network of smaller reserves throughout all areas of***

the landscape. This is particularly important in areas that are likely to be altered due to human settlement and economic activity.

6. ***Provide for diverse, ecologically sustainable, community-based economies***. To be sustainable and provide for social equity, economies need to facilitate a diverse range of activities that focus on fulfilling individual and community needs, and on protecting and maintaining natural capital. Healthy communities both depend upon, and sustain, healthy and diverse ecosystems.

7. ***Practice adaptive management.*** Within the constraints of the precautionary principle and ecological responsibility, undertake a variety of activities. Continuously evaluate the success of all activities at maintaining or restoring ecological health and biological diversity.

2.4.2 Ecosystem-Based Management

According to Clarke (2010), ecosystem-based management (EBM) is different from a single species or single sector approach to management by considering complicated interactions between human and the living and non-living environment over multiples scales in space and time. The goal of Ecosystem-based management is to manage sustainably both target and non-target species by preserving or restoring habitat quality to retain ecosystem services. Ecosystem-based management emphasizes connectivity within and between networks, such as between land and sea, focuses on the consequences of human actions within a particular ecosystem. Also emphasizes the protection and restoration of ecosystem structures, functions and processes, and integrates biological, socioeconomic and governance perspectives.

Using land and resources by human may result in significant changing of ecosystems, disrupting connectivity within and between habitats. Changing of ecosystems may reduce their health, productivity and resilience. Therefore, it must be managed to ensure ongoing availability of ecosystem services. It is important to understand that Ecosystem-based management is focused on management of human activities within ecosystems and not just the ecosystems themselves. Ecosystem-based management is a framework that can be applied to site-based projects along with the development by ensuring that management goals are focusing on protecting and restoring the natural

structure of ecosystems to maintain ecosystem services including concerning in social dimensions of resource using and ecosystem values into management. Recognizing the impacts of uncertainty and variability in dynamic ecosystems and concern in common vision among stakeholders, also informed and adapted from learning based on science and local knowledge (Clarke, 2010).

2.4.3 Sustainable Landscape Management and Ecosystem-Based Concept

"Landscape ecology integrates both of biophysical and analytical approaches with humanistic and holistic perspectives across the natural sciences and social sciences" , The Wildlife Trusts (WT, 2010). The concept considers the complex spatial relationships in the landscape that are flows of nutrients, energy and species of plants and animals and how these are affected by abiotic and biotic drivers. Landscapes are often modified by human usage that much of living landscape ecology is concerned with explaining the functionality of habitat patches within dominant land uses that usually built development or agricultural land.

Sustainable landscape management with the ecosystem-based approach, when combined with the planning and habitat network could help resolve conflicting land use objectives. Certainly, it would promote on synergies between social, economic and environmental goals. Such as, in urban and sub urban areas where development pressures are usually highest, spatial approaches and habitat network could be used to interweave functional green infrastructure into new developments. This could help in conflict resolution early in the planning process. *" Sustainable landscape management with the ecosystem-based approach could result in biodiversity being enhanced by development and assuming that existing natural heritage features are retained, and the functional connectivity of the area in and around the new development is increased by new ecologically habitat creation on former land*"(IALE, 2012).

2.5 Lessons Learned from various sustainable landscape management experiences

2.5.1 Lessons learned of sustainable landscape management and ecosystem-based approach

Sustainable landscape management practices have increase improvements over the past two decades as governments and private sectors attempted to incorporate sustainable development principles and practices into landscape management systems and operations. In many cases, landscape management can be identified within these procedures. Sustainable landscape management concepts are not new. Mostly of current resource management has no successful in balancing land and resource use with the need to protect and conserve the natural resources and land base. Instead, resources are generally assigned for development without considering other resources, users or the capacity of the land. There is limited utilization of time and area considerations, and inadequate of the assessment and management of further effects. Sustainable landscape management promotes continuous change that authorizes significant improvement to the procedures, delivers results on the land, and provides conviction for improvement on natural resource management. It approaches planning from the aspect of whole landscapes, which makes it apart from current systems. Sustainable landscape management optimizes a wide range of economic, social and environmental objectives, and addresses a multi-purpose of industrial, recreational, cultural and other activities.

Case Study 1: Canada's National Policy in Sustainable Landscape Management

According to Canadian Integrated Landscape Management Coalition (ILM, 2005), many countries around the world are recently focusing on sustainable landscape management and attempt to impel into the national policy process. In case of Canada, sustainable landscape management is guided by decisions made at the policy and planning stages, before the allocation of resources. Sustainable landscape management can also help address situations where conflicts arise among rights that have already been allocated. Managing the disposition process is critically important. Sustainable landscape management enables increased integration among departments, allowing for

a coordinated, multi-sectorial rights disposition process to determine what rights may be disposed over the geographic area in question, and how the collective rights of various land users could be managed to ensure sustainability.

Figure 2-3 Ontario Power Genaration, OPG's regional biodiversity programs on sustainable landscape management (http://www.opg.com/, 2013)

Using ecological criterions to define limits on impacts or on the intensity of activity is not widely used today but is an essential aspect of sustainable landscape management. Creating criteria is necessary for successfully managing further environmental effects. This is very important where the effects result from individual activities of small to moderate impact. This approach provides a great opportunity to improve land and resource management, including decision-making; thus, activation of environmental, social and economic objectives to be achieved effective in each provinces and across Canada as a whole (ILM, 2005).

Case Study 2: Conservation International Planning on Sustainable Landscape Management Using Ecosystem-Based Approach

Conservation international (CI) attempts to bring sustainable landscape management using with the ecosystem-based approach to reduce and prevent the impacts from climate vulnerability. Climate-friendly sustainable landscape management comprises a suite of sustainable production and landscape management practices that reduce greenhouse gas emissions and allow carbon to be maintained in forests, other

vegetation, pastures and soils. Most current land use practices are significant sources of carbon dioxide, second only to fossil fuels. Certain types of agriculture practices also emit high-impact greenhouse gases such as methane (CH4) and nitrous oxide (N2O). Sustainable landscape management practices have highly potential to capture massive amounts of carbon in vegetation and to ensure its storage in healthy soils. Also it can improve agricultural production and provide opportunities for communities to adapt to climate change. For example, tillage that has been practiced that maintains carbon stocks can improve water retention capacity and increase the efficiency of nutrient use. Also how farmers organize their land use can improve water quality, control soil erosion and increase carbon stocks. *"A diverse landscape with a mosaic of natural ecosystems and product zones is inherently more resilient to drought, floods, wildfires, pests and other phenomena that will be exacerbated by climate change. Conservation International is currently pursuing this work in Brazil's Cerrado and southern Amazon region and provinces developing oil palm and Liberia's bio- diverse forests and landscapes for agricultural and forest commodities* (CI, 2012).

Case Study 3: Living Landscapes towards Ecosystem-Based Conservation in Scotland

Living Landscapes towards ecosystem-based conservation in Scotland is one of the good exercises that integrated between sustainable landscape management and ecosystem-based approach. In recent years, both Government and voluntary sector organizations involved with biodiversity conservation have increasingly realized that to reverse continuing declines in biodiversity. It needs to take action not just in specially protected areas for wildlife, but also throughout the wider countryside, at the ecosystem or landscape, scale. There is also growing concern that the speed of climate change will exacerbate the effects of habitat fragmentation as species become marooned in unsuitable climate space, unable to adapt or migrate under rapid environmental change. Coupled with this is a move towards a holistic approach to environmental policy making, working to consider whole systems rather than individual elements of the system.

Case Study 4: The Scottish Wildlife Trust (SWT) Concepts Associated with Ecosystem-Based Approach and Sustainable Landscape Management.

Working at an ecosystem scale does not mean abandoning more established methods of conservation such as designating and managing protected areas, or targeting management at priority species and habitats. The Scottish Wildlife Trust (SWT, 2009) sees ecosystem-based conservation means of delivering a coherent package of measures at multiple scales. At one end of the scale this might include micro-scale measures, such as the management of a veteran tree or the provision of a green roof; at the other end of the scale it will include better spatial planning to maximize environmental, social and economic benefits at regional and national levels. The multiple-level nature of the ecosystem-based approach is the key to its success. No one component of the system is treated in isolation from any other component.

It will be possible to develop much more strategic approach to result the threats to biodiversity and prioritize the use of resources at the appropriate scale. It is also an approach which over time should encourage cooperate rather than conflicts between social, economic and environmental issues. There is an ongoing debate on what an ecosystem-based approach means in practice by changing emphasis towards such an approach, it will create the best use of limited resources. The purpose is to try and explain some of the theory behind the ecosystem-based approach and advocate its adoption widely in Scotland. It will also suggest a range of actions which can be undertaken by Government, non-Governmental organizations, landowners and other stakeholders to practically apply an ecosystem-based approach. Furthermore, it will attempt to clarify some of the terms and concepts associated with ecosystem-based approach and sustainable landscape management action, many of which tend to be interpreted differently by different stakeholders (SWT, 2009).

Figure 2-4 People learning at community Centre: The needs of communities is a key principle of the ecosystem approach (Scottish Wildlife Trust (SWT), 2009)

Figure 2-5 Areas of the uplands in Scotland (Scottish Wildlife Trust (SWT), 2009)

2.5.2 Conclusion of Lessons Learned from various sustainable landscape management experiences

According to lesson learned and experiences, governance at sustainable management in landscape level tends to be more challenging and complex than it is for individual protected areas. There are absolutely more stakeholders including, for example, protected areas of various types, various levels of government, various sectors within government, private landowners, extractive industries, and people who rely directly on natural resources for their livelihood. As a result there is a likely to be great diversity of benefits and values and the potential for conflict over those diverse benefits and values. In response to this challenge, all around the world should concern on variety of principles and approaches to governance and decision-making that are relevant for sustainable landscape management using ecosystem-based approach, for example, watershed management approaches and the convention on biological diversity's ecosystem approach, and learning from such experiences will be important for sustainable landscape management by using ecosystem-based approach.

CHAPTER III
RESEARCH METHODOLOGY

3.1 Guidance and Framework

This study would like to apply sustainable landscape management guidance and ecosystem-based planning principles for leading the direction of principles and processes of application to sustainable landscape management using ecosystem-based approach. Including, supporting the suitable methods and tools for the study.

Sustainable landscape management guidance (Federal Agencies for Designed Landscapes, 2009):

- Do no harm
- Precautionary principle
- Design with nature and culture
- Use decision-making hierarchy of preservation, conservation, and regeneration
- Use a systems thinking approach
- Provide regenerative systems
- Support a living process
- Use a collaborative and ethical approach
- Maintain integrity in leadership and research
- Foster environmental stewardship

Ecosystem-based planning principles (Hammond, 2002):

- Focus on what to leave, not on what to take.
- Recognize the hierarchical relationship between ecosystems, cultures, and economies.
- Apply the precautionary principle to all plans and activities.
- Ensure that the planning process is inclusive of the range of values and interests.
- Protect, maintain, and, where necessary, restore ecological connectivity, and the full range of composition, structures, and functioning of enduring features, natural plant communities, and animal habitats/ranges by establishing large

reserves, linkages, and an interconnected network of smaller reserves throughout all areas of the landscape.

- Provide for diverse, ecologically sustainable, community-based economies.
- Practice adaptive management.

Conceptual Framework

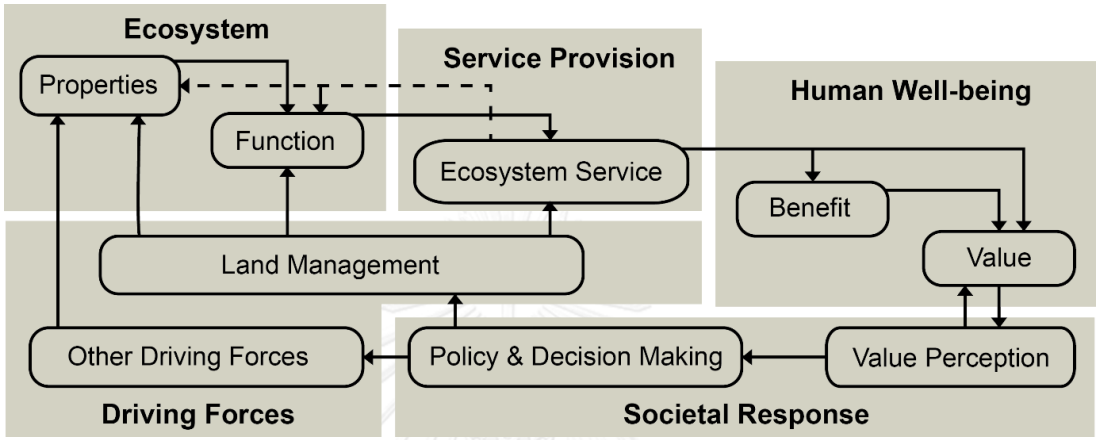


Figure 3-1 Framework for systematic indicator selection to assess effects of land management on ecosystem services (Alexander, 2012)

According to framework for systematic indicator selection to assess effects of land management on ecosystem services from (Alexander, 2012) that landscape management is an important factor that affects ecosystem services provision. However, interactions between landscape management, ecological processes and ecosystem service provision are still not fully understood at the present time. Therefore, indicators in this framework can help to better understand these interactions and provide information for policy-makers to prioritize landscape management interventions.

This framework distinguishes between ecosystem properties, ecosystem functions, and ecosystem services. The concepts in this framework are used to evaluate the effects of landscape management on ecosystem health and were found that it is not only affected to ecosystem properties, but also ecosystem functions and services directly, and absolutely effect to human well-being. This proposed framework can be used to determine quantitative links between factors, so that landscape management effects on ecosystem services provision can be modeled in a spatially definite manner. Thus, it is

explicit that this framework can be applied for evaluation and indicates the significances of the link between landscape management and ecosystem-based approach.

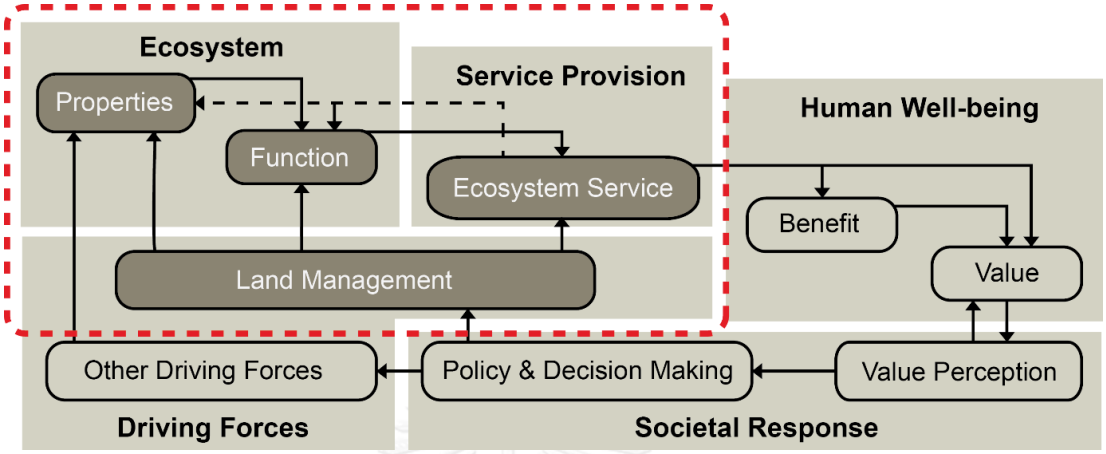


Figure 3-2 Scope of study from Framework for systematic indicator selection to assess effects of land management on ecosystem services (Alexander, 2012)

As figure 3-2 shows, this study focuses on the linkage between these factors; ecosystem, service provision and land management aspects and the framework serves as a foundation of the scope of study. These concepts along with the principles of sustainable landscape management and ecosystem-based planning will be applied to the study of Bang Nam Pueng area at a landscape scale for more integrated and sustainable approach to landscape management.

3.2 Research Design

This study focuses on the significance of landscape management using ecosystem-based approach and how it is effective for the proposed study area. Thus, this study would like to propose recommendations and strategies for the proposed study area on landscape planning and management direction.

The study uses both of quantitative and qualitative research methods to collecting data and gather in-depth information that related to the topic. And the main qualitative methods are document analysis, field observation and in depth interview by using focus group discussion with people, organization and government sectors that are involved

with the proposed study area and in the field of study. Including studying of the related case studies, after the study of the case study can be the survey and observation in the specific areas. Also using the questionnaire and interview with people who are related in the field of study.

- **Conduct a literature review**

Research and academic papers that related to sustainable landscape management and ecosystem-based approach; including, research and academic papers that related to the study area will be selected and conducted. Also the papers or reports from the government sectors or involve certificated organizations will be investigate, analyze and evaluate to conduct literature reviews.

- **Gather the data**

After getting the data and information, gathering the data and information was carefully managed and monitored to make sure that all of them are correct, up to date and useful.

- **Analyze and interpret the data**

After screening the data and information, analysis and interpretation the data and information are the most important step. Analysis and interpretation data and information were applied under theories and principles of sustainable landscape management and ecosystem-based; including, facts, experiences, knowledge, useful suggestions and integration to accomplish all of the objectives of the study.

- **Prepare and present findings**

All of the findings was written with highly rational and accurate. Presentation used suitable methods such as pictures, tables, maps and graphics to present the findings understandable. The value of proposed recommendations and solutions are expected for final report. The answers of all the questions are useful for all sectors that involve with the field of study.

3.3 Data Collection

3.3.1 Primary data collection

This method explores the data and information in the field of study and initiative assessing the information by compare and evaluate from the different sources of those data and information. The processes are as follow:

- **Field research**

Field research applies to the study by finding the validity of the related document and use it as a baseline to construct the framework and guidance for the study's processes. Also evaluate selected suitable documents that useful and efficiency for the further study. Information that the study mainly focusing on are as follow:

1) Information about current status and future trend of sustainable landscape management in Thailand; including, current specific areas that using sustainable landscape management, indicators, measurements and assessments in term of sustainable landscape management.

2) Information about current situation and statistic data of ecosystem-based approach in Thailand; including, previous, ongoing and future projects.

3) Information about landscape management using ecosystem-based approach that already occurred in Thailand by studying, finding the outcomes and assessing across the frameworks and guidelines that have been selected.

4) Information about current situation and existing landscape management of the study area, including national and local policy and planning that will focusing on sustainable landscape management by ecosystem-based approach.

- **Observation**

This study uses both of physical observation and human observation specific in the proposed study area. Physical observation mainly focused on ecology change; such as, the decreasing of the number of birds. Human observation focused on local people behavior and the management, including the changing in natural and cultural

landscapes; such as, settlement increase by the new housing project. Those are the driver factors of the ecology changes that directly related to the reduction of biodiversity and affect to the ecosystem.

- **In-depth interview and focus group discussion**

In-depth interview focuses on local people, administration organization, and government sectors that are involved to all aspects of the study.

1) People that are in the field of the study including people who used to study or work in the field of environment that is specially focus on environmental issues or natural study that focusing on ecosystem and biodiversity issues. Also people who used to study or work in the field of socio-economic that focusing on the assessment of the impacts from ecology changes.

    a. People herein also included people who used to expose and experience in the areas that related to the field of study.

2) Organization that the study focusing on is the organizations those take responsibility in the landscape management and environment issues such as Green World Thailand and The Urban Green Scene Thailand or organizations those take action on corporate social responsibility is also considering.

3) Government sector is focusing on the current policy and measurement also the future planning that take response in environment and land use planning issues. Such as, Department of Environmental Quality Promotion and Department of Public Works and Town & Country Planning. It consists of the sectors that involved with the field of study and the sectors that involved with the study areas.

4) Local administration organizations that take responsibility for development, management and planning of the proposed study area and local people who live in the proposed study area.

For focus group discussion held in March, 9 people were selected by purposive sampling method (Bernard, 2012) due to their involvement with environmental

management of Bang Nam Pueng sub district. The focus group members consisted of community leader, local people, local governmental officer and university student. These respondents provided their input and perspectives regarding environment and conservation issues relevant to environmental management in Bang Nam Pueng sub district. This focus group discussion supplemented the data collection from in-depth interviews and field observations.

3.3.2 Secondary data

Using secondary data provides the accurate background work needed that has already been carried out such as from literature reviews, case studies, published texts and statistics could have been already used elsewhere, media promotion and personal contacts have also been utilized. This wealth of background of the data means that secondary data has a pre-established degree of validity and reliability. Furthermore, secondary data is also helpful in the research design of subsequent primary research and can provide a baseline with which the collected primary data results can be compared to.

3.4 Data Analysis

After gathering data, the analysis of the data for assessing and evaluate all of the data will apply across framework and guidance and based on the conceptual framework of the study. The analysis will be covering all of the sustainable development aspects; environment, development and sustainability. The base analysis methods to analyze and assess the data are selected as appropriate as follow:

- **Decision Theory (Einhorn, 1981)**

This research used sustainable landscape management and ecosystem-based approach principles to theorize decisions on human behavior, environmental and cultural changes, current landscape management and planning of Bang Nam Pueng sub district. However, decision theory is not quite as all-embracing, it focuses on only some aspects of human activities. In particular, it focuses on how people use their knowledge and wisdom. In the situations treated by decision theorists, there are options to choose between, and choose in a non-random way. Their choices in these situations are directed

objective activities. Hence, decision theory is concerned with directed objective behavior in the presence of selections. There are periods in which most of the decision-making is made, and other periods in which most of the implementation is taking place.

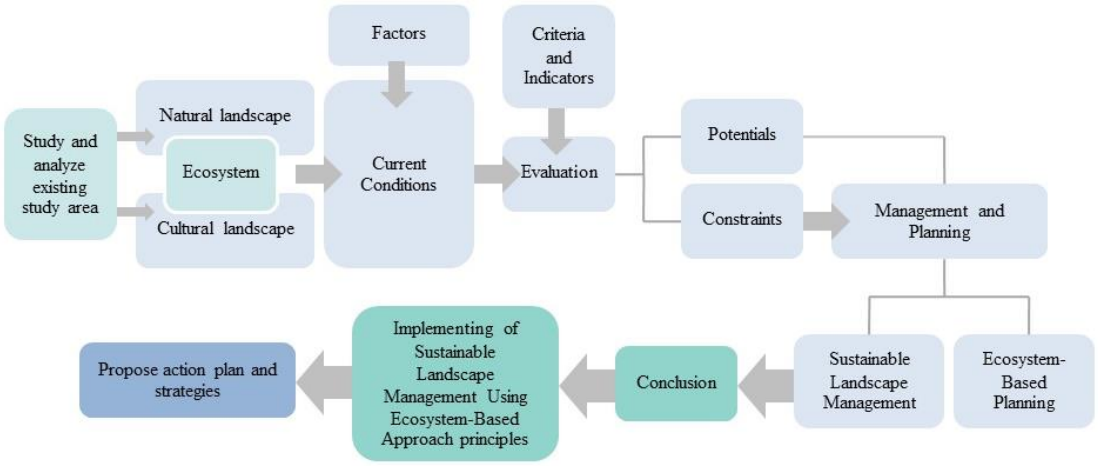
- **Environmental Policy Analysis and Practice; Six Policy Analysis Criteria (Greenberg, 2007)**

Governance and policy for environmental and landscape management tend to be more challenging and complex than it is for individual protected areas. There are potentially more stakeholder groups including, for Bang Nam Pueng sub district case; protected areas of various types, various levels of government, various sectors within government, private landowners, extractive industries, and local people who rely directly on natural resources for some or all their livelihood. As a result there is a likely to be great diversity of interests and values and the potential for conflict over those diverse interests and values. In response to this challenge, an analysis approaches to governance and decision-making that are relevant for landscape-level environmental management that have been implemented; including, for example, biosphere reserves, various wastewater management approaches, and the Convention on Biological Diversity's ecosystem approach, and learning from such experiences will be important for creating a common understanding in the new environmental management initiatives at the landscape level.

- **SWOT Analysis (Strengths, Weaknesses, Opportunities, and Threats)**

This research used SWOT Analysis to identify strengths, weaknesses, opportunities and threats of Bang Nam Pueng sub district by focusing on the performance of environmental and landscape management; including, ecosystem retention. Using SWOT Analysis assigned the value of natural resource, ecosystem and its services in Bang Nam Pueng sub district while indicated the significant environmental issues that occurred and affected to ecosystem function and services that tend to be more severe in the future. SWOT analysis also assigned opportunities for planning and management of Bang Nam Pueng sub district that could be developed for proposed action plan and strategies for sustainable landscape management using ecosystem-based approach of Bang Nam Pueng sub district.

3.4.1 Step of Study and Analysis Proposed by the Author



3.5 Scope of Study

This study focuses on the significance of applying sustainable landscape management using ecosystem-based approach principles with the proposed study area and how it is effective and can lead to sustainability. From the objective, Bang Nam Pueng sub district is selected as the study area. In order to Bang Nam Pueng sub district is located at Bang Kra Chao island area that consider as a largest and most important green conservation area of Bangkok; thus, Bang Nam Pueng sub district can represent the value of its existing ecosystem that the community completely relies on.

However, as rapidly expansion property developments inside of Bangkok city, Bang Nam Pueng area is located in Samutprakarn province that consider as a metropolitan will be directly affected from the expansion of the capital development and the changing of land use. Nowadays, Bang Nam Pueng has been deteriorated its pristine environment and natural resources, as large amounts of its green areas are lost each year to housing estates and fruit plantations. Residents are selling their lands to well-paying developers, at an annual rate of around 100 Rai per year. Many areas that located along the shore of the Chao Phraya River have the salinity soil problem because of Militia Sea, and the land use of agricultural area and community forest has turned into lucrative orange plantation which requires huge amounts of chemical fertilizers and insecticides, and it ceases waste water that effect to the whole ecosystem. Thus, Bang Nam Pueng

sub district is at risk status that highly needed a key of ecological concern in the long run (Intarat, 2013).

Figure 3-3 Aerial image of Bang Kra Chao shows the largest green area surrounded by the urban area of Bangkok (http://www.siamscubadiving.com/, 2009)

Moreover, Bang Nam Pueng is going to be a popular tourism place and the development plan is ongoing; including, the trend of using chemical fertilizers and insecticides for agriculture is increasing. Also Bang Nam Pueng is a riverside and flood plains, that causing this area vulnerable to flood and alkaline soil. Hence, Bang Nam Pueng is highly needed to concern about the sustainable landscape management to sustain its value and existing ecosystem in a long term. This study would like to propose recommendations and solutions on applying sustainable landscape management using ecosystem-based approach for the proposed study area.

CHAPTER IV
DATA ANALYSIS AND FINDINGS

4.1 Overall Landscape of Bang Nam Pueng sub district

Bang Nam Pueng is located in Pra Phradaeng district, Samutprakarn province. It is located in the area surrounded by Chao Praya River along with other 5 sub districts which are Bang Kor Bua, Bang Kra Chao, Bang Kra Sorb, Bang Yor and Song Kanong. Generally, Bang Nam Pueng areas are lowlands, wetlands and river basins. Bang Nam Pueng sub district has 6 main canals pass through all around the area.

4.1.1 General information of Bang Nam Pueng sub district

Adjacent borders of Bang Nam Pueng sub district are as follow:

North: adjacent to Bang Kor Bua sub district.
South: adjacent to Bang Kra Sorb sub district.
East: adjacent to the Chao Phraya River (Across the Area of Bangkok)
West: adjacent to Bang Yor sub district and Bang Kor Bua sub district.

With topography of an island, mostly of Bang Nam Pueng areas are lowlands and wetlands surrounded by the Chao Phraya River. Due to it is located in the area nearby the Chao Phraya River, it causes Bang Nam Pueng area influenced by sea water intrusion. The water in this area is mixed together with fresh water, sea water and brackish water and it has created distinct ecosystems of coexisting. Being flood plain of the river makes this area have been influenced by the sea water during precipitation. Due to the passing of water through canals in this area, villagers usually do horticulture by using water from canals nearby their areas. The soil in this area is rich in minerals and nutrients; therefore, there are many species of plants and animals (appendix II).

In the past, the Chao Phraya River and canals were used as a main resource and a travel route in Bang Nam Pueng sub district. Bang Nam Pueng area was an origination of vegetable patches and fruit plantations, nurtured by canals that treated water to terraces piled with plenty river soil (Gluckman, 2010). Local people usually sold their fruits and vegetables such as Coconuts, Bananas and Mangoes. Traditional occupation of local people in Bang Nam Pueng sub district was fruit plantation, because of nectar in flowers

that attractive to bees generally living in this area; therefore, villagers usually made a merit and gave alms to Buddhist monks by giving honey to the monks as a way of life. This cultural tradition was inherited from generation to generation. Since then this area has been dubbed as “Honey District” and most people in Bang Nam Pueng sub district called the name of this area as a “Pig Stomach” (Kra Phor Moo), due to the shape of this area and topography of the basin that cause this area has been flooded for a long time. Since the adjacent of Bang Nam Pueng sub district and the Chao Phraya River allow the flow of water into every side in the area; during the neap tide, this area will become a pan shaped basin so-called “Pig Stomach” (Kra Phor Moo) as distinctive and unique as their own.

Figure 4-1 Bang Nam Pueng sub district is located in the area called “Pig Stomach” (Kra Phor Moo) (Map adapted from http://bk.asia-city.com/, 2012)

Because of plenty of this area, local people in those days generally grew rice as well as horticulture and Bang Nam Pueng used to be the important breadbasket in Thailand. From Bang Nam Pueng’s history and all of land plots that were shown during the reign of King Rama V, this area probably age over 200 years. Moreover, in the history of Pra Phradaeng District also stated Bang Nam Pueng is likely to last more than 200 years. Mostly of people in Bang Nam Pueng sub district are Thai from Central Thailand, Mon and Chinese. Bang Nam Pueng sub district has 11 villages and the Ministry of Interior announced the establishment of Local Administration Organization of Bang Nam

Pueng sub district, Pra Phradaeng district, Samutprakarn province, on December 16, 2539, which was announced in the Royal Gazette, General Issue, Volume 113, Special Part 52, dated December 25, 2539. Due to Bang Nam Pueng sub district is located in the area that considered as largest green area nearest Bangkok and work as “Lung of the city”; therefore, this area has been preserved (The Resolution of the Cabinet on September 14, 2520 to preserve green space in Bang Kra Chao area)(AOTB, 2011).

4.1.2 Natural and Cultural Landscapes of Bang Nam Pueng sub district

Bang Nam Pueng sub district is one of the most significant landscapes in Thailand due to its topography and natural resources combined with the traditional way of life of local people that created a distinguished landscape. With the unique and valuable of both cultural and natural landscapes of this area, they make Bang Nam Pueng famous and well-known worldwide. Land use types of Bang Nam Pueng sub district can be mainly categorized as natural area and community area. Natural area consists of fruit plantation, community forest, mangrove forest, Nypa Palm forest, Prairie and Coconut Palm forest.

Table 4-1 Approximate Area of Land Use in Bang Nam Pueng sub district (Administration Organization of Bang Nam Pueng sub district, 2012)

Land Use	Percentage of Land Use	Approximate Area	
		Square Meter	Rai
Nypa Palm Forest	2.263	55,472	34.67
Community Area	12.406	304,160	190.10
Unused Area	3.873	94,944	59.34
Prairie	4.385	107,504	67.19
Community Forest	27.025	663,696	414.81
Coconut Palm Forest	4.396	107,760	67.35
Mangrove Forest	0.316	7,792	4.87
Temple	1.934	47,408	29.63
Fruit Plantation	38.168	935,707	584.82
Water Area	5.234	128,320	80.20
Total	100.000	2,452,763	1532.98

Natural Landscape of Bang Nam Pueng sub district

Natural landscape of Bang Nam Pueng sub district can be categorized as main 4 features of landscapes which are fruit plantation area, community forest area, mangrove forest area and unused area.

- **Fruit Plantation Area**

Mostly of the areas in Bang Nam Pueng are fruit plantation with the approximate area 584 Rai. Main products from fruit plantation in Bang Nam Pueng are Coconuts, Mangoes, Bananas and Passion fruits (AOTB, 2011). Over 200 years that people in this area have been making profit by selling product from fruit plantation. At the present time, mostly of local people are still working for fruit plantation as a main career and some of local people are working as a second source of income.

From survey and observation found that mostly of fruit plantation areas are belonged to the owner of the lands and some areas were rented by other people. Hence, fruit plantation is normally belonged to the local people and they work as a family business for earning main source of income. Some fruit plantation areas have been developed by following technical theory. Some areas have been fallowed because of changing of the main career of local people. When next generation gets high education, they usually find other careers inside Bangkok city or changing from working for fruit plantation as main career to second career.

Nowadays, the changing of fruit plantation areas has been increasing from many factors. There are many difficulties for fruit plantation and main causes are the changing of local people's career, the increasing of maintenance cost and renting cost, deteriorated soil and water condition. Notwithstanding, because of their loving in their birthplace, many of local people are still restoring their own fruit plantation areas along with conducting other local people to preserve fruit plantation areas by being educated and using consulting experts from other organizations. From in-depth interview indicates that Mostly of local people still want their descendants to keep the land and working for fruit plantation in the future.

Figure 4-2 Fruit Plantation area (Coconuts) in Bang Nam Pueng sub district

Figure 4-3 Fruit Plantation area (Bananas) in Bang Nam Pueng sub district

- **Community Forest Area**

Community forest is considered as a main green area of Bang Nam Pueng sub district along with fruit plantation. With the approximate area 414 Rai, there are many species of plants such as Sentol, Tembusu, Royal Palm, Pind Tecoma, Javanese Cassia, Ebony, Thingan, Padauk, etc. And many species of animals such as Locus, Leaf Insect, Ladybug, Firefly, Common Lowland Frog, Water Monitor, Brahminy Kite, etc. Local people in Bang Nam Pueng sub district importantly gain benefit from community forest in terms of nature aspect. Community forest creates green space that valuable more than just being a "Green Area". Back then this area used to be plenty forest with many species of plants and animals. Due to development and selling the lands from local people, community forest areas have been losing continuously, hence; local people realize and understand more about the threats and they have been managing community forest since then. At the present time, community forest is arose and preserved as a conservation area.

Figure 4-4 Community forest area in Bang Nam Pueng sub district

The main significance of Bang Nam Pueng's community forest is retention the balance of ecosystem in community scale up to macro scale. Moreover, community forest is being a place for educational purpose and ecotourism. Community forest area is also popular as biking and hiking for tourists as well. Some parts of community forest areas are allowed local people for harvesting products, therefore; local people receive the benefits from community forest from selling products, such as Herbs, Tamarinds, Olives, Jackfruit, Neems etc. Although local people can harvest products from community forest, but still; there is a community regulation agreement and local people must respect and obey.

- **Mangrove Forest Area**

Mangrove forest in Bang Nam Pueng is considered as a type of basin forest. It is one of the parts of wetland areas near by the Chao Phraya River with the approximate area 4.8 Rai. Main species of mangrove plants are Nypa Palm, Red Mangrove, Cork Tree and Xylocarpus Granatum. There are many species of animals such as Firefly, Mangrove Crab, Nepidae, Pila Ampullacea, etc. Mangrove forest greatly retains the balance of ecosystem in this area and effects to the water system and water condition from community scale up to macro scale.

Figure 4-5 Nypa Palms in Bang Nam Pueng sub district

In the past, local people made use of Nypa Palm's leaf for creating roof of their houses, however; nowadays, local people don't harvest any products from mangrove forest. Mangrove forest in Bang Nam Pueng is being a popular place for biking and educational purpose as well as community forest. Firefly in mangrove forest is attractive to tourists, therefore; mangrove forest can make profit from ecotourism as well. Besides the retention of balancing of ecosystem, mangrove forest is also work as dust filter that helps improving the quality of the air in this area. Moreover, mangrove forest gives shades to the houses and walkways in the community. One of the main benefits from mangrove forest in this area is to protect waves and coastal erosion.

- **Unused Area**

Main causes of unused area in Bang Nam Pueng sub district are the changing of main career of local people and the changing of land use. Unused areas in Bang Nam Pueng sub district are scattered around with approximate area 59 Rai. Unused areas in terms of monetary value and benefits cannot be assessed, however; unused area is valuable in terms of natural process and ecosystem of this area. Unused area has biodiversity and its own ecosystem that can create balancing of ecosystem by its own nature.

Figure 4-6 Unused area in Bang Nam Pueng sub district

Cultural Landscape of Bang Nam Pueng sub district

Cultural landscape of Bang Nam Pueng sub district can be identified as a community area. The way of life of people in Bang Nam Pueng sub district is family and kinship systems, thus family and kinship systems are the main cause of retention of tradition of older generation. Although time has passed but local people still remain and respect their own culture and tradition, hence; it can perfectly represent the unique and distinctive cultural landscape of this area.

- **Community Area of Bang Nam Pueng sub district**

Bang Nam Pueng sub district has amounted population 4,941 people with 2,354 males and 2,587 females. Community area of Bang Nam Pueng sub district has 1,391 households with approximate area 190 Rai (Bureau of the Central Registration Department, Department of the Interior, September 18, 2011),(AOTB, 2011). The density of the population averages 628 people per square meter. Bang Nam Pueng's community is under control and management of administration organization of Bang Nam Pueng sub district. Community area is greatly valuable as originating benefits to local people. Besides the main benefit as a residence, Bang Nam Pueng's community area is distinguished with the ability of making benefit from many aspects. Local wisdom of the people and community management in Bang Nam Pueng sub district are the main factors that make Bang Nam Pueng's community area valuable and profitable. Mostly of local people make use of the areas inside their residence's areas for planting fruits and vegetables that can be consumed for their own families and getting profits from selling fruits and vegetables; including, producing processed plant products. Processed plant products from Bang Nam Pueng are qualified as "One Tambon One Product" (OTOP) that make amount of profit to community. Main processed plant products of Bang Nam Pueng are herbal incense stick and weaved bag from water hyacinth.

Figure 4-7 Community area (Residential Area) of Bang Nam Pueng sub district

Figure 4-8 Community area (Residential Area) of Bang Nam Pueng sub district

Figure 4-9 Community area (Bang Nam Pueng School) of Bang Nam Pueng sub district

Figure 4-10 Community area (Bang Nam Pueng Nai Temple) of Bang Nam Pueng sub district

The important thing is that Bang Nam Pueng's community area can keep the traditional way of life and can perfectly represent the culture of its own. The retention of traditional way of life and culture make Bang Nam Pueng famous as a cultural tourism as well as ecotourism. Most famous community area for cultural tourism is Bang Nam Pueng Floating Market. Bang Nam Pueng Floating Market was originated by local community more than 40 years ago. It was operated to public on 28 February 2004 and was grand opened on 6 March in the same year. Bang Nam Pueng Floating Market was originated by cooperation between Bang Nam Pueng sub district administration organization and local community in attempt to release their abundant crops and OTOP products, create employment and earn income to the community. Bang Nam Pueng Floating Market is considered as a center of Bang Nam Pueng's community and it is a center for learning about the way of life, folkways, local wisdom and traditional culture.

Figure 4-11 Bang Nam Pueng Floating Market

Figure 4-12 Bang Nam Pueng Floating Market

Figure 4-13 Bang Nam Pueng Floating Market

Figure 4-14 Bang Nam Pueng Floating Market (Vegetables Plantation)

Figure 4-15 Bang Nam Pueng Floating Market (Bike Parking)

4.2 Ecosystem of Bang Nam Pueng sub district

Bang Nam Pueng sub district occupies a large green area of 9,000 rai. The dredging of canal shortcuts allows the Chao Phraya River from the Bangkok city area to pass directly to the Gulf of Thailand. The topography is an arc basin of 17.5 kilometers wide with the Bang Nam Pueng area surrounded by rivers and canals. Bang Nam Pueng is located by the estuary of the Gulf of Thailand; hence this area is directly affected by tidal flow. The topography and location of Bang Nam Pueng sub district has created distinct ecosystems of coexisting freshwater, estuarine, and brackish water. The diverse ecosystems of Bang Nam Pueng have caused biodiversity that has impacted on both the macro- and micro-scale. The Bang Nam Pueng area can be analyzed as multiple ecosystems with different water resources, soil resources, vegetation and animal populations.

Water Resource of Bang Nam Pueng sub district

Most important natural water source of Bang Nam Pueng sub district is the Chao Phraya River. Local people have been making use of the Chao Phraya River in main 4 aspects as follow:

- **Transportation of Agricultural Products**

Over 400 years that people in Bang Nam Pueng sub district transported by using river and canals. Local people usually trade agricultural products on the boat nearby the Chao Phraya River, there were areas near by the river and canals for local people to make trading of agricultural products such as rice and fruits and those areas became floating market at the present time. This tradition of using boat for trading by the Chao Phraya River and canals was lost because of the construction of piers along the Chao Phraya River and cargo ships. Many piers and cargo ships cause strong and huge waves, for this reason; local people cannot resist while paddling their boats and they started changing from using water transportation to onshore since then.

- **Transportation Routes**

Besides for trading purpose, in the former time local people in Bang Nam Pueng sub district normally go traveling from house to house by using transportation via canals

and the Chao Phraya River. At the present time, local people use streets and pathways for transportation inside community area.

- **Agriculture**

From the past to present, local people in Bang Nam Pueng sub district have been using water from the Chao Phraya River and canals for nourishing their agricultural areas and community forests. Local people apply the ridging to their planting areas, thus; it creates small water ways that allow water from the Chao Phraya River and canals pass through planting areas directly.

- **Draining Water into The Sea**

The Chao Phraya River is the most important water way for collecting and draining water into Gulf Thailand. Especially for Bang Nam Pueng area, draining water into the sea prevent the area from flood and protect their agricultural areas from Militia Sea that can cause salinity problems. As 4 main aspects mentioned above, the Chao Phraya River itself cannot work perfectly without canals. Main canals are connected to the Chao Phraya River and small water ways inside local people's agricultural areas, hence; local people in Bang Nam Pueng sub district have been using water for their daily life and agricultural purpose. Main canals in Bang Nam Pueng consist of 6 canals as follow:

1) **Bang Nam Pueng Canal,** located in village number 3, 4 and 10.

2) **Yai Rew Canal,** Rideau Township of village numer 1 and 2. It is connected with Ta Lam Canal and flow into Bang Nam Pueng Canal.

3) **Ta Lam Canal,** located in village number 4. It is connected with Yai Rew Canal and flow into Bang Nam Pueng Canal.

4) **Ta Yaeng Lhai Canal,** located in village number 5 and 6. It is connected with Ta Sak Canal at the joint of village number 8 and 7.

5) **Ta Sak Canal,** Rideau Township of Bang Nam Pueng sub district and Ban Kra Sorb sub district. It is located in village number 6, 7 and 8.

6) **Song Canal,** located in village number 5, 8 and 8.

Nowadays, people in Bang Nam Pueng sub district use water from the Chao Phraya and canals for agriculture as a main purpose and they apply drilling of underground water for consuming in their households. In 2009, there was an infrastructure development, therefore; many of local people switched using from underground water to Metropolitan Water Services.

Figure 4-16 Bang Nam Pueng Canal

Figure 4-17 Waterways inside fruit plantation area

Soil Resource of Bang Nam Pueng sub district

Bang Nam Pueng area is lowland and wetland surrounded by the Chao Phraya River. The location that adjacent to the Chao Phraya River causes Bang Nam Pueng area influenced by sea water intrusion; including, causing Bang Nam Pueng being a swamp. Being flood plains of the river causes this area has been influenced by Militia Sea during precipitation. Because the water in this area is mixed together with fresh water, sea water and brackish water, thus; the type of soil in this area is clay that categorized as "Samut Songkram Soil Series" (Sso). The soil has the deposition layers and plenty with organic matter. The color of the soil is grey that caused from fruit plantation.

After building dams surround the island of 6 districts in Pra Phradaeng district, the dams separate the area of island into 2 sections (AOTB, 2011). The first section is flooded area and the second section is area without flood that located inside the dam areas. Therefore, the character of the soil depends on those 2 section areas. The character of the soil that located in flooded area nearby the Chao Phraya River is liquid clay. Liquid clay cannot use for fruit plantation, hence; mostly of this areas are mangrove area. The character of the soil inside the dam areas is tight clay, some parts of the areas have less number of organic matter inside the soil because this area did not flood for a long time. It causes the depending on amount of fertilizer of local people for surviving their agricultural areas and affects to the water and soil quality.

Figure 4-18 Soil character of "Samut Songkram Soil Series" (Sso)

Vegetation Resource of Bang Nam Pueng sub district

After the policy declared Bang Nam Pueng sub district as a green space, the implementation of land expropriation was enforced for protecting community forest and mangrove forest areas. Theses protected areas are under control and management of local people and administration organization of Bang Nam Pueng sub district. Community forest of Bang Nam Pueng sub district plays an important role in many aspects, it helps retention the balance of ecosystem and making profit for local people from forest's products, including for educational purpose. Dominant feature of community forest in Bang Nam Pueng sub district is the interweaving of forest between mangrove forest and tropical forest, including intercropping of other plants such as tamarinds and bananas. The interweaving of forest in Bang Nam Pueng area enhances biodiversity of Bang Nam Pueng area; including, enhancing the operation and retention the balance of ecosystem. Types of forest in Bang Nam Pueng sub district are as follow:

- **Mangrove Forest**

Mangrove forest areas in Bang Nam Pueng sub district are located nearby the Chao Phraya River's shore, these areas have been influenced by tide of the Chao Phraya River and the intrusion of the sea from Gulf of Thailand. Main species of mangrove plants are Nypa Palm, Red Mangrove, Cork Tree and Xylocarpus Granatum.

- **Tropical Forest**

Tropical forest in Bang Nam Pueng sub district has the important role in terms of being an ecotone between mangrove forest areas and lowlands inside the community areas. Ecosystem of tropical forest has the character of Botany of Central Thailand vegetation. There are plenty of species of vegetation in tropical forest such as Leadtree, Fetid Passionflower, Paduak, White cheesewood, etc.

- **Grove Wood**

Grove Wood in Bang Nam Pueng sub district has the important role in terms of retention the balance of ecosystem. Mostly of Grove Wood areas in Bang Nam Pueng sub district are located inside the community area**s**. The character of Grove Wood areas can be in the form of complete agricultural areas or degenerative agricultural areas,

including unused areas. There are many species of Grove Wood in Bang Nam Pueng sun district such as Pandanus Palm, Clustering Fishtail Palm, Garden Balsam, Yellow Velvet Leaf, Pak-wan Tree, etc.

Figure 4-19 Community forest in Bang Nam Pueng sub district

Figure 4-20 Grove Wood area in Bang Nam Pueng sub district

Biodiversity of Vegetation in Bang Nam Pueng sub district

According to survey and bioblitz (2014), Bang Nam Pueng sub district has approximate number of vegetation species 110 species. Besides the biodiversity of community forest, mangrove forest and Grove Wood as mentioned above, agricultural areas in Bang Nam Pueng sub district also has various vegetation species. Local people usually do agriculture along with growing trees around their housing areas and along pathways inside community areas, hence; biodiversity of vegetation in Bang Nam Pueng sub district can categorized by the growing areas as follow:

- Trees planted along the Chao Phraya River, canals and water ways, such as Pong Pong, Red Mangrove, Sea Holly, Cork Tree, etc.
- Trees planted in community areas, such as Coconuts, Mangoes, Paduak, Javanese Cassia, Cassod Tree, Rain Tree, Buddha's Belly bamboo, Ivory Coast Almond, etc.
- Trees planted in fruit plantation areas, such as Coconuts, Lime, Mangoes, Papaya, Star Gooseberry, Bael, Star Fruit, Guava, Java Apple, etc.
- Tress planted in Backyard Garden, such as Basil, Galangal, Ginger, Stink Weed, Cayenne Pepper, Leech Lime, etc.

Table 4-2: Vegetation Density by Land Use of Bang Nam Pueng sub district ((Administration Organization of Bang Nam Pueng sub district, 2012)

Land Use	Vegetation Density (A tree per 1,000 square meter)
Community Forest	0.169
Fruit Plantation	0.07
Unused Area	0.064
Mangrove Area	0.041
Community Area	0.213

There are several species of vegetation that can be found in almost every area in Bang Nam Pueng sub district, these plants play important role in terms of ecosystem approach and have great significance for local people's being by providing various benefits. Most important and distinguished trees in Bang Nam Pueng sub district are Pong Pong, Mangoes, Coconuts, Spring Bitter Cucumber and Nypa Palm.

- **Pong Pong Tree,** it enhances ecosystem and purify the condition of air; including, enhancing the adhesion of soil surface to prevent soil erosion.

- **Mangoes,** Bang Nam Pueng sub district is famous for mangoes that have very good taste from natural sweeteners. Mango in Bang Nam Pueng sub district is called "Ma Muang Nam Dokmai (Ripe Mango) Number 4" which is high market demand.

- **Coconuts,** local people in Bang Nam Pueg sub district have been using the products from coconut tree by privatization such as coconut sugar, coconut dessert, toys, etc.

- **Spring Bitter Cucumber,** it is categorized as an ivy. Spring Bitter Cucumber is a local plant that local people have been making use of its fruit for long time ago. In the past, local people used its young fruit for cooking. After the research about the properties of Spring Bitter Cucumber has spread out among Thai people, with plenty of beta-carotene, Lycopene and fatty acid that can prevent the formation of cancer cells. Thai people paid high attention to Spring Bitter Cucumber and the products from Spring Bitter Cucumber in Bang Nam Pueng sub district have been selected as one of the best Spring Bitter Cucumber products in Thailand. Therefore, community can make high profit from selling Spring Bitter Cucumber products and the trend of demanding is likely to be increasing every month.

Figure 4-21 Spring Bitter Cucumber planted in Bang Nam Pueng floating market area

- **Nypa Palm,** Nypa Palm plays important role in terms of protecting Bang Nam Pueng area from strong wind and wave from the Chao Phraya River; including, preventing Bang Nam Pueng area from flood, soil erosion and coastal erosion. Moreover, local people making use of its leaf for building their house's roof and creating handcraft, and use its fruit for cooking in their households.

Animal Resource of Bang Nam Pueng sub district

Bang Nam Pueng sub district is considered as a shelter of biodiversity of animals in lower the Chao Phraya River basin area. At the present time, lower the Chao Phraya River basin area has only few of shelters for animals. Bang Nam Pueng area can be called as "last home" for many species of animals in lower the Chao Phraya River basin area, because Bang Nam Pueng area is the one of the areas nearby the Chao Phraya River that can retain its own ecosystems and natural resources.

Because of the distinguished and diverse ecosystems from coexisting of freshwater ecosystem, estuarine ecosystem and brackish water ecosystem, thus; Bang Nam Pueng area is plenty of vegetation species and biodiversity of many species of animals. According to survey and bioblitz (2014), Bang Nam Pueng area has approximate number of animal species 120 species, with 40 species of birds, 6 species of mammals, 14 species of reptiles, 5 species of amphibians, over 7 species of aquatic animals and over 30 species of insects.

- **Birds,** 39 species of birds in Bang Nam Pueng area are sedentary bird such as White-Breasted Waterhen, Red Collared Dove, Spotted-necked Dove, White-throated Kingfisher, Tree Sparrow, Common Myna, Large-Billed Crow, etc. Just only 1 species of Migratory bird in this area that is Barn Swallow.
- **Mammals**, 6 species of mammals that found in Bang Nam Pueng area are Dog, Cat, Red-bellied Squirrel, House rat, Indochinese ground squirrel and Common tree shrew.
- **Reptiles,** such as Changeable Lizard, Monocled Cobra, Common Sun Skink, Grass Frog, Water Monitor, Red-tailed Pipe Snake, etc.
- **Amphibians,** 5 species of amphibians that found in Bang Nam Pueng area are Black-spiny Toad, Asian Painted Frog, Painted Chorus Frog and Ornate Chorus Frog.
- **Aquatic animals,** such as Striped Catfish, Sepat Siam, Striped Snake-head Fish, Walking Catfish, etc.
- **Insects,** such as Firefly, Black Tree Ant, Locust, Leaf Insect, Giant Honey Bee, etc.

Figure 4-22 Cat found in Bang Nam Pueng community area

Figure 4-23 White-Breasted Waterhen found in Bang Nam Pueng sub district

Figure 4-24 Ashy Drongo found in Bang Nam Pueng sub district (GWF, 2014)

Figure 4-25 Asian Pied Starling found in Bang Nam Pueng sub district **(***GWF, 2014)*

4.3 Current Condition of Bang Nam Pueng sub district

Current Condition of Terrestrial Ecosystem of Bang Nam Pueng sub district

By exploring the soil, variety kinds of invertebrates and fungus, such as red-rounded millipede and 16 kinds of fungus, slime mold and Maramius sp. for example, that are normally seen in healthy forest, has been found which indicates the soil fertility in the ecosystem. The Plants and animals society is an indicative of near city ecosystems that is quite balanced. At least big groups of birds have been seen as various styles of living; including, some groups that eat many kinds of fruits. It reflects abundant food crops in the area. Also, there is a woodpecker which indicates natural structure of trees. There are numerous fruit bats which recognized as the substantial of Cork trees and other plant species. Plant surveying and observation has found that the outbreak of plant diseases has been increasing because of salinity from sea water intrusion resulting in alkaline soil and degenerated soil from waste water and chemical substance using in household inside community. The plant surveying has yet found many local indigenous plant species, many of them are edible as food for humans and animals. However, the number of water monitors is very high because they can eat on land and in the water. They also feed on carcasses and garbage. Without predators that are as big as them, the population of the water monitors cannot be controlled.

Figure 4-26 Condition of alkaline and deaerated soil

Lichens are the best indicator of air quality. According to the lichen surveying in Bang Nam Pueng sub district, lichens that are found suggest the air quality is quite good. Despite that there are no large lichens that indicate great air quality without the pollution to be found, *Arthonia sp.* and *Physcia undulata* are found. *Arthonia* can be found in some parks that are far from pollutes in Bangkok. *Physcia undulata* cannot be seen outside of Bang Nam Pueng area possibly means that Bang Nam Pueng sub district has the best weather in the area nearby Bangkok. Though, there are traces of degraded surface on lichens which possibly are a result of acid rain that blew passed industrial area.

Current Condition of Aquatic Ecosystem of Bang Nam Pueng sub district

According to survey, observation and bioblitz (2014), most of water ways in the area are still in good condition in terms of water quality and water resources which are suitable for fireflies to live in and prominent symbol of Bang Nam Pueng sub district. Kingfishers, such as great kingfishers and common kingfishers, are also found feeding many kind of fish. Survey and observation has found that overall quality of the water is relatively clean despite that exploring organism in the water shows worrisome problems. The information of surveying of plankton and fish, aligns is in the same direction which indicates that this area has water quality problems. Some of water ways and canals are quite bad already such as Bang Nam Pueng canal nearby Bang Nam Pueng floating market area, and some of canals begin to deteriorate quickly as seen by shells of shellfish that like good quality water but the shellfish cannot be seen nearby. Moreover, quite a lot of green algae and blue algae have been seen which causes a toxic in the water. Surveying and observation also found the fish invasions by alien species. The water problem can be categorized by character of water as follow:

- Water flow is a small body of water ways about two to three meters. Mostly of water flow areas are in a good quality and clear without odors. Also, an underwater plant (Macrophytes) which is Pung Chado algae, is found with various kinds of fish.
- The Chao Phraya River is very turbid that can indicated from checking by observation roots of Water Hyacinth. The roots of Water Hyacinth are pitch

black, unkempt and very short, indicate that the water has low oxygen and low water quality. The root of Water Hyacinth will grow longer in clean water because it can well contain oxygen in the deep water. But in poor quality water ways, oxygen is available only on the surface where gas exchange with air.

- Duckweeds are found in stagnant water in plantations, cover the surface of the water. It shows that the water contains a lot of minerals and the water quality is not good enough for the fish that feed on plants lives, which causes duckweeds covering the surface completely. Then, the water is wasted even further because sunlight does not reach the water surface and the duckweeds block gas exchanging on the surface.
- Stagnant water in community area has the worst quality of all, because of the boom of the plant plankton on the surface that cause the changing of color of water to dark green (Eutrophication). The boom of the plant plankton is caused by the amount of nutrients of waste water from the community. There are very few animals live in the water since oxygen level is very low, especially at night. Moreover, the acidity and alkalinity of the water are very fluctuating. Only a few of species could live in the water with nasty smells and colors. The water cannot be used for consumption. From surveying and observation found that a lot of garbage is trashed from the community directly to the canals, consumed water from the community is released directly to canals as well. Green water is the secondary sewage, then; it will turn into black water which is the worst sewage. If a strong campaign to refrain from dumping and to strictly monitor the water is not started, it is possible that the water source will turn into the black water soon. The water will cause terrible stench and will be a hotbed of carrier animals with various diseases, especially mosquitoes.
- The main canals, especially Bang Nam Pueng Canal was conducted a survey nearby Bang Nam Pueng floating market area. It was found that there is an outbreak of cyanobacteria (blue-green algae) which caused by too much minerals in the water, significantly phosphate. The phosphate is found in cleaning products. The activity of the market is expected to grow which may

cause waste and sewage disposal to the water source. Furthermore, the cyanobacteria can produce toxins that are harmful to both humans and animals. Therefore, the water problems should be dealing urgently, especially the problem of sewage and garbage from Bang Nam Pueng floating market and community areas.

Figure 4-27 Wastewater problem in Bang Nam Pueng community area

Figure 4-28 Wastewater problem in Bang Nam Pueng community area

Figure 4-29 Wastewater problem in Bang Nam Pueng floating market

Figure 4-30 Duckweed covers water surface in fruit plantation area

4.4 Results from in-depth interview and focus group discussion

Trends in good governance in environmental management are not new to Thai society. The Constitution of the Kingdom of Thailand B.E. 2540 (1997) is regarded as "The People's Constitution" because of the participation of the public in its drafting process. The Constitution itself also allows public participation in decision-making. The demand for increased public participation in environmental management was strengthened during the environmental forum. More than 130 civil society organizations encouraged the public to take on an additional role and to exercise their rights in equal management of natural resources and environment. The current Constitution also promotes equal opportunity for all members of society in environmental management especially local administration organizations. The right to participation has legitimized public participation in environmental management process with the government. Such provisions are new concepts for the government since it previously held direct authority over natural resources and environmental conservation and management (TEI, 2011).

According to focus group discussion (March, 2014), Bang Nam Pueng sub district is being as a conservation area and it is promoted as an area for eco-tourism; there are many development plans that highly needed environmental and landscape management in the process for conserving natural resources and protecting the way of life of the local people. Therefore, the conflicts between government, local administration organization, landowners, extractive industries and local people who rely on natural resources always occurred during the process of the development plan. Even though the current Constitution and environmental policies emphasize public participation on environmental management, the Thai bureaucratic system has not fully adjusted itself in accordance with the intention of the constitution; including, understanding of the environmental management and public participation is still unclear. Local people in Bang Nam Pueng sub district always got involved with the public hearing in the environmental management process and they used this process of public hearing just for manage and solve the conflicts, while the aim of public participation between government, local administration organization and local people, in fact, is to prevent or avoid conflicts that might arise without participation.

Therefore, the most important problem for Bang Nam Pueng in environmental and landscape management is about creating public participation, collaboration between government sector, local administration organization and local people. It is not acceptance or rejection of such a principle but the lack of basic understanding by several parties of the perspectives, goals, and procedures to establish genuine public participation. It is a responsibility of government sector, local administration organization and local people to create common understanding of good governance and public participation in environmental management.

According to data collecting, surveying and observation, it indicates that Bang Nam Pueng area has the severe problems on salinity soil from Militia Sea and waste water from the Chao Phraya River and main canals that directly affect to the whole ecosystem of Bang Nam Pueng area and affect to ecosystem on macro scale as well. From the past to present, these severe threats have been generated from the changing of land use and the expansion of Bangkok city in Bang Nam Pueng area. The changing of land use and ecosystem in Bang Nam Pueng sub district are the main factors of the decreasing of vegetation and animal species; including, degenerating quality of natural resources. Therefore; landscape management is highly needed for Bang Nam Pueng area. At the present time, Bang Nam Pueng sub district has no specific action and policy on landscape management. Whereas, there are achieved action, strategies and policies on protecting and enhancing ecosystem and natural resources of Bang Nam Pueng sub district by the cooperation between local people, Administration Organization of Bang Nam Pueng sub district, government sector and non-government organization (NGOs) as follow:

4.4.1 Results from in-depth interview and focus group discussion with Local People

According to in-depth-interview, Local people in Bang Nam Pueng sub district have been involved in the conservation of natural resources. They have been educated and participated about environmental issues regularly. At the present time, local people are trying to reduce the amount of waste water and garbage from their households that harmful to ecosystem by applying a waste grease trap before discharging into main canals. Moreover, they also produce Microbial Fertilizer from household's garbage for

making profit and using for eliminating waste water inside community area. Local people always participated environmental activities such as planting trees, pouring Microbial Fertilizer and throwing Microbial Fertilizer Ball (EM Ball) into the Chao Phraya River and Canals. They seriously participate continuing every year with the cooperation of government sector, administration organization of Bang Nam Pueng sub district and non-governmental organization. Including, meeting of people in community for planning maintenance of natural resources regularly cooperated with public and private sectors openness.

Local people in Bang Nam Pueng sub district also play important role in terms of the conservation of cultural heritage and traditional way of life. Bang Nam Pueng sub district has distinguished local wisdom for maintaining the way of life and making profits for surviving. Local people is the main factor of the retention of cultural and natural landscapes of Bang Nam Pueng sub district with their philosophy of sufficiency economy. Local people supported for the establishment of Cultural Council for community cultural activities, such as Songkran festival, Lent Candle and Loy Kratong festival as a tool to count on the values, identities and consciousness of Thailand-esteem. Most importantly, local people always have their love in community and want to maintain their plenty of natural resources; including, conserving cherished way of life for their next generation.

Figure 4-31 Local people are applying a waste grease trap before discharging into main canals (Administration Organization of Bang Nam Pueng sub district, 2011)

4.4.2 Results from in-depth interview with Administration Organization of Bang Nam Pueng sub district

According to the in-depth interview with local governmental officers responsible for planning and management of Bang Nam Pueng sub district, the establishment and management of Bang Nam Pueng is administrated by Administration Organization of Bang Nam Pueng sub district (AOTB). At the present time, Bang Nam Pueng is a natural tourist attraction with local distinctions, thus; administration Organization of Bang Nam Pueng sub district mainly assists local people in agriculture purpose such as selling their agricultural products, launching careers, and increasing their income. Such development success had been derived from an external factor which supports trends launched by the government in various types of tourism to steadily motivate people's needs in travelling while simultaneously supporting local tourist attractions.

Bang Nam Pueng was formed in an elevated agricultural area near Bangkok which has been conserved by the government since 1977. Apart from the advantages of its suitable location, its efficient leader also plays a vital role in the community. The Chairman of Administration Organization of Bang Nam Pueng sub district is the key person who mainly allocated the budget for developing on management continuously and also widely extended the results of sustainable development to link with development in other aspects such as transportation, infrastructure, cultural and natural restoration. Administration Organization of Bang Nam Pueng sub district has been promoting Bang Nam Pueng sub district as a ecotourism area by using 4 components of ecotourism namely, (1) Tourist's allocated area, (2) Management, (3) Activity Process, and (4) Participation; including, public relations and network making for sustainable development both inside and outside the community area, the first three components were very well performed. For the fourth component, some improvements are needed, especially in terms of increasing participation and network-making in developing tourist attractions within the districts nearby.

Administration Organization of Bang Nam Pueng sub district also plays important role in terms of supporting the participation of local people for providing education and

making local people realize on environmental issues; including, emphasizing on community management and development of quality of life. Administration Organization of Bang Nam Pueng sub district created a group of young generation in Bang Nam Pueng sub district called “Bee Power Save the World” to raise awareness about environmental issues inside the community. “Bee Power Save the World” group has been working on restoring community ecosystem by collecting garbage from households to produce Microbial Fermentation (AOTB, 2011).

Figure 4-32 Administration Organization of Bang Nam Pueng sub district creates an area for producing Microbial Fermentation

Figure 4-33 Administration Organization of Bang Nam Pueng sub district participated wastewater treatment project (Samutprakarn Amnuaywit School, 2011)

4.4.3 Results from in-depth interview with Government Sector

According to the governmental officers responsible for environmental policy and planning, Thailand has no specific policy and regulation on Sustainable Landscape Management. At the present time, even policy on environmental management is still haphazard. Thailand has been using Policy on Natural Resource Management and Conservation as a main guideline for environmental and landscape management; including, Thailand's Environmental Impact Assessment System that take action on environmental and landscape management projects. During the past decades, Thailand has been focusing on general principles of environmental planning process and management under the guidelines of The 1992 NEQA. The implementation plan called the Environmental Quality Management Plan (EQMP) to manage the environmental quality in accordance with the designated standard. For sensitive areas or in environmentally critical areas, which includes Environmentally Protected Areas (EPA), where there is a locality designated as an environmentally protected area. The provincial governor of the designated area must prepare the provincial action plan (PAP); the law requires the local administration organization in the locality designated area to prepare a local environmental management plan for the provincial governor to incorporate into the provincial action plan.

- **Natural Resource Management and Conservation Policy**

Five major laws play significant roles in protecting nature are the National Parks Act (NPA) of 1961, the National Reserved Forests Act (NRFA) of 1964, the Forest Act of 1941, the Timber Farming Act (TFA) of 1992, and the Wildlife Reservation and Protection Act (WRPA) of 1992.

- **Thailand's Environmental Impact Assessment System**

The EIA system was incorporated into Thailand's legislation when the 1975 Improvement and Conservation of National Environmental Quality Act were partially amended in 1979. The Ministry of Science, Technology and Energy, as it was known at the time, issued a notification defining the types and sizes of projects or activities subject to an EIA. EIA reports are currently required for 29 types and sizes of projects or activities, ranging from public works such as dam or reservoir construction to

private-sector projects such as petrochemical plant construction. EIA requirements for private enterprises extend to eleven types of plant construction projects in industries such as petrochemical, oil refining, iron and steel, and sugar. As a related activity, construction of an industrial estate also requires an EIA.

Current Policy and Development Plan of Government Sector on Sustainable Development of Bang Nam Pueng sub district

According to the National Economic Development Plan 2541 (PTT, 2011), there is an appointment of setting up the board of the development of eco-tourism because the demand for eco-tourism is likely to be higher and can create more economic value for Thailand. Therefore, the local administration encourages tourism by using sustainable development planning and the budget has been supported by the national agenda on sustainable tourism.

Administration Organization of Bang Nam Pueng sub district was established in early 2540 during the economic crisis because of the potential of Bang Nam Pueng for self-development in many aspects. Bang Nam Pueng sub district located in Bang Kra Chao area which is consider as a green conservation area of Bangkok since 2520. Because of the conservation of the green area, Bang Nam Pueng sub district has the project called "Suan Krang Mahanakorn" (Garden of Central of The Metropolis) that as a center of ecological learning; including, its role as a cultural area because of the existing historic and religious places. "Suan Krang Mahanakorn" (garden of the central of the metropolis) is currently under the supervision of the forestry department with the implementation of community forestry projects to engage the community in sustainable management on natural resources and enhance opportunities for professional development. By encouraging application of local wisdom to preserve the environment and culture, local people are allowed to preserve and use the land for various learning and community projects.

Even though, Current direction of sustainable development of Bang Nam Pueng sub district attempts to include environmental and societal concerns but it is still fragmented and does not concern the linkage between landscape management and existing ecosystems; In addition, current landscape management of Bang Nam Pueng sub

district does not incorporate ecosystem-based approach resulting in unsustainable landscape management.

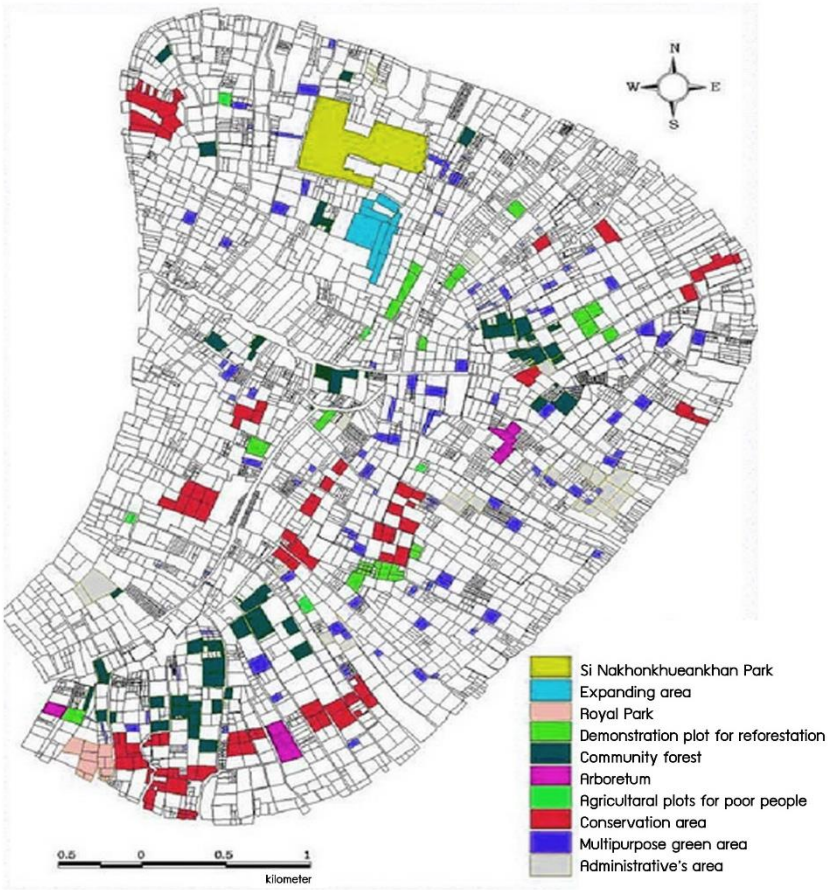


Figure 4-34 Conservation areas in Pra phradaeng district (Administration Organization Office of Bang Kra Chao sub district, 1999)

4.4.4 Results from in-depth interview with Non-governmental Organizations

Development and management on environmental issues in Bang Nam Pueng sub district are basically under the cooperation between local people and Administration Organization of Bang Nam Pueng sub district. Government sector plays the roles mainly on macro scale policy making and environmental law enforcement, by this reason; government sector do not work intimately with local people and Administration Organization of Bang Nam Pueng sub district. Therefore; the cooptation of local people and Administration Organization of Bang Nam Pueng sub district always get assistance

from Non-governmental Organizations. Many environmental restoration projects and activities of Bang Nam Pueng sub district are supported by Non-governmental Organizations such as Bangchak Petroleum Public Company Limited, PTT Public Company Limited Thailand, Toyota Motor Company Limited, Kasikorn Bank, etc. Non-governmental Organization focuses on providing funding for community on maintaining and enhancing environment and ecosystem conditions. Furthermore, Non-governmental Organization has been providing knowledge and assisting raising awareness about the environmental issues among community; including, participation of environmental activities along with local people. One of the significant environmental projects which includes the participation of local people and Administration Organization of Bang Nam Pueng sub district and other stake holders is The 84 Tambons for King project under operation of PTT Public Company Limited. This project was examined by this study as an example of the co-operation between different stake holders related to environmental management.

The 84 Tambons for King by PTT Public Company Limited Thailand

The 84 Tambons for King project under operation of PTT Public Company Limited Thailand is the most important environmental project that runs by Non-governmental Organization in Bang Nam Pueng sub district. This project plays important role on assisting Administration Organization of Bang Nam Pueng sub district and the leaders of community began to pay attention on young generation and creating common understanding among them. The process of learning is emphasized on creating concept and attitude in a good way by intimate participation with the youth. There is a technique to create a concept of raising awareness about nature conservation that make the youth willing to work together with leaders and adults in the community without feeling uncomfortable. This project makes the youth become aware of their valuable natural resources and the youth has their pride of working with leaders and adults in the community (PTT, 2011).

84 Tambons for King project also assists about ecotourism development. By focusing on the development of Bang Nam Pueng's homestay and management of community forest areas, with emphasizing on the creation of alternative tourism for tourists which

are both ecotourism and tourism oriented learning. This project reorganized tourist areas to be ready for educational purpose and assisting on human resource development to be able to disseminate knowledge on natural and cultural resources conservation. This project is divided into 2 aspects which are of forest and water conservation and the creation of tourist activities. Forest and water conservation aims to raise awareness of local people by helping planting trees, maintenance and fertilizing trees planted on special events; including, encouraging the reducing of household waste water and garbage. The creation of tourist activities emphasizes on human resource management and consistent with the community to promote training and development in various fields, such as training on standards of homestay, training on a good host for the preparation of traveling by biking.

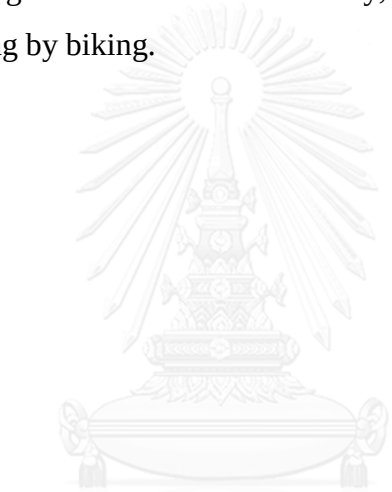


Figure 4-35 84 Tambons for King by PTT Public Company Limited Thailand project in Bang Nam Pueng sub district (www.84tambonsforking.com, 2011)

Analysis on Action on Landscape Management and Ecosystem Retention of Bang Nam Pueng sub district (Six Policy Criteria Analysis for Sustainable Landscape Management, (Greenberg, 2007))

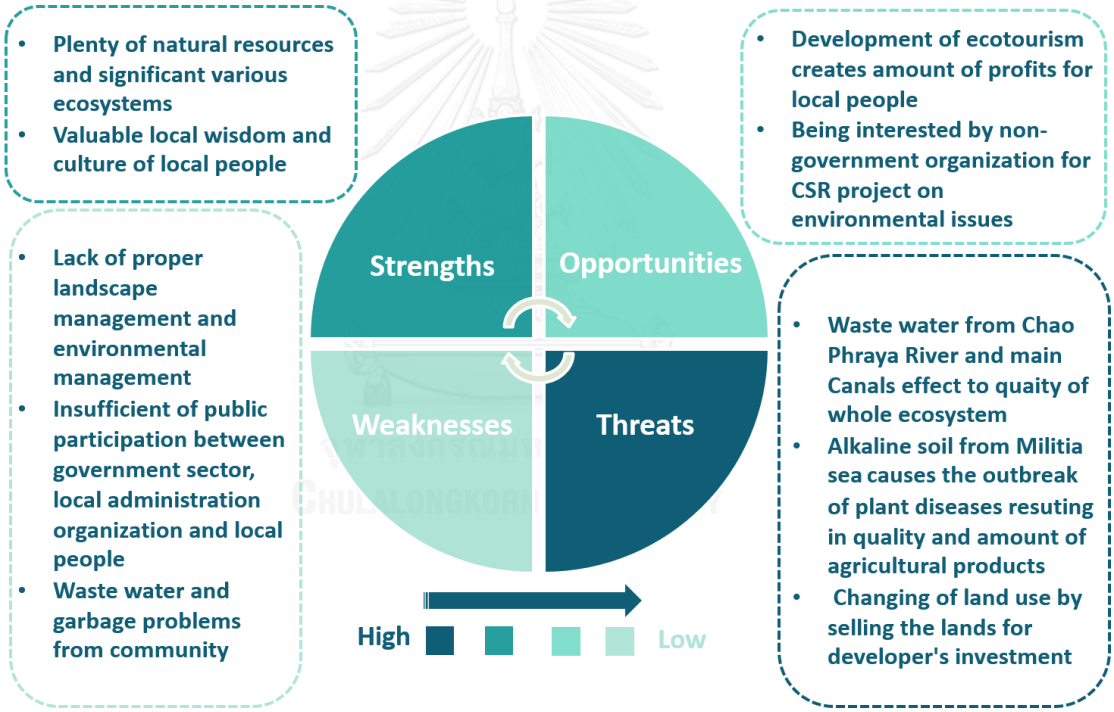
Criterion	Advantages	Vulnerabilities
Reaction of elected officials and staff	- Strong support from government could implement the performance of the local administration on environmental and landscape management. - Good governance may result in implementation of Constitution and environmental policy into development plan. - Establish common understanding among elected officials and staff in environmental and landscape management.	- Political status may affect the performance of elected officials and staff and could result in bad solution. - Collaboration among government and local administration may fragmented because of environmental and landscape management in different scales. - It may take a long time on decision making and multistage of process in environmental and landscape management.
Reaction of Non-government Organization	- Public participation has implemented in the process of decision making. - Opportunity for local people and non-government organization to share	- Some local people may not willing to get involved with the development plan if they have to relocate or the develop plan can lead to the loss of benefits from the existing property.

	common requirements and commitments. - Non-government organizations are supportive. - Local people will put great pressure on elected officials to perform efficiently. - Local people could live in the area with better environment and quality of life.	- Lack of common understanding between local people and stakeholders may affect to the wrong decision and direction of development plan on environmental and landscape management.
Human and ecological health	- Conserve and retain capacity of existing ecosystem and biodiversity. - Protect animal habitat and improve the connecting between abiotic and biotic in the ecosystem. - More green spaces with multipurpose areas for local people. - Enhance efficiency in natural resource and environmental management; including, retention of functional connectivity in the area with new development.	- Some local people may not want to continue their work on agriculture or forest community because of new development that may cause changing in career field. - Decision of development plan on environmental and landscape management could affect in a bad solution to some selected people and areas.

Economic costs and benefits	- High benefits for local people and stakeholders from more productive in agricultural sectors; including, from ecotourism. - More opportunity in career field and long term benefits may improve quality of environment and quality of life.	- High benefits from agricultural sectors and ecotourism may cause the conflict among local people, stakeholders and developers.
Moral imperatives	- Increase environmental concerns among government sector, local administration organization, non-government organization and local people to sustain utilization of natural resources. - Local people learn how to live in balance with nature and have a heart for protecting natural resources and their identity and culture.	- Irresponsibility and irrespective of elected officials and staff may result in the bad solution in environment and landscape management. - Delaying of making decision of elected officials and staff may cause unsustainable of utilization of natural resources.
Time and flexibility	- Protect from malfunction of existing ecosystem and	- Concern on environmental planning and landscape

	prevent from loss of biodiversity. - Each phases and processes of development plan have implemented environmental concerns.	management needs to be addressed before investments and political commitments are made.

4.4 SWOT analysis of Landscape Management and Ecosystem Retention of Bang Nam Pueng sub district



- **Strengths of Landscape Management and Ecosystem Retention of Bang Nam Pueng sub district**

  In term of natural landscape, the location of Bang Nam Pueng sub district makes valuable and distinguished ecosystems from coexisting of fresh water, sea water and brackish water ecosystems. Bang Nam Pueng sub district has plenty of natural resources from community forest, mangrove forest, fruit plantation and unused area; including, water and soil resources. Bang Nam Pueng sub district has long term management on environmental issues; thus, natural resources are retained. Plenty of natural resources creates diverse of plant and animal species that are significant for the retention of health and services of ecosystem from district to national and regional scales.

  In term of cultural landscape, Bang Nam Pueng sub district has valuable local wisdom and culture. The way of river life is retained and adapted to new development. Traditional culture was inherited from generation to generation and Bang Nam Pueng area can represent it decently.

- **Weaknesses of Landscape Management and Ecosystem Retention of Bang Nam Pueng sub district**

  At the present time, Bang Nam Pueng sub district is still lack of proper landscape and environmental management. Because of the severe problem of wastewater, Administration Organization of Bang Nam Pueng sub district focuses mainly at waste management while other environmental issues are still going on. Even there are many projects were achieved on conservation of this area; but, mostly of projects focus on retention of community forest and mangrove forest area. Mostly of conservation projects are still lack of planning and action plan in long term period that need to be concerned on connectivity between natural and community area.

  From data collection indicates that many natural areas were destroyed because of insufficient of public participation between government sector, local administration organization and local people. Due to environmental issues are

going on and affect to quality of soil and water resources that cause the reduction in quality and quantity of agricultural products; therefore, local people need assistance from local administration organization and government sector. In the meantime, public participation between government sector, local administration organization and local people could not find the conclusion; consequently, local people needed to sell their lands and many natural areas were changed into construction site.

- **Opportunities of Landscape Management and Ecosystem Retention of Bang Nam Pueng sub district**

  Nowadays Bang Nam Pueng floating market is very popular among Thai and foreigner tourists; hence, Administration Organization of Bang Nam Pueng sub district has been promoting Bang Nam Pueng sub district as an ecotourism place. Since that, the performance on promoting ecotourism of Administration Organization of Bang Nam Pueng sub district with the cooperation of government sector and local people was successful and created amount of profits for local people while natural areas were retained. Therefore, ecotourism can be developed along with the conservation for continuous generating profit to local people. At the same time, when Bang Nam Pueng is popular for ecotourism, Bang Nam Pueng area is being interested by non-government organization for operation Corporate Social Responsibility (CSR) project on environmental issues.

- **Threats of Landscape Management and Ecosystem Retention of Bang Nam Pueng sub district**

  Severe environmental issue in Bang Nam Pueng sub district is wastewater problem from the Chao Phraya River and main canals in Bang Nam Pueng area. Wastewater problem affects directly to the whole ecosystem. Including, sea intrusion that cause alkaline soil could result in outbreak of plant diseases and reduce quality and quality of agricultural product. The consequent of changing of quality of health and service of ecosystem causes local people do not want to continue working on agriculture and end up with selling the land to developers.

CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

This study aims to study and analyze the existing landscape management of Bang Nam Pueng sub district and apply the principles of sustainable landscape management using ecosystem-based approach at a landscape scale. This study also aims to provide recommendations and strategies for future planning on sustainable landscape management of the proposed study area towards sustainability.

Research Questions

3. What are the significances of sustainable landscape management using ecosystem-based approach to the purposed study area and how to make it successful?

4. How to apply the principles of ecosystem-based approach to the landscape management of the purposed study area to lead to its sustainability?

5.1 Conclusions

Bang Nam Pueng sub district is located in Pra Phradaeng district, Samutsprakarn province, and the area is located in largest green area near by Bangkok, so-called “lung of Bangkok” with the area 1,936 Rai (765.5 Acres). Through the topography of island that surrounded by the Chao Phraya River and under influence of seawater intrusion because its location next to the mouth of river. Thus, the ecosystem of Bang Nam Pueng sub district is mix together among freshwater, seawater and brackish water. Mixed ecosystem creates two types of plant which are mangrove plant and freshwater forest. With the significant mixed ecosystem, it causes Bang Nam Pueng sub district has plenty of plant and animal species that assist the balancing of ecosystem from micro to macro scales.

Mostly of local people in Bang Nam Pueng sub district have been working in agricultural field. Due to the changing of land use and decreasing of quality of natural resources, some of local people changed their main careers to other fields such as lancer and merchant, etc., and some of local people sold their lands and moved into Bangkok city. From past to present, fruit plantation is the main way for earning income of local

people in Bang Nam Pueng sub district, by selling fresh fruits and processed products. Besides selling agricultural products, local people have been utilizing their own agricultural products in their households such as using Coconut for cooking, Nypa Palm's leaf for creating house's roof, Spring Bitter Cucumber for producing medicine, etc. In conclusion, local people in Bang Nam Pueng sub district mainly rely on their own natural resources for living.

Over 400 years of Bang Nam Pueng's community, local people of Bang Nam Pueng sub district have been remaining their own culture and traditional way of life. Among charming nature, the way of living by the river side and canals is the identity of local people in Bang Nam Pueng sub district. From the past, local people used to travel and sell their agricultural products by using the Chao Phraya River and canals. Even though the culture of using water transportation has been gradually disappearing, but; local people still remain floating market called "Talad Nam Bang Nam Pueng (Bang Nam Pueng floating market)" as a center of community. At the present time, Bang Nam Pueng floating market is a center of Bang Nam Pueng community for many purposes such as selling agricultural products, community meeting, education and religious ceremony, etc. Bang Nam Pueng floating market is considered as a main source of income of local people. With plenty of natural resources and identity of traditional way of life, Bang Nam Pueng sub district has been promoted as ecotourism and it became very popular for tourists at the present time.

Bang Nam Pueng seems to have repletion in culture and nature, on the other hand; Bang Nam Pueng sub district is facing with threats from both inside and outside factors. As the location is nearby the Chao Phraya River which is the major river in central Thailand that covers 12 provinces along the river, the Chao Phraya River carry wastewater from households, agricultural and industrial sectors that directly affects to ecosystem of Bang Nam Pueng area. From data collecting, it indicates that the quality of agricultural product is decreasing due to degenerative soil from wastewater, such as the reducing of coconut fruit size and less sweetness in Mangoes. Moreover, the intrusion of sea water is becoming a huge trouble for quality of soil as well. Since the changing of land use, mangrove and forest area have been gradually decreased and resulting in less protection zone from Militia Sea. Militia Sea causes salinity in water and soil, alkaline soil and

brine cause plant and animal diseases. Plant disease became more severe from discharging of wastewater inside community; including, the increasing of garbage from large numbers of tourists, poor condition of main canals is considered at a severe stage. Therefore, the wastewater problem is the most important issue that should be dealing urgently. Despite Bang Nam Pueng area has plenty of natural resources, but; gradually changing in quality and quantity of natural resources would result in changing of the whole ecosystem. Currently, even though local people and Administration Organization of Bang Nam Pueng sub district are focusing on wastewater treatment, but the changing of ecosystem is still going on. From data analysis indicates that ecosystem of Bang Nam Pueng sub district has been changing, can be concluded as the evidence shown as follow:

- Increasing of numbers of cyanobacteria (blue-green algae),
- Expansion of duckweed on water surface
- Outbreak of the plant plankton
- Increasing of numbers of migratory birds and decreasing of numbers of local birds
- Newcomers of fish species and disappearance of old species.
- Increasing of numbers of water monitors
- Outbreak of plant and animal diseases
- Reducing in quality of agricultural products
- No large lichen found in the area

Environmental issues in Bang Nam Pueng sub district are continuously increasing while local people and involved sectors are still lack of proper action and management on the retention of ecosystem. Hence, local people, Administration Organization of Bang Nam Pueng sub district and other involved sectors should concern more than wastewater management issue, but; building understanding and concerning on retention the balancing of the whole ecosystem is highly needed for management of Bang Nam Pueng sub district presently. Thus, sustainable landscape management using ecosystem-based approach would be one of the proper solutions for sustaining the value of existing ecosystem and take the different distribution of landscape properties and

values into account, to keep landscapes differ in their capacities for continuous providing ecosystem services and natural resources.

5.2 Recommendations

5.2.1 Implementing on Sustainable Landscape Management Using Ecosystem-Based Approach for Bang Nam Pueng sub district

Applying ecosystem-based approach in sustainable landscape management entails considering on further impacts from different threats that would affect to quality of life of the people, functionality and services of the ecosystem; including, quality and quantity of natural resources. Ecosystem-based approach when combined with landscape management, could help resolve conflicting of land use objectives and help enhance ecological condition; including, mitigate against damage to key biodiversity features. For Bang Nam Pueng sub district, environmental issues inside the area are still going on along with continuous degenerating of its ecosystem. Moreover, in suburb area like Bang Nam Pueng sub district where development pressure is usually highest, landscape management using ecosystem-based approach could be used to interweave functional green infrastructure into new developments with ensuring that existing natural resources are retained, and the functional connectivity of the area in and around the new development is increased by new habitat creation on formerly ecologically denuded land. This approach could result in biodiversity and ecosystem being enhanced by development. Truly, development of Bang Nam Pueng sub district should promote on sustainable landscape management using ecosystem-based approach to enhance synergies between social, economic and environmental aspects, to lead the success on sustainability.

The guidance of sustainable landscape management and ecosystem-based approach can be applied on development and management guidelines of Bang Nam Pueng sub district, with the guidance describes goals and strategies to achieve sustainable development outcomes. Due to it intends to inspire flexibility, innovation, and culture changing; including, applies to new constructions, major renovations, and existing sites and to create less impact to the existing small scale landscaping, thus; this recommendations accommodate regional differences and can be adapted to support

diverse local people, administration organization and government's missions and policies. Principles served as a foundation for the recommendations in the guidance of sustainable landscape management (Sustainable Sites Initiative (SITES™, 2009)) can be applied for Bang Nam Pueng sub district as follow:

- ***Do no harm:*** Bang Nam Pueng sub district plays important roles in terms of ecosystem that effect on micro and macro scales, keeping capacities of ecosystem services and natural resources in Bang Nam Pueng area would assist enhancing the balancing of ecosystem in national scale, especially; lower the Chao Phraya River basin ecosystem. In case of Bang Nam Pueng sub district, mangrove and community forest areas should be conserved as a first priority, avoiding changes of these areas, remain and enhance these areas by increasing numbers of plants and plants. Improvement of sites with previous disturbance or development; including, enforcement of rules to preserve these areas as conservation areas of Bang Nam Pueng sub district.

- ***Precautionary principle:*** Besides concerning of conservation areas, precaution of risks that would harm to local people and ecosystem health is needed for management of Bang Nam Pueng sub district. Precautionary principle helps people and the area from risk that may happen in the future by planning and analysis from previous incidences and creating alternatives of risks and guidelines for protection and improvement.

- ***Design with nature and culture:*** Both cultural and biological diversity are central components of the ecosystem approach, and landscape management should take this into account. Bang Nam Pueng sub district is distinguished because of its nature and culture. Local people rely on nature that correlated with their own culture. At the present time, Bang Nam Pueng community still represents traditional way of life of local people that inherited from generation to generation over 400 years. Therefore, in terms of development and management, Bang Nam Pueng sub district needs creating and implementing designs that are responsive to economic, environmental, and cultural condition;

including, designing that concerned about the harmony of nature and culture, to retain capacities of natural resources and identity of traditional way of life.

- ***Use a decision-making hierarchy of preservation, conservation, and regeneration:***

  In a stage of development, local people, administration organization of Bang Nam Pueng sub district and involved sectors should apply a decision-making hierarchy of preservation, conservation, and regeneration as a first priority along with planning and management. Focusing on maximize the benefits of ecosystem services by preserving existing natural resources in a sustainable manner, and regenerating lost or damaged ecosystem services.

- ***Use a systems thinking approach:*** Building knowledge and understanding of the significance and value of ecosystem is highly needed for management and development. Local people, administration organization of Bang Nam Pueng sub district and involved sectors are the major factor to impel development into the right way. Using systems thinking approach on relationships in in an ecosystem and sustain ecosystem services, re-establish the integral and essential relationship between natural processes and human activity would result in sustainability inside community.

- ***Provide regenerative systems:*** Bang Nam Pueng sub district has mixed ecosystem of freshwater ecosystem, estuarine ecosystem and brackish water ecosystem. Diverse ecosystems of Bang Nam Pueng sub district causes biodiversity, thus; providing future generations with sustainable environment supported by regenerative systems and natural resources helps retention the balancing of ecosystem.

- ***Support a living process:*** Living process is the most important factor for retention balancing of ecosystem, landscape management using supporting living process of plant and animal species, and avoiding disturbance in Bang Nam Pueng area is needed for regenerating and restoring of living things.

Including, continuously re-evaluate assumptions and adapt to demographic and environmental change.

- ***Use a collaborative and ethical approach:*** Bang Nam Pueng sub district needs encouraging and promoting on environmental participation among local people, administration organization of Bang Nam Pueng sub district, government sectors and non-governmental organization; including, site users and tourists to link long-term sustainability with environmental stewardship.

- ***Maintain integrity in leadership and research:*** Bang Nam Pueng sub district plays important roles in terms of ecosystem processes that effect on micro and macro scales, thus; leadership and research are one of the key for sustainable development at the local and national scale. Implement transparent and participatory leadership; including, developing on research and communicating of new findings that foster sustainable landscapes consistent would assist to sustain Bang Nam Pueng ecosystem services and natural resources that enhance balancing of ecosystem at national scale as well.

- ***Foster environmental stewardship:*** In all aspects of development, management and maintenance, foster ethic of environmental stewardship with the understanding that healthy ecosystems improve the quality of life for present and future generations is the most important issues toward sustainability.

According to Hammond (2002), important ecosystem-based planning principles that underlie ecosystem-based approach which can be applied Bang Nam Pueng sub district include:

- ***Focus on what to leave, not on what to take:*** Bang Nam Pueng sub district becomes a popular place for tourists from various attractions, local people are mainly focusing on earning income from floating market. While floating market produces amount of garbage and wastewater that caused environmental issues inside Bang Nam Pueng area. Ecosystem-based approach focuses on fully functioning ecosystems at all spatial scales through time. Main purpose of ecosystem-based approach is to protect biological diversity, species of plants

and animals, community, landscape, and regional diversity, therefore; development and management of Bang Nam Pueng sub district should focus more on maintaining natural resources and functioning of ecosystem more than development on expansion of floating market areas and activities.

- ***Recognize the hierarchical relationship between ecosystems, cultures, and economies:*** Economies and cultures are part of ecosystems, therefore; protecting ecosystem functioning provides healthy cultures and economies. As well as Bang Nam Pueng sub district, to maintain and enhance quality of life and culture of local people, recognizing the relationship between ecosystems, cultures, and economies are the most significant object. And the hierarchical relationship between ecosystems, cultures, and economies should be applied in planning and development stages.
- ***Apply the precautionary principle to all plans and activities*:** With ongoing promoting on tourism in Bang Nam Pueng sub district, development and management need precautionary principle to deal with uncertainties. Decisions, interpretations, plans and activities would be incorrect on the side of protecting ecosystem functioning that resulting in unsustainability. That is the reason why applying precautionary principle is important for all plans and activities. If hesitancy happens during the action of planning, and unsure that ecosystem will be protected, better do not do it and re-thinking on processes again.
- ***Ensure that the planning process is inclusive of the range of values and interests:***

  Local people living in Bang Nam Pueng sub district are important stakeholders and their rights and interests should be recognized. Ecosystem-based approach focuses on value of ecosystem as first priority. In case of Bang Nam Pueng sub district, local people earn income from agricultural products and rely on natural resources in the area for living, hence; development and management must be ensured that the planning process is inclusive of the range of values and interests of ecosystem services for healthy quality of life of local people.
- ***Protect, maintain, and, where necessary, restore ecological connectivity, and the full range of composition, structures, and functioning of enduring***

features, natural plant communities, and animal habitats/ranges by establishing large reserves, linkages, and an interconnected network of smaller reserves throughout all areas of the landscape: This principle is particularly important for Bang Nam Pueng sub district. Due to local people and involved sectors are still lack of knowledge and understanding on landscape management, land use is separated depending on utilization without connectivity between patches. To protect species of plants and animals, designing and planning on restoring ecological connectivity is needed to apply on landscape management; including, creating green linkages between ecotone, community forest area, mangrove forest area and community area for protecting animal habitats.

- ***Provide for diverse, ecologically sustainable, community-based economies*:** Sustainability includes social equity, thus; economy of Bang Nam Pueng sub district needs to be ensured that it can continuously facilitate a diverse range of activities that focus on fulfilling individual and community needs; including; protecting and maintaining natural resources. Healthy community and healthy diverse ecosystems would result in sustainability for Bang Nam Pueng sub district.
- ***Practice adaptive management:*** Due to uncertainties that may happen on protecting ecosystem, besides applying precautionary principles, practice on adaptive management is needed for planning process as well. Continuously development of Bang Nam Pueng sub district would cause threats from inside and outside factors, hence; encouraging on activities at maintaining and restoring ecological health and biological diversity in the area are the key for practice adaptive management.

5.2.2 Proposed Proper Action Plan

This study will establish sustainable landscape management using ecosystem-based approach strategies for addressing environmental issues in the action plan of Bang Nam Pueng sub district that limited implementation for short-term and long-term periods. These strategies will be applied on landscape scales in specific location and in an entire

area. Main responsible persons are local people and Administration Organization of Bang Nam Pueng sub district with the intensive support from Non-governmental Organization and government sector. The proposed strategies aim to establish sustainability in landscape management by using ecosystem-based approach. The proposed strategies are influenced by sustainable landscape management principles and ecosystem-based approach principles along with the concepts of sustainable development. The proposed strategies are as following:

Short-term Strategies

- Establish responsible persons on environmental planning and landscape management of Bang Nam Pueng sub district. From data analysis, it indicates that one of major problems of environmental issues in Bang Nam Pueng sub district is the inefficiency and improper management; including, lack of leaders or key persons on environmental planning and landscape management which lead to the decadent of the ecosystem. Therefore, Bang Nam Pueng sub district should establish team or board on environmental planning and landscape management in order to state the policies, apply and take action on management strategies. Besides landscape management, landscape management team needs to be established an efficient facility management for community as well such as creating multipurpose area for local people, etc. Administration Organization of Bang Nam Pueng sub district should be the main organizer for the establishment of the team that able to attract collaborations from many concerned organizations to assist on environmental planning and landscape management.

- Build knowledge and understanding, and conducting extensive study on sustainable landscape management using ecosystem-based approach for local people in Bang Nam Pueng sub district and responsible persons. Building knowledge and understanding should consider all forms of relevant information; including, scientific and local wisdom, innovations and practices. Information from all sources is critical to arriving at effective landscape management strategies. Supporting learning on ecosystem functions and the

impact of community activities to the ecosystem is desirable. All relevant information from concerned issues should be shared with all stakeholders and take into account. Assumptions behind proposed sustainable landscape management decisions should be made definite and verified against available knowledge and point of view of all stakeholders. This proposed strategy could have been done by academic persons or professional organizations with the support from government sectors and Non-governmental Organization.

- Restore existing degenerated ecosystem and natural resources. After Building understanding and conducting extensive study on sustainable landscape management using ecosystem-based approach, the existing degenerated ecosystem, natural resources and unused areas should be restored in order to sustain its ecosystem services in the future. Including, planning for new management on creating connectivity between natural area and community area. Restoration existing degenerated ecosystem and natural resources should involve all relevant knowledge and scientific disciplines. Due to most problems of biological diversity are complex, with many interactions, side-effects and implications, therefore; restoration operation should involve the necessary expertise and stakeholders at the local, national, regional and international level, as appropriate. Restoration or new construction of Bang Nam Pueng sub district could have been done by local people and Administration Organization of Bang Nam Pueng sub district with the support from academic persons or professional organizations, government sectors and Non-governmental Organization.

- Apply guidance of on Sustainable Landscape Management Using Ecosystem-Based Approach into account. In order to maintain efficiency of natural resources and balancing of ecosystem. The guidance should be prepared for local people and all stakeholders for guiding them to appropriate action on planning. Applying guidance on sustainable landscape management using ecosystem-based approach should consider the effects of community activities on adjacent and other ecosystems. Management interventions in ecosystems could have unknown or unpredictable effects on other ecosystems, thus; possible impact needs cautious consideration and analysis. Applying guidance

may require new arrangements of organization for stakeholders involved in decision-making. This proposed strategy could have been done by academic persons or professional organizations with the support from local people and Administration Organization of Bang Nam Pueng sub district, including government sectors.

Long-term Strategies

- Recognizing potential gains from management by:

a) Reduce market distortions that adversely affect biological diversity
b) Align incentives to promote biodiversity conservation and sustainable use
c) Internalize costs and benefits in the given ecosystem to the extent feasible

The greatest threat to biological diversity lies in its replacement by alternative systems of land use. In case of Bang Nam Pueng sub district, the threat arises through floating market and community activity distortions, which inefficiently natural systems and populations; including, provide eccentric incentives and subsidies to favor the conversion of land use to less diverse systems. As Convention on Biological Diversity (CBD, 2003) stated that *"Those who benefit from conservation do not pay the costs associated with conservation and, similarly, those who generate environmental costs escape responsibility. Alignment of incentives allows those who control the resource to benefit and ensures that those who generate environmental costs will pay"*

- Integrate and apply new green design and ecological awareness concept for sustainable landscape management along with conservation of ecosystem feature and functioning, in order to maintain ecosystem services and natural resources. Conservation should be considered as a first priority of the ecosystem-based approach. Ecosystem functioning and resilience depend on a dynamic relationship within species, among species and between species and their abiotic environment, as well as the physical and chemical interactions within the environment. New green design can be a designated green recreation area for local people with multi-purpose functions serve for community's activities. Including, creating linkage between natural patches by its function

and services and concern on wildlife habitat as well. Therefore, the conservation of existing ecosystem and integrating of new green design and ecological awareness concept should be appropriated and concerned of these interactions and processes. Long-term development on integrating new green design and ecological awareness concept for sustainable landscape management would be resulting in sustaining ecosystem services and protection of plant and animal species. This proposed strategy needs to be presented as a long-term strategy throughout the planning of connectivity of zones in the Bang Nam Pueng area.

- Establish adaptive sustainable landscape management, in order to accomplish all of plans and visions, and sustain capacity of natural resources and ecosystem services by recognize ecosystem changes, including species composition and population abundance. Thus, sustainable landscape management should be adopt to those indeterminate changes. Apart from their inherent dynamics of change, ecosystem is encompassed by various types of uncertainties and potentials in the human, biological and environmental systems. Traditional disturbance system both from nature and human is important for ecosystem feature and functioning, and may need to be maintained or restored. The ecosystem-based approach should utilize adaptive sustainable landscape management in order to anticipate and cater for such changes and events and should be cautious in making any decision that may foreclose options; including, consider mitigating actions to cope with long-term changes.

- Apply monitoring strategy, in order to determine how proposed strategies and action plans of sustainable landscape management using ecosystem-based approach are working or follow the vision, goals and objectives or not. Development and management of Bang Nam Pueng sub district has to set up both of routine monitoring strategies and long-term monitoring strategies in their management's schedule and also need to present the monitoring result to the public by various communications. The collaborative stakeholders from outside Bang Nam Pueng sub district should have opportunity to participate in monitoring process as well for leading to more effective approach in order to manage sustainably.

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APPENDICES

APPENDIX I

In-depth interview questionnaire

แบบสอบถาม
เรื่อง การจัดการทางภูมิทัศน์อย่างยั่งยืนในเขตพื้นที่ตำบลน้ำผึ้ง
อำเภอพระประแดง จังหวัดสมุทรปราการ
แบบสอบถามนี้เป็นส่วนหนึ่งของวิทยานิพนธ์เรื่อง การจัดการทางภูมิทัศน์อย่างยั่งยืนโดยใช้หลักการทางระบบนิเวศวิทยา กรณีศึกษาตำบลน้ำผึ้ง อำเภอพระประแดง จังหวัดสมุทรปราการ
คณะสิ่งแวดล้อม การพัฒนาและความยั่งยืน จุฬาลงกรณ์มหาวิทยาลัย

คำชี้แจง กรุณาทำเครื่องหมาย / หรือเติมข้อความในช่องว่างซึ่งตรงกับความเป็นจริง
ส่วนที่ 1 ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม

1. **เพศ**

O หญิง O ชาย

2. **อายุ**

O ต่ำกว่า 20 ปี O 20-29 ปี O 30-39 ปี O 40-49 ปี O 50-59 ปี O 60 ปีขึ้นไป

3. **ภูมิลำเนา**

O ภาคเหนือ

O ภาคตะวันออกเฉียงเหนือ

O ภาคกลาง

ท่านมีภูมิลำเนาอยู่ในตำบลบางน้ำผึ้ง อำเภอพระแดง จังหวัดสมุทรปราการ O ใช่ O ไม่ใช่

O ภาคตะวันออก

O ภาคตะวันตก

O ภาคใต้

4. **การศึกษา**

O มัธยมศึกษา

O อนุปริญญา/ปวส.

O ปริญญาตรี

O ปริญญาโท

O ปริญญาเอก

5. **อาชีพ**

O นักเรียน/นักศึกษา

O ธุรกิจส่วนตัว/ค้าขาย

O พนักงานบริษัท/ลูกจ้าง

O ข้าราชการ/พนักงานรัฐวิสาหกิจ

O เกษตรกร

O ไม่ประกอบอาชีพ

ส่วนที่ 2 ความรู้ทั่วไปเกี่ยวกับตำบลบางน้ำผึ้ง อำเภอพระประแดง จังหวัดสมุทรปราการ

1. **ก่อนท่านจะเดินทางมายังตำบลบางน้ำผึ้ง ท่านมองภาพลักษณ์ของตำบลบางน้ำผึ้งเป็นอย่างไร**

O พื้นที่ทางเกษตรกรรม O แหล่งท่องเที่ยว

O พื้นที่อยู่อาศัย O พื้นที่อนุรักษ์ทางวัฒนธรรม

O พื้นที่อนุรักษ์ทางธรรมชาติ O อื่นๆ (โปรดระบุ) _____

2. **ท่านทราบข้อมูลของตำบลบางน้ำผึ้งจากแหล่งที่มาใด**

O อินเตอร์เนต O โทรทัศน์ / วิทยุ

O สื่อสิ่งพิมพ์ต่างๆ O ป้ายโฆษณากลางแจ้ง / โปสเตอร์ตามสถานที่ต่างๆ

O ครอบครัว / เพื่อน / คนรู้จัก O อื่นๆ (โปรดระบุ) _____

3. **ท่านเดินทางมายังตำบลบางน้ำผึ้งบ่อยเพียงใด**

O ทุกวัน O 1-2 ครั้งต่อสัปดาห์

O 1-2 ครั้งต่อเดือน O หลายเดือนต่อ 1 ครั้ง

O มากกว่าหนึ่งปี ต่อ 1 ครั้ง O อื่นๆ (โปรดระบุ) _____

4. **ท่านเดินทางมายังตำบลบางน้ำผึ้งด้วยเหตุใดเป็นหลัก**

O ชื่นชมแหล่งท่องเที่ยวเชิงธรรมชาติ (พื้นที่เกษตรกรรม, พื้นที่ป่า ฯลฯ)

O ชื่นชมแหล่งท่องเที่ยวเชิงวัฒนธรรม (หมู่บ้าน, วิถีชีวิตของคนในชุมชน, วัด ฯลฯ)

O ซื้อสินค้าและบริการ (ตลาดน้ำ, ผลผลิตทางการเกษตร, ร้านอาหาร ฯลฯ)

O ทำกิจกรรมร่วมกับคนในครอบครัว เพื่อนหรือคนรู้จัก (การออกกำลังกาย, การใช้สวนสาธารณะ, ทำบุญ ฯลฯ)

O เพื่อการศึกษาหรือทำการวิจัย

O อื่นๆ (โปรดระบุ) _____

5. **ในความคิดเห็นของท่าน สภาพภูมิทัศน์หรือสภาพแวดล้อมของตำบลบางน้ำผึ้งเป็นอย่างไร**

O เป็นพื้นเพื่อการอยู่อาศัย หมู่บ้านและชุมชน

O เป็นพื้นที่ทางเกษตรกรรม

O เป็นพื้นที่ป่าและพื้นที่ทางธรรมชาติ

O เป็นพื้นที่เพื่อการค้าขายและการท่องเที่ยว

O เป็นพื้นที่ทางวัฒนธรรม

O อื่นๆ (โปรดระบุ) _____

6. **ท่านมีความคิดเห็นอย่างไรกับการจัดการทางสภาพภูมิทัศน์หรือสภาพแวดล้อมของตำบลบางน้ำผึ้ง**

O มีการจัดการพื้นที่ดีในทุกทุกพื้นที่ ไม่มีปัญหาหรือข้อบกพร่องในพื้นที่นั้นๆ

O มีการจัดการที่ดีในบางพื้นที่ บางพื้นที่ยังพบปัญหาหรือข้อบกพร่อง

O ยังขาดการจัดการที่ดีและเป็นระบบ พบปัญหาหรือข้อบกพร่องได้โดยทั่วไป

O อื่นๆ (โปรดระบุ) _____

7. จากคำตอบข้อ 5 และข้อ 6 ในความคิดเห็นของท่าน ท่านให้คะแนนความพอใจในความสมบูรณ์ (ความอุดมสมบูรณ์, ความสวยงาม, ความสะอาด, ความสะดวก) ของสภาพภูมิทัศน์หรือสภาพแวดล้อมโดยรวมของตำบลบางน้ำผึ้งอย่างไร (3 - ดีมาก, 2 – ดี, 1 – ปานกลาง, 0 – ควรปรับปรุง)

O 3 O 2 O 1

O 0

ส่วนที่ 3 การมีส่วนร่วมกับการจัดการทางภูมิทัศน์ของตำบลบางน้ำผึ้ง อำเภอพระประแดง จังหวัดสมุทรปราการ

1. ท่านเคยมีส่วนร่วมหรือร่วมกิจกรรมเกี่ยวกับการอนุรักษ์หรือการจัดการพื้นที่ทางธรรมชาติ (รวมถึงพื้นที่เกษตรกรรม) ในตำบลบางน้ำผึ้งหรือไม่ หากเคยเข้าร่วมโปรดระบุกิจกรรมนั้น ๆ

O ไม่เคยเข้าร่วม O เคยเข้าร่วมกิจกรรม

_____

2. ท่านเคยมีส่วนร่วมหรือร่วมกิจกรรมเกี่ยวกับการอนุรักษ์หรือการจัดการพื้นที่ทางวัฒนธรรม (หมู่บ้าน, ชมชุน สถานที่ทางศาสนาและประวัติศาสตร์) ในตำบลบางน้ำผึ้งหรือไม่ หากเคยเข้าร่วมโปรดระบุกิจกรรมนั้น ๆ

O ไม่เคยเข้าร่วม O เคยเข้าร่วมกิจกรรม

_____

3. หากท่านไม่เคยเข้าร่วมกิจกรรมใด ๆ ท่านมีความคิดจะเข้าร่วมในอนาคตหรือไม่

O ไม่เข้าร่วม O เข้าร่วม

_____

- ขอขอบพระคุณเป็นอย่างสูงสำหรับการให้ความร่วมมือในการทำแบบสอบถามครั้งนี้ค่ะ -

APPENDIX II

Field data collection

During in-depth interview with local people

During field observation

Biking was used as a main tool for observation

Participation in Bio Blitz 2014: Operating Survey of Biodiversity in "Lung of Bangkok"

Source: http://www.greenworld.or.th/

Participation in Bio Blitz 2014: Operating Survey of Biodiversity in "Lung of Bangkok"

During operating survey; partition groups depends on the study areas and species of plants and animals

During conclusion of the survey results

APPENDIX III

List of plants and animals found in island area of Pra Phradaeng district, Samutprakarn province

Source: Administration Organization of Bang Nam Pueng sub district, 2012

ตารางที่ 4.1 ความหลากหลายทางชีวภาพด้านพืชในพื้นที่คุ้งบางกะเจ้า

ที่	ชื่อ	ชื่อสามัญ:	ชื่อวิทยาศาสตร์	ลักษณะ:
1	กก	Sedge	*Cyperus polystachyos flower head*	ไม้ล้มลุก
2	กรรณิการ์	Night Blooming Jasmine	*Nyctanthes arbor-tristis* Linn..	ไม้พุ่ม
3	กรวยป่า	Kruaipaa	*Casearia grewiaefolia vent.*	ไม้ยืนต้น
4	กระเจี๊ยบเขียว	Okra, Gumbo, Lady`s Finger	*Abelmoschus esculentus moench.*	ไม้ล้มลุก
5	กระเจี๊ยบแดง	Jamaica Sorrel, Roselle	*Hibiscus sabdariffa* Linn.	ไม้ล้มลุก
6	กระชาย	Kaempfer	*Boesenbergia rotunda* (Linn.) Mansf.	ไม้ล้มลุก
7	กระดังงาไทย	Ylang-ylang Tree	*Cananga odorata* Hook.f. &Thomson var.	ไม้เถา
8	กระถิน	Leadtree	*Leucaena leucocephala*	ไม้ยืนต้น
9	กระทกรก	Fetid Passionflower	*Passiflora foetida*	ไม้เลื้อย
10	กระท้อน	Sentul, Santol, Red sentol	*Sandoricum koetjape* (Burm. F.) Merr.	ไม้ยืนต้น
11	กระทิง	Alexandrian Laurel	*Calphyllum inophyllum* Linn.	ไม้ยืนต้น
12	กระเพราขาว	N/A	*Ocimum tenuiflorum* Linn.	พืชล้มลุก
13	กระเพราแดง	N/A	*Ocimum tenuiflorum* Linn.	พืชล้มลุก
14	กล้วยไข่	Pisang Mas	*Musa* (AA Group) "Kluai Khai"	พืชล้มลุก
15	กล้วยไข่พระตะบอ	N/A	*Musa* (AAA Group) "Kluai Khai Pra Tabong"	พืชล้มลุก
16	กล้วยน้ำว้า	Banana	*Musa abb cv.* Kluai 'Namwa'	พืชล้มลุก
17	กล้วยไม้	Orchid	*Orchid*	กล้วยไม้
18	กล้วยเล็บมือนาง	Banana	*Musa sapientum* Linn	พืชล้มลุก
19	กล้วยหอม	Gros Michel	*Musa* (AAA Group) "Kluai Hom Thong"	พืชล้มลุก
20	กล้วยหอมแกรนด์เ	Grand Naine	*Musa* (AAA Group)	พืชล้มลุก
21	กล้วยหอมเขียว	Pisang Masak Hijau	*Musa* (AAA Group "Cavendish")"Kluai Hom Khieo	พืชล้มลุก
22	กันเกรา	Anon, Tembusu	*Fagraea fragrans roxb.*	ไม้ยืนต้น
23	ก้ามกุ้งเลดี้ไค	Matchstick	*Heliconia psittacorum* l.f. 'Lady Di'	ไม้แตกกอ
24	กาหลง	Galaong, Snowy Orchid Tree	*Bauhinia acuminata* Linn.	ไม้พุ่ม
25	กุหลาบ	Rose	*Rosa spp. & hybird*	ไม้พุ่ม
26	กุหลาบมอญ	Damask Rose	*Rosa damascena mill.*	ไม้พุ่ม
27	เกด	Milkey Tree	*Manilkara hexandra dubard*	ไม้ยืนต้น
28	เกลือกระโห้	Balsam Apple, Copey	*Clusia rosea jacq.*	ไม้ยืนต้น
29	แก้วมังกร	Dragon Fruit	*Hylocereus undulatus* (Saw.) Dritton & Rose.	ไม้เถา
30	โกงกางใบเล็ก	N/A	*Rhizophora apiculata blume*	ไม้ยืนต้น
31	โกงกางใบใหญ่	Red Mangrove	*Rhizophora mucronata poir .*	ไม้ยืนต้น
32	โกงกางหัวสุม	N/A	*Bruguiera sexangula poir.syn*	ไม้ยืนต้น
33	โกสน	Croton	*Codiaeum varicgatum*	ไม้ยืนต้น
34	ขจร	Cowslip Creeper	*Telosma minor craib*	ไม้เถา

ตารางที่ 4.1 (ต่อ)

ที่	ชื่อ	ชื่อสามัญ:	ชื่อวิทยาศาสตร์	ลักษณะ:
35	ขนุน	Jackfruit Tree	*Artocarpus heterophyllus* Lam.	ไม้ยืนต้น
36	ขมิ้น	Turmaric	*Curcuma longa* Linn.	พืชล้มลุก
37	ขลู่	Indian Marsh Fleabane	*Pluchea indica* (L.) Less.	ไม้พุ่ม
38	ข่อย	Siamese Rough Brush	*Streblus asper* lour.	ไม้ยืนต้น
39	ข่า	Galangal, False Galangal	*Alpinia nigra* (Gaertn.) Burtt	พืชล้มลุก
40	ขิง	Ginger	*Zingiber officinale roscoe*	พื้นล้มลุก
41	ขี้กาแดง	N/A	*Bryonia lacinioas*	ไม้เถา
42	ขี้เหล็ก	Cassod Tree	*Cassia siamea lam.*	ไม้ยืนต้น
43	เข็มแดง	N/A	*Ixora lobbii loud.*	ไม้พุ่ม
44	เข็มตาไก่	N/A	*Ixora cibdela craib*	ไม้พุ่ม
45	เข็มสีม่วง	Blue Sage	*Pseuderanthemum graciliflorum* (Nees) Ridl.	ไม้พุ่ม
46	เข็มเหลือง	N/A	*Ascocentrum minatum* (Lindl.)	ไม้พุ่ม
47	คราม	Indigo	*Lndigofera tinctoria* Linn.	ไม้ยืนต้น
48	คะน้า	Kale	*Brassica alboglabra*	ไม้ล้มลุก
49	แคดอกขาว	Agasta, Sesban	*Sesbania grandiflora* (L.) Desv.	ไม้พุ่ม
50	แคดอกแดง	Agasta, Sesban	*Sesbania grandiflora* (L.) Desv.	ไม้พุ่ม
51	แคป่า	N/A	*Dolichandrone serrulata* (DC.) Seem.	ไม้ยืนต้น
52	แคแสด	Africom Tulip Tree	*Spathodea campanulata beauv.*	ไม้ยืนต้น
53	โคลงเคลง	Malabar Melastome	*Melastoma malabathricum* Linn.	ไม้พุ่ม
54	เงาะ.	Rambutan	*Nephelium lappaceum* Linn	ไม้ยืนต้น
55	เงินไหลมา	Tricolor Nephthytis	*Syngonium podophyllum schott*	ไม้เถา
56	จันทน์ลูกหอม	N/A	*Diospyros decandra* Lour.	ไม้ยืนต้น
57	จาก	Nipa Palm	*Nipa fruticans wurmb.*	ไม้พุ่ม
58	จามจุรี	Rain Tree	*Samanea saman* (Jacq.) Merr	ไม้ยืนต้น
59	จำปา	Champaka, Orange Champak	*Michelia champaca* Linn.	ไม้ยืนต้น
60	จำปี	White Champaka	*Michelia x alba dc.*	ไม้ยืนต้น
61	จำปูน	Jum-poon	*Anaxagorea javanica blume.*	ไม้ยืนต้น
62	จิกน้ำ	Indian Oak	*Barringtonia acutangula* (L.) Gaertn.	ไม้ยืนต้น
63	ชงโค	Orchid Tree, Purder	*Bauhinia blakeana dunn.*	ไม้ยืนต้น
64	ชบา	Hibiscus	*Hibiscus spp. And hybrid*	ไม้พุ่ม
65	ชมพู่แก้มแหม่ม	Java Apple, Wax Apple	*Syzygium samarangense* (Blume) Merr. & L.M.	ไม้ยืนต้น
66	ชมพู่ทับทิมจันทร์	Rosoe Apple	*Eugenia javaniea lamk*	ไม้ยืนต้น
67	ชมพูพันธ์ทิพย์	Pind Tecoma, Pink Trumpet	*Tabebuia rosea* (Bertol.) DC.	ไม้ยืนต้น
68	ชมพู่พันธุ์น้ำดอกไม้	Rose Apple	*Syzygium jambos* (L.) Alston	ไม้ยืนต้น

ตารางที่ 4.1 (ต่อ)

ที่	ชื่อ	ชื่อสามัญ:	ชื่อวิทยาศาสตร์	ลักษณะ:
69	ชมพู่เพชร	N/A	*Eugenia javanica larnk*	ไม้ยืนต้น
70	ชมพู่เพชรสายรุ้ง	N/A	*Eugenia javanica larnk*	ไม้ยืนต้น
71	ชมพู่มะเหมี่ยว	Malay Apple	*Syzygium malaccensis* (L.) Merr.& L.M.	ไม้ยืนต้น
72	ชวนชม	Desert Rose, Mock Azalea	*Adenium obesum* .	ไม้พุ่ม
73	ช้องนาง	Bush Clock Vine	*Thunbergia erecta* (Benth.) Anderson	ไม้พุ่ม
74	ชะพลู	Wildbetal Leafbush	*Piper sarmentosum roxb.*	พืชล้มลุก
75	ชะลูด	N/A	*Alyxia reinwardtii* bl.var. lucida markgr.	ไม้เถา
76	ชะอม	N/A	*Acaciapennata* (Linn.)Willd.Subsp.	ไม้พุ่ม
77	ชะอม	N/A	*Acacia insuavis, lace*	ไม้พุ่ม
78	ชะเอมไทย	N/A	*Albizia myriophylla benth.*	ไม้เถา
79	ชัยพฤกษ์	Javanese Cassia	*Cassia javanica* Linn.	ไม้ยืนต้น
80	ชำมะเลียง	Luna Nut, Chammaliang	*Lepisanthes fruticosa leenh.*	ไม้ยืนต้น
81	ชำมะเลียงดำ	Luna Nut, Chammaliang	*Lepisanthes fruticosa leenh.*	ไม้ยืนต้น
82	เชอร์รี่ไทย	Barbados Cherry	*Malpighia glabra* Linn.	ไม้พุ่ม
83	ดอกแก้ว	Orang Jessamine	*Muraya paniculata.*	ไม้ยืนต้น
84	ดอกข้าวใหม่	Bread Flower	*Vallaris glabra* (L.) Kuntze.	ไม้เถา
85	ดอกผีเสื้อ	Dianthus, Pink	*Dianthus chinensis* Linn.	พืชล้มลุก
86	ดาวกระจาย	Cosmos, Mexican Aster	*Cosmos sulphureus cav.*	ไม้ล้มลุก
87	ดาวเรือง	African Marigold	*Tagetes erecta* Linn.	ไม้ล้มลุก
88	ดาหลา	Torch Ginger	*Etlingera elatior* (Jack) R. M. Smith.	ไม้ล้มลุก
89	ดีปลี	Long Pepper	*Piper retrofractum vahl*	ไม้เถา
90	โด่ไม่รู้ล้ม	Prickly-leaved Elephant's	*Elephantopus scaber* Linn.	ไม้ล้มลุก
91	ต้นใบพาย	N/A	*Aegialitis rotundifolia Roxb.*	ไม้น้ำ
92	ต้นรัก	Crown Flower	*Calotropis gigantea* (Linn.) R. BR. Ex Ait	พืชล้มลุก
93	ต้นอ้อ	Red grass, Giant reed	*Arundo donax* Linn.	หญ้า
94	ต้อยติ่ง	Waterkanon, Watrakanu	*Ruellia tuberosa* Linn.	พืชล้มลุก
95	ตะกู	N/A	*Anthocephalus chinensis*	ไม้ยืนต้น
96	ตะโก	Ebony	*Diospyios rhodcalyx.*	ไม้ยืนต้น
97	ตะขบ	Calabura, Jamalcan, Cherry	*Muntingla calabura* Linn.	ไม้ยืนต้น
98	ตะขบป่า	N/A	*Flacourtia indica* (Burm.F.) Merr.	ไม้ยืนต้น
99	ตะเคียนทอง	Thingan, Sace, Takian	*Hopea odorata roxb.*	ไม้ยืนต้น
100	ตะไคร้	Lemon Grass, Lapine	*Cymbopogon citrates (dc. Ex nees) stapf.*	พืชล้มลุก
101	ตะไคร้หอม	Citronella Grass	*Cymgopogon winterianus jowitt*	พืชล้มลุก

ตารางที่ 4.1 (ต่อ)

ที่	ชื่อ	ชื่อสามัญ:	ชื่อวิทยาศาสตร์	ลักษณะ:
102	ตะบูนขาว	N/A	*Xylocarpus granatum koenig*	ไม้ยืนต้น
103	ตะแบก	Flower fence	*Lagerstroemia floribunda jack.*	ไม้ยืนต้น
104	ตะลิงปิง	Bilimbi,Bilimbing	*Averrhoa bilimbil*	ไม้ยืนต้น
105	ตาลโตนด	N/A	*Borassus flabellifer* L.	ไม้ยืนต้น
106	ตำลึง	Ivy Gourd	*Coccinia grandis*	ไม้เถา
107	ตีนเป็ดทราย	Sea mango	*Cerbera manghas*	ไม้ยืนต้น
108	ตีนเป็ดน้ำ	Pong Pong	*Cerbera odollam gaertn.*	ไม้ยืนต้น
109	เตยหนู	Karaket Nu	*Pandanus odoratissimus* Linn.	ะเมล็ด แยกห
110	เตยหนู	Pandanus Palm	*Pandanus odoratissimus* Linn.	ไม้กอ
111	เตยหอม	Pandanus Palm	*Pandanus amaryllifolius roxb.*	ไม้พุ่ม
112	เต่าร้าง	Clustering Fishtail Palm	*Cargota smitis lour.*	ไม้กอ
113	แตงกวา	Cucumber	*Cucumis sativus* Linn.	พืชล้มลุก
114	ใต้ใบ	Luuk Tai Bai	*Phyllanthus amarus schum &thonn.*	ไม้ล้มลุก
115	ถั่วผี	N/A	*Phaseolus lathyroides l.f.*	ไม้ล้มลุก
116	ถั่วฝักยาว	Yard Long Bean	*Vigna Unguiculata hc*	ไม้เถา
117	ถั่วพู	Winged Bean	*Psophocarpus tetragonolobus* Linn.	ไม้เถา
118	เถายั้ง	N/A	*Smilax lanceifolia roxb.*	ไม้เถาเลื้อย
119	ทองกวาว	Flame of the Forest	*Butea monosperma kuntze.*	ไม้ยืนต้น
120	ทองพันชั่ง	Rhinacanthus	*Rhinacanthus nasutus kurz*	ไม้พุ่ม
121	ทองหลาง	Indian Coral Tree	*Erythrina variegata* Linn.	ไม้ยืนต้น
122	ทองหลางด่าง	Tiger Claw	*Erythrina variegata alba*	ไม้ยืนต้น
123	ทับทิม	Pomegranate	*Punica granatum L* inn.	ไม้พุ่ม
124	เทียนบ้าน	Garden Balsam	*Impatiens balsamina* Linn.	ไม้ล้มลุก
125	ไทรย้อย	Weeping Fig	*Ficus benjamina* Linn.	ไม้ยืนต้น
126	ธรรมรักษา	Heliconia	*Heliconia bihai (l.)* LINN.	ไม้ยืนต้น
127	ธูปฤาษี	Cat-tail, Elephant Grass	*Typha angustifolia* Linn.	ไม้ล้มลุก
128	นนทรี	Copper pod , Yellow Flame	*Peltophorum pterocarpum*	ไม้ยืนต้น
129	น้อยหน่า	Sugar Apple , Sweet Sop	*Annona sguamosa* Linn	ไม้ยืนต้น
130	น้อยโหน่ง	Bullock Sheart	*Annona reticulata* Linn.	ไม้ยืนต้น
131	นางแย้ม	Glory Bower	*Clerodendrum philippinium*	ไม้ยืนต้น
132	น้ำเต้าต้น	Calabash	*Crescentia cujete* Linn.	ไม้ยืนต้น
133	น้ำนมราชสีห์	Garden Spurge	*Euphobia hirta* Linn.	ไม้ล้มลุก
134	นุ่น	White silk cotton tree	*Ceiba pentandra* (Linn.) Gaertn	ไม้ยืนต้น

ตารางที่ 4.1 (ต่อ)

ที่	ชื่อ	ชื่อสามัญ:	ชื่อวิทยาศาสตร์	ลักษณะ:
135	บวบหอม	Sponge Gourd	*Luffa cylindrica* (L.) M.J.Roem	ไม้เถาเลื้อย
136	บวบเหลี่ยม	Angled Loofah	*Luffa acutangula* (Linn.) Roxb.	ไม้เถาเลื้อย
137	บอน	Dasheen , Eddoe	*Colocasia esculenta* (L.) Schott	พืชล้มลุก
138	บอนสี	Fancy Leaved Caladium	*Caladium bicolor vent.*	พืชล้มลุก
139	บอระเพ็ด	Menisspermaceae	*Tinospora crispa* (L.) Miers EX Hook. F & Thoms.	ไม้เถา
140	บัวบก	Asiatic Pennywort	*Centella asiatica* (Linn.) Urban.	พืชล้มลุก
141	บัวหลวง	Sacred Lotus, Egyptian	*Nelumbo nuclfera gaertn.*	ไม้น้ำ,ล้มลุก
142	บานชื่น	Zinnia	*Zinnia elegans*	พืชล้มลุก
143	บานบุรีสีม่วง	Purple Allamanda	*Allamanda 1violacea gard. & field.*	ไม้เถา
144	บานบุรีเหลือง	Golden trumpet, Allamanda.	*Allamanda cathartica* Linn.	ไม้เถา
145	บานไม่รู้โรย ขนห์	Gomphrena, Globe Amaranth	*Comphrena globosa*	ไม้ล้มลุก
146	บุก	Elephant Yam	*Amorphophallus campanulatus bl.*	ไม้ล้มลุก
147	บุนนาค	Iron Wood	*Mesua ferrea* Linn.	ไม้ยืนต้น
148	บุหงาส่าหรี	Common Lime	*Citharexylum spinosum* Linn	ไม้ยืนต้น
149	ปรง	N/A	*Cycas siamensis miq*	ไม้พุ่ม
150	ปรงทอง	Leather Fern, Swamp Fern	*Acrostichum aureum* L.	เฟิร์น
151	ประดู่	Burma Padauk	*Plerocapus indicus.*	ไม้ยืนต้น
152	ประดู่	Padauk	*Plerocarpus indicus*	ไม้ยืนต้น
153	ประดู่กิ่งอ่อน	N/A	*Pterocarpus indicus willd.*	ไม้ยืนต้น
154	ปราง	Marian Plum , Plum Mango	*Bouea macrophylla griffith*	ไม้ยืนต้น
155	ปาล์มขวด	Royal Palm	*Roystonea regia* (Kunth) Cook	ไม้ยืนต้น
156	ปาล์มน้ำมัน	Oil palm, African Oil Palm	*Elaeis guineensis jacq.*	ไม้ยืนต้น
157	ปาล์มเยอรมัน	Manila Palm	*Veitchia merrilli h.e.* Moore	ไม้ยืนต้น
158	ปาล์มสามเหลี่ยม 1	Spindle palm	*Mascarena rerachaffeltii*	ไม้ยืนต้น
159	ปาล์มหางจิ้งจอก	Foxtail Palm	*Wodyetia bifurcata a.k.* Irvine	ไม้ยืนต้น
160	ปาล์มหางปลา	N/A	*Caryota mitis lour.*	ไม้ยืนต้น
161	ปีกแมลงสาบ	N/A	*Tradescantia zebrina loudon*	ไม้ล้มลุก
162	ปีบ	Cork Tree, Indian Cork	*Millingtonia* hortensis L.	ไม้ยืนต้น
163	ปีบยูนาน	N/A	*Radermachera sinica*	ไม้ยืนต้น
164	โป๊ยเซียน	Crow of Thorns	*Euphorbia milli desmoul.*	ไม้ดอก
165	ผกากรอง	Weeping Lantana	Lantana camara Linn.	ไม้พุ่ม
166	ผักกวางตุ้ง	N/A	*Brassica chinensis jusl var parachinensis*	พืชล้มลุก
167	ผักกวางตุ้ง	Chinese Cabbage-Pai tsai	*Brassica pekinensis*	ไม้ล้มลุก
168	ผักกาดขาว	Chinese Cabbage	*Brassica pekinensis*	พืชล้มลุก

ตารางที่ 4.1 (ต่อ)

ที่	ชื่อ	ชื่อสามัญ:	ชื่อวิทยาศาสตร์	ลักษณะ:
169	ผักกาดน้ำ	Common Plantain	*Plantago major* Linn.	พืชล้มลุก
170	ผักกูด	Oak Fern	*Dryopteris amboinensis ktze.* F	เฟิร์น
171	ผักคราดหัวแหวน	Para cress , Tooth-ache Plant	*Acmella oleracea* (L.) R.K.Jansen	ไม้ล้มลุก
172	ผักชีฝรั่ง	Stink Weed	*Eryngium foeidum* Linn.	พืชล้มลุก
173	ผักบุ้งจีน	Water Convolvulus	*Ipomoea aquatica forsk.* Var. Reptan	ไม้เถา
174	ผักบุ้งไทย	Swamp Morning Glory	*Ipomcea aquatica forsk.*	ไม้เถา
175	ผักปราบ	N/A	*Commelina benghalenis* Linn	พืชล้มลุก
176	ผักปล้อง	N/A	*Cf. Echinochloa sp.*	หญ้า
177	ผักปลัง	Malabar Nightshade	*Basella alba linn., basella rubra* Linn. (Syn.)	ไม้เถา
178	ผักพาย	Yellow Velvet Leaf	*Limnocharis flava buch.*	พืชล้มลุก
179	ผักหนาม	N/A	*Lasia spinosa* (L.) Thwaites	พืชล้มลุก
180	ผักหวานบ้าน	Pak-wan Tree	*Sauropus androgynus*	ไม้พุ่ม
181	ผักฮีฮิน	Pod Fern (Swamp fern)	*Monochoria vaginalis* (Burm.F.) Presl.	ไม้น้ำ
182	ไผ่ดำ	Fernledt Bamboo	*Bambusa vulgaris schracd.ex h.*	พืชล้มลุก
183	ไผ่ตง	N/A	*Dendrocalamus asper backer*	พืชล้มลุก
184	ไผ่น้ำเต้า	Buddha's Belly Bamboo	*Bambusa ventricosa mcclure.*	พืชล้มลุก
185	ไผ่ป่า	N/A	*Bambusa bambos*	พืชล้มลุก
186	ไผ่รวก	N/A	*Thyrsostachys siamensis gamble*	พืชล้มลุก
187	ไผ่สีสุก	N/A	*Bambusa blumeana schult.*	พืชล้มลุก
188	ไผ่เหลือง	N/A	*Bambusa valgaris schrad ex.h. wendl*	พืชล้มลุก
189	ฝรั่ง	Guava	*Psidium guajava* Linn.	ไม้ยืนต้น
190	ฝาง	Sappan Tree	*Caesalpinia sappan* Linn.	ไม้ยืนต้น
191	พญานาคราช	Giant Hare's-Foot	*Davallia solida sw.*	ไม้เถา
192	พญาไร้ใบ	N/A	*Euphorbia tirucalli* Linn.	ไม้พุ่ม
193	พญาสัตบรรณ	White Cheesewood	*Alstonia scholaris*	ไม้ยืนต้น
194	พริก	Cayenne Pepper	*Capsicum annuum linn. Var acuminatum fingerh.*	พืชล้มลุก
195	พริกขี้หนู	Bird Chilli	*Capsicum frutescens* Linn.	พืชล้มลุก
196	พริกไทย	Black Pepper	*Piper nigrum* Linn.	ไม้เถา
197	พลับพลึง	Crinum Lily, Cape Lily	*Crinum amabile donn*	พืชล้มลุก
198	พลู	Betel Pepper	*Piper betle* Linn.	พืชล้มลุก
199	พลูด่าง	Devil"s ivy	*Scindapsus aureus*	ไม้เถา
200	พวงคราม	Wreath, Sanpaper Vine	*Petrea volubilis* Linn.	ไม้เถา
201	พวงชมพู	Coral Vine	*Antigonon leptopus hook*	ไม้เถา

ตารางที่ 4.1 (ต่อ)

ที่	ชื่อ	ชื่อสามัญ:	ชื่อวิทยาศาสตร์	ลักษณะ:
202	พวงแสดเถา	Orange Trumpet	*Pyrostegia venusta* (Ker-Gawl.)	ไม้เถา
203	พะยอม	White Meranti	*Shorea roxburghii g.don*	ไม้ยืนต้น
204	พิกุล	Bullet Wood	*Mimusops elengi* Linn.	ไม้ยืนต้น
205	พิลังกาสา	N/A	*Ardisia polycephala wall.*	ไม้พุ่ม
206	พุด	Gerdenia Crape Jasmine	*Gardenia jasminoides.*	ไม้ยืนต้น
207	พุดตาน	Cotton Rose	*Hibiscus mutabilis* Linn.	ไม้พุ่ม
208	พุทธรักษา	Canna, Indian Shoot	*Indian shot canna indica* Linn.	ไม้ล้มลุก
209	พุทรา	Common Jujube	*Ziziphus mauritiana* Lam.	ไม้ยืนต้น
210	พู่ระหง	Fringed Hibiscus	*Hibiscus schizopetalus hook.* F	ไม้พุ่ม
211	เพชรสังฆาต	N/A	*Cissus quadrangularis* Linn.	ไม้เถา
212	แพงพวย	Creeping Water Primrose	*Jussieua repens* Linn.	หญ้า
213	แพงพวยฝรั่ง	Cape Periwinkle, Bringht Eye	*Catharanthus roseus* (L.) G.Don	ไม้ล้มลุก
214	โพธิ์ทะเล	Portia Tree, Cork Tree	*Thespesia populnea* (Linn.) Sol. EX Correa	ไม้ยืนต้น
215	ไพล	Z.purpureum Roscoe	*Zingiber montanum (koenig) link ex dietr.*	พืชล้มลุก
216	ฟักข้าว	Spring Bitter Cucumber	*Momordica cochinchinensis spreng.*	ไม้เถา
217	ฟักเขียว	Chinese Watermelon	*Benincasa hispida cogn.*	ไม้เถา
218	ฟักทอง	Pumpkin	*Cucurbita moschata decne.*	ไม้เถา
219	ฟ้าทะลายโจร	Kariyat, The Creat	*Andrographis paniculata* (Burm.F.) Wall.EX	ไม้ล้มลุก
220	เฟิร์นข้าหลวง	Bird's Nest Fern	*Asplenium nidus* Linn.	เฟิร์น
221	เฟื่องฟ้า	Bougainvillea	*Bougainvillea spp.*	ไม้พุ่ม
222	มณฑา	Magnolita	*Talauma candollei*	ไม้พุ่ม
223	มหาหงส์	Butterfly Lily, Garland Flower	*Hedychium coronarium* J.knig	ไม้ล้มลุก
224	มะกรูด	Leech Lime, Kaffir Lime	*Citrus hystrix dc.*	ไม้ยืนต้น
225	มะกล่ำตาหนู	Jequirity Bean, Rosary Bean	*Abrus precatorius* Linn.	ไม้เถา
226	มะกอกน้ำ	Ma Kok Nam	*Elaeocarpus hygrophilus kurz.*	ไม้ยืนต้น
227	มะกอกฝรั่ง	Spondias Cytherea Sonn.	*Jew's plum, otatheite apple*	ไม้ยืนต้น
228	มะขวิด	Wood Apple	*Feronia limonia* (Linn.) Swing.	ไม้ยืนต้น
229	มะขาม	Tamarind	*Tamarindus indica* Linn.	ไม้ยืนต้น
230	มะขามแขก	Senna	*Cassia angustifolia vahl*	ไม้พุ่ม
231	มะขามเทศ	Manila Tamarind	*Pithecolobium dulce*	ไม้ยืนต้น
232	มะขามป้อม	Emblic Myrablan	*Phyllanthus emblica* Linn.	พืชล้มลุก
233	มะเขือเทศ	Tomato	*Lycopersicon esculuentum mill.*	ไม้ล้มลุก
234	มะเขือเปราะ	Yellow Berried Nightshade	*Solanum xanthocarpum schrad. & wendl.*	ไม้ล้มลุก

ตารางที่ 4.1 (ต่อ)

ที่	ชื่อ	ชื่อสามัญ:	ชื่อวิทยาศาสตร์	ลักษณะ:
235	มะเขือพวง	Common Asiatic Weed	*Solanum torvum swartz.*	ไม้พุ่ม
236	มะเขือม่วง มะเขือ	Egg Plant	*Solanum melongena* Linn.	ไม้ล้มลุก
237	มะเขือยาว	Egg plant, Potato Tree	*Solanum melongena* Linn.	ไม้ล้มลุก
238	มะคัน	Garcinia	*Garcinia schomburgkiana pierre.*	ไม้ยืนต้น
239	มะเดื่อ	N/A	*Ficus racemosa* Linn	ไม้ยืนต้น
240	มะตูม	Bael	*Aegle marmelos* (L.) Correa EX Roxb.	ไม้ยืนต้น
241	มะนาว	Lime, Common Lime	*Citrus aurantifolia* (Christm) Swing.	ไม้ยืนต้น
242	มะพร้าว	Coconut	*Cocos nucifera* Linn.	ไม้ยืนต้น
243	มะพร้าวแคระ	Arikury Palm	*Syagrus schizophylla* (Mart.) Glassm.	ไม้ยืนต้น
244	มะพร้าวน้ำหอม	Coconut	*Cocos nucifera* Linn.	ไม้ยืนต้น
245	มะพร้าวไฟ	Coconut	*Cocos nucifera* Linn.	ไม้ยืนต้น
246	มะพลับ	Bo Tree	*Diospyros malabarica (desv.) kostel. var.*	ไม้ยืนต้น
247	มะพูด	N/A	*Garcinia vilersiana pierre*	ไม้ยืนต้น
248	มะเฟือง	Star Fruit, Carambola	*Averrhoa carambola* Linn.	ไม้ยืนต้น
249	มะไฟ	Burmese Grape	*Baccaurea ramiflora lour.*	ไม้ยืนต้น
250	มะม่วงเขียวเสวย	Mango Tree	*Manaifera indica* Linn.	ไม้ยืนต้น
251	มะม่วงน้ำดอกไม้	Mango Tree	*Manaifera indica* Linn.	ไม้ยืนต้น
252	มะม่วงมันขุนศรี	Mango Tree	*Manaifera indica* Linn.	ไม้ยืนต้น
253	มะม่วงแรด	Mango Tree	*Manaifera indica* Linn.	ไม้ยืนต้น
254	มะม่วงอกร่อง	Mango Tree	*Mangifera indica* Linn.	ไม้ยืนต้น
255	มะยง	Marian Plum, Plum Mango	*Bouea macrophylla griffith*	ไม้ยืนต้น
256	มะยม	Star Gooseberry	*Phyllanthus acidus skeels.*	ไม้ยืนต้น
257	มะระ	Bitter Cucumber-chinese	*Momordica charantia* Linn.	ไม้เถาเลื้อย
258	มะระขี้นก	Bitter Cucumber	*Momordica charantia* Linn.	ไม้เถาเลื้อย
259	มะรุม	Horse Radish Tree	*Moringa oleifera* Lam.	ไม้ยืนต้น
260	มะละกอ	Papaya, Pawpaw, Tree Melon	*Carica papyya* Linn.	พืชล้มลุก
261	มะลิ	Arabian jasmine	*Jasminum sambac* (L.) Aiton	ไม้พุ่ม
262	มะหวด	N/A	*Lepisanthes rubiginosa* (Roxb.) Leenh.	ไม้ยืนต้น
263	มะอึก	Bolo Maka	*Solanum stramonifolium jacq.*	ไม้พุ่ม
264	มะฮอกกานี	Broad Leaf Mahogany	*Swietenia macrophylla king.*	ไม้ยืนต้น
265	มังคุด	Mangostee	*Garcinia mangostana* Linn.	ไม้ยืนต้น
266	มันเทียน	N/A	*Dioscorea daunaea* Prain & Burkii.	ไม้เถา
267	มันปู	N/A	*Glochidion wallichianum muell.*	ไม้พุ่ม

ตารางที่ 4.1 (ต่อ)

ที่	ชื่อ	ชื่อสามัญ:	ชื่อวิทยาศาสตร์	ลักษณะ:
268	แมงลัก	Hairy Basil	*Ocimum basilicum l.f. Var. Citratum back.*	พืชล้มลุก
269	โมก	Moke	*Wrightia religiosa*	ไม้ยืนต้น
270	ยอ	Indian Mulberry	*Morinda citrifolia* Linn.	ไม้พุ่ม
271	ยางนา	Yang	*Dipterocarpus alatus roxb.*	ไม้ยืนต้น
272	ยางเหียง ชาด	N/A	*Dipterocarpus obtusifolius teijsm.ex miq*	ไม้ยืนต้น
273	ยางอินเดีย	Indian Rubber Tree	*Ficuselastica roxb. ex hornem*	ไม้ยืนต้น
274	ย่านาง	Bamboo Grass	*Tiliacora triandra (colebr.) diels*	ไม้เถา
275	ยี่โถ	Sweet Oleander, Rose Bay	*Nerium oleandes* Linn.	ไม้พุ่ม
276	ยี่หร่า	Kawawya, Caraway Friut	*Ocimum gratissimum cuminum cyminum* L.	พืชล้มลุก
277	ยูคาลิปตัส	Eucalyptus	*Eucalyptus camaldulensis dehnh.*	ไม้ยืนต้น
278	โยทะกา	St. Thomas Tree	*Bauhinia tomentosa* Linn.	ไม้พุ่ม
279	รสสุคนธ์	Rose-Su-Kon	*Tetracera loureiri*	ไม้เถา
280	รางจืด	N/A	*Thumbergia laurifolia lindl.*	ไม้เถา
281	ราชพฤกษ์	Golden Shower	*Cassia fistula* L.	ไม้ยืนต้น
282	รำเพย	Yellow Oleander, Lucky Bean	*Thevetia peruviana* (Pers.) K.Schum.	ไม้พุ่ม
283	ลิ้นครุฑ	Polyscias	*Polyscias sp.*	ไม้พุ่ม
284	ลองกอง	Longkong	*Lansium domesticum correa*	ไม้ยืนต้น
285	ละมุด	Marian Plum	*Manilkara achras fosberg*	ไม้ยืนต้น
286	ละมุดสีดา	N/A	*Madhuca esculenta h.r. fletcher*	ไม้ยืนต้น
287	ลำดวน	Lamdman	*Melodorum fruticosum lour.*	ไม้ยืนต้น
288	ลำพู	Cork Tree	*Sonneratia caseolaris* (L.) Engl.	ไม้ยืนต้น
289	ลำไย	Longan	*Dimocarpus longen lour.*	ไม้ยืนต้น
290	ลิ้นจี่	Lychee,Lichi itchi, Lici	*Litchi chinensis sonn.*	ไม้ยืนต้น
291	ลีลาวดี	Frangipani, Pagoda Tree	*Plumeria acutifolia poir.*	ไม้ยืนต้น
292	เล็บมือนาง	Chinese honey Suckle	*Quisqualis indica* Linn.	ไม้เถา
293	เล็บเหยี่ยว	N/A	*Zizyphus oenoplia mill.*	ไม้เถา
294	เลียบ	N/A	*Ficus lacor buch.*	ไม้ยืนต้น
295	ว่านกาบหอย	Oyster plant	*Tradescantia spathacea stearn*	ไม้ล้มลุก
296	ว่านชักมดลูก	N/A	*Curcuma xanthorrhiza roxb.*	ไม้ล้มลุก
297	ว่านหางจระเข้	Star cactus, Aloe, Aloin	*Aloe vera* (L.) Burm.F.	ไม้ล้มลุก
298	วาสนา	Queen of Dracaenas	*Dracaena goldieana.*	ไม้ยืนต้น
299	ศรีมหาโพธิ์	Sacred Fig Tree, Pipal Tree	*Ficus religiosa* Linn.	ไม้ยืนต้น

ตารางที่ 4.1 (ต่อ)

ที่	ชื่อ	ชื่อสามัญ:	ชื่อวิทยาศาสตร์	ลักษณะ:
300	โศก	Asoka Tree	*Saraca indica* Linn.	ไม้ยืนต้น
301	สนแผง	Chimese Arborvitae	*Thuja orientalis endl.*	ไม้ยืนต้น
302	ส้มเขียวหวาน	Mandarin Orange	*Citrus reticulata blanco*	ไม้ยืนต้น
303	ส้มซ่า	Bouquetier, Sour Orange	*Citrus aurantium* Linn. Cv. Group bouquetier	ไม้ยืนต้น
304	ส้มป่อย	N/A	*Acacia concinna* (Willd.) D.C.	ไม้พุ่ม
305	สมอไทย	Myrabolan Wood	*Terminalia chebula retz.*	ไม้ยืนต้น
306	ส้มโอ	Pummelo, Shaddock	*Citrus maxima* (Burm.) Merr.	ไม้ยืนต้น
307	สร้อยไก่	Celosia	*Celosia argentea* Linn.	ไม้ล้มลุก
308	สะเจ	Catechu Tree, Cutch Tree	*Acacia catechu* (L.F.) Willd.	ไม้ยืนต้น
309	สะเดา	Siamese Neem tree, Nim	*Azadirachta indica a. Juss. Var. Siamensis valeto*	ไม้ยืนต้น
310	สะเดามันทวาย	Siamese Neem Tree, Nim	*Azadirachta indica a. Juss. Var. Siamensis valeto*	ไม้ยืนต้น
311	สะระแหน่	Kitchen Mint, Marsh Mint	*Mentha cordifolia opiz.*	พืชล้มลุก
312	สัก	Teak	*Tectona grandis l.f.*	ไม้ยืนต้น
313	สับปะรด	Pineapple	*Ananas comosus* (L.) Merr.	ไม้ล้มลุก
314	สาเก	Bread Fruit Tree	*Artocarpus altilis forsberg*	ไม้ยืนต้น
315	สาบเสือ	N/A	*Chromolaena odoratum*	ไม้พุ่ม
316	สายหยุด	Desmos	*Desmos chinensis lour.*	ไม้พุ่มกึ่งเลื้อย
317	สารภี	Negkaser	*Mammea siamensis kosterm*	ไม้ยืนต้น
318	สุพรรณิการ์	Yellow Silk Cotton	*Cochlospermum religiosum*	ไม้ยืนต้น
319	เสลดพังพอนตัวผู้	Hop Headed Barleria	*Barleria lupulina lindl.*	ไม้พุ่ม
320	เสลดพังพอนตัวเมี	Snake Plant	*Clinacanthus nutans* (Burm.F) Lindau.	ไม้พุ่ม
321	เสาวรส	Jamaica Honey-suckle, Passion fruit, Yellow Granadilla		ไม้เถา
322	แสงจันทร์	Lettuce Tree	*Pisonia grandis*	ไม้ยืนต้น
323	แส้หางม้า	Ponytail Palm, Pony's Tail	*Beaucarnea recurvata lem.*	ไม้ยืนต้น
324	โสน	N/A	*Sesbania aculeata*	ไม้ล้มลุก
325	โสมไทย	Fame - Flower	*Talinum paniculatum gaertn.*	พืชล้มลุก
326	หงอนไก่	Common Cockscomb	*Celosia argentea* L.	ไม้ล้มลุก
327	หญ้าขน	Paragrass, Buffalo Grass	*Brachiaria mutica (forsk.) stapf*	หญ้า
328	หญ้าข้าวนก	Barnyard Grass	*Echinochloa colonum* (L.) Link	หญ้า
329	หญ้าคา	Cogon Grass	*Imperata cylindrica* (Linn.) Beauv	หญ้า
330	หญ้าแฝก	Vetiver Grass	*Vetiveria zizanioides nash*	หญ้า
331	หญ้าแพรก	Bahana Grass, Bermuda Grass	*Cynodon dactylon* (L.) Pers.	หญ้า

ตารางที่ 4.1 (ต่อ)

ที่	ชื่อ	ชื่อสามัญ:	ชื่อวิทยาศาสตร์	ลักษณะ:
332	หญ้าหนวดแมว	Java tea, Kidney Tea Plant	*Orthosiphon aristatus (blume) miq.*	พืชล้มลุก
333	หญ้าแห้วหมู	Nut grass, Cocograss	*Cyperus rotundus* Linn.	ไม้ล้มลุก
334	หนวดปลาหมึกยัก	Umbrella Tree, Octopus Tree	*Schefflera actinophylla*	ไม้พุ่ม
335	หนอนตายหยาก	N/A	*Stemona tuberose lour.*	ไม้ล้มลุก
336	หนามแท่ง	N/A	*Catunaregam tomentosum* (Kurz) Bakh.F.	ไม้ยืนต้น
337	หนามบังคอ	N/A	-	ไม้พุ่ม
338	หมาก	Betel Nut	*Areca catechu* Linn.	ไม้ยืนต้น
339	หมากกะลิงเทศ	Ringworm Bush	*Cassia alata* Linn.	ไม้พุ่ม
340	หมากเขียว	MacArthur's Plam	*Ptychosperma macarthurii*	ไม้ยืนต้น
341	หมากแดง	Sealing-wax Palm	*Cyrtostachys renda*	ไม้พุ่ม
342	หมากผู้หมากเมีย	Cordyline	*Cordyline fruticosa*	ไม้พุ่ม
343	หมากเม่า	N/A	*Antidesma velutinosum blume*	ไม้ยืนต้น
344	หมากเหลือง	Madagacar Palm	*Ptychosperma macarthurii*	ไม้ยืนต้น
345	หลุมพอทะเล	N/A	*Intsia bijuga* (Colebr.) O. Ktze.	ไม้ยืนต้น
346	หว้า	Jambolan Plum, Java Plum	*Syzygium cumini* (L.) Skeels	ไม้ยืนต้น
347	หว้า	Black Poum Satin Ash	*Syzygium cumini* (L.) Skeels	ไม้ยืนต้น
348	หวาย	Rattan	*Calamus caesius blume*	ไม้เถา
349	หวายลิง	N/A	*Flagellaria indica* Linn.	ไม้เถา
350	หางนกยูงไทย	Flower Fence	*Caesalpinia pulcherrima* (L.) SW.	ไม้ยืนต้น
351	หางนกยูงฝรั่ง	Flamebuoyant Tree	*Delonix regia* (Bojer Ex Hook.)	ไม้ยืนต้น
352	หูกระจง	Ivory Coast Almond	*Terminalia ivoriensis a.c hev.*	ไม้ยืนต้น
353	หูกวาง	Indian Almond	*Terminalia catappa* Linn.	ไม้ยืนต้น
354	เหงือกปลาหมอ	Sea Holly	*Acanthus ebracteatus vahl.*	ไม้พุ่ม
355	เห็ดโคน	Termite Mushroom	*Termitomyces fuliginosus heim*	เห็ด
356	เหลืองปรีดียาธร	Silver Trumpet tree	*Tabebuia argentea britt*	ไม้ยืนต้น
357	อบเชยเทศ	Cinnamon Tree	*Cinnamomum verum j.presl*	ไม้ยืนต้น
358	อบเชยไทย	Cinnamon	*Cinnamomum iners reinw. ex blume*	ไม้ยืนต้น
359	อโศกอินเดีย	Mast tree, Cemetery Tree	*Polyalthia longifolia benth & hook .F.*	ไม้ยืนต้น
360	ออกดิบ	N/A	*Colocasia gigantea hook.* F.	พืชล้มลุก
361	อ่อมแซบ	Indian Asystasia.	*Justicia gangetica*	ไม้ไม้พุ่ม
362	อ้อย	Sugar Cane	*Saccharum officinarum* Linn.	ไม้ล้มลุก
363	อัญชัน	Blue Pea, Butterfly Pea	*Clitoria ternatea* L.	ไม้ล้มลุก

ตารางที่ 4.1 (ต่อ)

ที่	ชื่อ	ชื่อสามัญ:	ชื่อวิทยาศาสตร์	ลักษณะ:
364	อัมพวา	Namnam, Namu-Namu	*Cynometra cauliflora*	ไม้ยืนต้น
365	อินทผลัม	Date Palm	*Phoenix dactylifera*	ปาล์ม
366	อุตพิด	N/A	*Typhonium trilobatum schott.*	ไม้ล้มลุก
367	เอื้องหมายนา	Spiral Flag, Wild Ginger	*Costus speciosus* Smith	ไม้ล้มลุก
368	ฮวานง็อก	Hoan-Ngoc	*Pseuderanthemum palatiferum*	ไม้พุ่ม

ตารางที่ 4.2 สัตว์ที่พบในพื้นที่คุ้งบางกะเจ้า 6 ตำบล อำเภอพระประแดง จังหวัดสมุทรปราการ

ชื่อ	ชื่อสามัญ	ชื่อวิทยาศาสตร์	ประเภทสัตว์
มวนท้องยาว	Giant Red Bug	*Macroceroea grandis gray*	แมลง
มวนแดง	Red Bug	*Dysdercus cingulatus fabricius*	แมลง
ยุงลายสวน	Genus Aedes	*Aedes albopictus*	แมลง
ยุงก้นปล่อง	Genus Anopheles	*Anopheles sp.*	แมลง
มดดำ	Iridomyrmex Anceps	*Oecophylla smaragdina fabricius*	แมลง
มดแดง	Red or Yellow Ant	*Oecophylla smaragdina fabricius*	แมลง
มดตะนอย	Black Tree Ant	*Tetraponera attenuate* (Smith, 1877)	แมลง
มดน้ำผึ้ง	Yellow Crazy Ant	*Anoplolepis gracilipes* (FR.Smith)	แมลง
มดคันไฟ	Fire Ants	*Solenopsis geminata* (Fabr.)	แมลง
ตั๊กแตนหน้าแหลม	Slant-faced Grasshopper	*Acrida turrita*	แมลง
ตั๊กแตนขาแดง	Red-legged Locust	*Chondracris roseapbrunner*	แมลง
ตั๊กแตนลาย	Locust	*Choredocus insignis*	แมลง
ตั๊กแตนปาทังก้า	Bombay Locust	*Patanga succincta linnaeus*	แมลง
ตั๊กแตนคอนดราคริส	Citrus Locust	*Chondracris rosea brunneri*	แมลง
ตั๊กแตนโลคัสตา	Oriental Migratory Locust	*Locusta migratoria mani-lensis*	แมลง
ตั๊กแตนไซตาแคนธาคริส	Cyrtacanthacris	*Cyrtacanthacris tatarica* (Linnaeus)	แมลง
ตั๊กแตนหนวดสั้น	Short-horned Grasshopper	*Acridoidea macleay,* 1821.	แมลง
ตั๊กแตนข้าวเล็ก	Small Rice Grasshoppers	*Oxya japonica* (Thunberg, 1815)	แมลง
ตั๊กแตนแคระ	Pygmy Grasshopper	*N/A*	แมลง
ตั๊กแตนขาลายข้างแถบ	White-banded Rufous Locust	*Pternoscirta caliginosa*	แมลง
ตั๊กแตนหนวดยาว	Long horned Grasshopper	*Euconocephalus incertus walker*	แมลง
ตั๊กแตนใบไม้	Leaf Insect	*Phyllium bioculatum*	แมลง
ตั๊กแตนกิ่งไม้	Phobaeticus	*Tenodera pinapavonis*	แมลง
ตั๊กแตนตำข้าว	Mantid	*Tenodera sinensis*	แมลง
แมลงทับ	Metalic Wood Boring Beetle	*Sterocera acquisignata saunders*	แมลง
แมลงเม่า	Termite	*Termes sp.*	แมลง
กระชอน	Mole Cricket	*Gryllotalpa africana beauvois*	แมลง
จิ้งหรีดทองดำ	House Cricket	*Gryllus* (Teloegryllus)	แมลง
จิ้งหรีดทองแดง	Ground Cricket	*Gryllus testaceus walker*	แมลง
จิ้งหรีดหัวโต	Short Tailed Cricket	*Brachytrupes portentosus*	แมลง
เต่าทอง	Ladybird, Ladybug	*Coccinella transvesalis fabrsalis*	แมลง
ผึ้งหลวง	Giant Honey Bee	*Apis dorsata* (Fabricius, 1793)	แมลง
ผึ้งมิ้ม	Little Bee, Dwarf Bee	*Apis florea* (Fabricius, 1787)	แมลง

ตารางที่ 4.2 (ต่อ)

ชื่อ	ชื่อสามัญ	ชื่อวิทยาศาสตร์	ประเภทสัตว์
กบหนอง	Grass Frog. Rice Field	*Ferjervaya limnocharis*	สัตว์ครึ่งบกครึ่งน้ำ
เขียดจะนา	Common Puddle Frog	*Occidozyga lima*	สัตว์ครึ่งบกครึ่งน้ำ
เขียดทราย	Marten's Puddle Frog	*Occidozyga martensii*	สัตว์ครึ่งบกครึ่งน้ำ
เขียดหลังขีด	Stripe-backed	*Rana macrodactyla*	สัตว์ครึ่งบกครึ่งน้ำ
หอยทาก	African Giant Snail	*Molluska*	สัตว์น้ำ
ไก่ประดู่หางดำ	Pradu Hang Dam	*Gallus gallus*	สัตว์ปีก
ไก่เหลืองหางขาว	Lueng Hang Kao	*Gallus gallus*	สัตว์ปีก
ไก่แดง	Dang	*Gallus gallus*	สัตว์ปีก
ไก่ชี	Chee	*Gallus gallus*	สัตว์ปีก
ไก่แจ้	Bantam	*Gallus gallus*	สัตว์ปีก
เป็ดไข่พันธุ์กากีแคมป์เบล	Khaki Campbell	*Anas platyrhynchos*	สัตว์ปีก
กระรอก	Variable Squirrel	*Callosciurus finlaysonii*	สัตว์เลี้ยงลูกด้วยนม
กระแต	Common Treeshrew	*Tupaia glis*	สัตว์เลี้ยงลูกด้วยนม
หนูบ้าน	House Rat, Common Rat	*Rattus norvegicus*	สัตว์เลี้ยงลูกด้วยนม
โคพื้นเมือง	Native Beef Cattle	*Bos taurus linnaeus*	สัตว์เลี้ยงลูกด้วยนม
งูเขียวบอน	Green Cat Snake	*Boiga cyanea*	สัตว์เลื้อยคลาน
งูเขียวหัวจิ้งจกมลายู	Malayan Green Whip Snake	*Ahaetulla mycterizans*	สัตว์เลื้อยคลาน
งูเขียวปากแหนบ	Long-nosed Whip Snake	*Ahaetulla nasuta*	สัตว์เลื้อยคลาน
งูเขียวหางไหม้	Green Pit Viper	*Trimeresurus sp.*	สัตว์เลื้อยคลาน
งูปล้องทอง	Mangrove Snake	*Boiga dendrophila* (Boie, 1827)	สัตว์เลื้อยคลาน
งูสามเหลี่ยม	Banded Krait	*Bungarus fasciatus*	สัตว์เลื้อยคลาน
งูเห่า	Monocled Cobra	*Naja kaouthia*	สัตว์เลื้อยคลาน
งูเหลือม	Reticulated Python	*Python reticulatus*	สัตว์เลื้อยคลาน
งูทางมะพร้าวสายขัด	Copperhead Racer	*Elaphe radiata* (Boie, 1827)	สัตว์เลื้อยคลาน
งูก้นขบ	Red-tailed Pipe Snake	*Cylindrophis ruffus* (Laurenti, 1768)	สัตว์เลื้อยคลาน
งูสิง	Gunther's Rat Snake	*Ptyas fusca* (Gunther, 1858)	สัตว์เลื้อยคลาน
งูปี่แก้วธรรมดา	Common Kukri Snake	*Oligodon cyclurus* (Cantor, 1839)	สัตว์เลื้อยคลาน
งูแสงอาทิตย์	Sunbeam Snake	*Xenopeltis unicolor*	สัตว์เลื้อยคลาน
งูงวงช้าง	Elephan Trunk Snakenulated File S	*Acrochordus javanicus*(Hornstedt, 1787)	สัตว์เลื้อยคลาน
งูดินบ้าน	Common Blind Snake	*Ramphotyplops braminus*	สัตว์เลื้อยคลาน
กิ้งก่าหัวแดง	Changeable Lizard	*Calotes versicolor* (Daudin, 1802)	สัตว์เลื้อยคลาน
กิ้งก่าเขาหนามสั้น	Masked Spiny Lizard	*Acanthosaura crucigera*	สัตว์เลื้อยคลาน
งูเขียวปากจิ้งจก	Oriental Whip Snake	*Ahaetulla prasina*	สัตว์เลื้อยคลาน

ตารางที่ 4.2 (ต่อ)

ชื่อ	ชื่อสามัญ	ชื่อวิทยาศาสตร์	ประเภทสัตว์
งูเขียวหัวจิ้งจกมลายู	Malayan Green Whip Snake	*Ahaetulla mycterizans*	สัตว์เลื้อยคลาน
งูเขียวปากแหนบ	Long-nosed Whip Snake	*Ahaetulla nasuta*	สัตว์เลื้อยคลาน
งูเขียวหางไหม้	Green Pit Viper	*Trimeresurus sp.*	สัตว์เลื้อยคลาน
งูปล้องทอง	Mangrove Snake	*Boiga dendrophila* (Boie, 1827)	สัตว์เลื้อยคลาน
งูสามเหลี่ยม	Banded Krait	*Bungarus fasciatus*	สัตว์เลื้อยคลาน
งูเห่า	Monocled Cobra	*Naja kaouthia*	สัตว์เลื้อยคลาน
งูเหลือม	Reticulated Python	*Python reticulatus*	สัตว์เลื้อยคลาน
งูทางมะพร้าวสายขัด	Copperhead Racer	*Elaphe radiata* (Boie, 1827)	สัตว์เลื้อยคลาน
งูก้นขบ	Red-tailed Pipe Snake	*Cylindrophis ruffus* (Laurenti, 1768)	สัตว์เลื้อยคลาน
งูสิง	Gunther's Rat Snake	*Ptyas fusca* (Gunther, 1858)	สัตว์เลื้อยคลาน
งูปี่แก้วธรรมดา	Common Kukri Snake	*Oligodon cyclurus* (Cantor, 1839)	สัตว์เลื้อยคลาน
งูแสงอาทิตย์	Sunbeam Snake	*Xenopeltis unicolor*	สัตว์เลื้อยคลาน
งูงวงช้าง	Elephan Trunk Snakenulated File S	*Acrochordus javanicus*(Hornstedt, 1787)	สัตว์เลื้อยคลาน
งูดินบ้าน	Common Blind Snake	*Ramphotyplops braminus*	สัตว์เลื้อยคลาน
กิ้งก่าหัวแดง	Changeable Lizard	*Calotes versicolor* (Daudin, 1802)	สัตว์เลื้อยคลาน
กิ้งก่าเขาหนามสั้น	Masked Spiny Lizard	*Acanthosaura crucigera*	สัตว์เลื้อยคลาน
กิ้งก่าแก้ว	Forest Crested Lizard	*Calotes emma gray,* 1845	สัตว์เลื้อยคลาน
จิ้งจกหางหนาม	Spiny-tailed House Gecko	*Hemidactylus frenatus*	สัตว์เลื้อยคลาน
จิ้งจกหางเรียบ	Garnot's House Gecko	*Hemidactylus garnotii*	สัตว์เลื้อยคลาน
จิ้งเหลนบ้าน	Common Sun Skink	*Mabuya multifasciata* (Kuhl, 1820)	สัตว์เลื้อยคลาน
จิ้งเหลนเรียวท้องเหลือง	Bowrung's Slender Skink	*Riopa bowrungii* (Gunther, 1864)	สัตว์เลื้อยคลาน
ตุ๊กแกบ้าน	Tokay Gecko	*Gekko gecko* (Linnaeus, 1758)	สัตว์เลื้อยคลาน
ตะขาบ	Centipede	*Scolopendra gigantea*	สัตว์เลื้อยคลาน
กิ้งกือ	Millipede	*Desmoxytes purpurosea*	สัตว์เลื้อยคลาน
แมงป่อง	Scorpion	*Appendicula floribunda*	สัตว์เลื้อยคลาน
แมงป่องเล็ก	Lesser Brown Scorpion	*Isometrus maculatus*	สัตว์เลื้อยคลาน
ตะกวด	Clouded Monitor	*Vaeanus nebulosus* (Gray, 1831)	สัตว์เลื้อยคลาน
ตัวเงินตัวทอง	Water Monitor	*Varanus salvator*	สัตว์เลื้อยคลาน

ตารางที่ 4.2 (ต่อ)

ชื่อ	ชื่อสามัญ	ชื่อวิทยาศาสตร์	ประเภทสัตว์
ต่อ	Vespa cincta	*Vespa sp.*	แมลง
แตน	Hymenoptera	*N/a*	แมลง
ปลวก	Termite	*Odontotermes takensis* (Ahmad)	แมลง
ด้วงกว่าง	Scarab Beetle	*Xylotrupes gideon linneaus*	แมลง
แมงพลัด	N/A	*Sternocea sp.*	แมลง
ด้วงค่อมทอง	Weevil	*Hypomeces squamosus fabricius*	แมลง
ด้วงหนวดยาวอ้อย	Long-horned Beetle	*Dorysthenes buqueti* (Guerin, 1844)	แมลง
ด้วงหนวดปมจุดเหลืองดำ	Common Tuft-bearing Longhorn	*Aristobia approximator* (Thomson)	แมลง
ด้วงหนวดยาวทหาร	Diastocera Wallichi Tonkinensis	*Diastocera wallichi*	แมลง
หนอนม้วนใบกล้วย	Skipper	*Erionota thrax thax linnaeus*	แมลง
หิ่งห้อย	Firefly	*Pteroptyx malacae*	แมลง
จักจั่น	Cicada	*Meimuna opalifera walker*	แมลง
แมลงสาบ	Cockroach	*Periplaneta americana*	แมลง
แมลงวันบ้าน	Common House Fly	*Musca domestica*	แมลง
แมลงวันหัวเขียว	Blow Fly, Blue Bottle	*Chrysomya megacephala* (Fabricius)	แมลง
แมลงวันหลังลาย	Fresh Fly	*N/A*	แมลง
แมลงวันคอกสัตว์	Stomoxys Fly	*Stomoxys calcitrans*	แมลง
แมลงวันผลไม้	Guava Fruit Fly	*Bactrocera correcta*	แมลง
แมงมุมไหมทอง	Nephila Maculata	*Latrodectus geometricus*	แมลง
แมงมุมใยทองลายจุด	N/A	*Nephila antipodiana*	แมลง
แมงมุมมดแดง	Myrmarachne Plataleoides	*Kerengga ant-like jumper*	แมลง
แมงมุมเขียว	N/A	*N/A*	แมลง
แมงมุมเขี้ยวใหญ่ลายประ	Decorative Leucauge	*Leucauge decorata*	แมลง
แมงมุมนุ่งชิ่นใหญ่	N/A	*Great arglope spider*	แมลง
แมงมุมนุ่งชิ่นหลากสี	N/A	*Multi-coloured arglope spider*	แมลง
แมงมุมหลังหนามดำขา	N/A	*Gasteracantha kuhlii*	แมลง
แมงมุมหลังหนามเหลือ	N/A	*Hosselt's spiny spider*	แมลง
คางคกบ้าน	Black-spiny Toad	*Bufo melanostictus*	สัตว์ครึ่งบกครึ่งน้ำ
อึ่งอ่างบ้าน	Asian Painted Frog	*Kaloula pulchra*	สัตว์ครึ่งบกครึ่งน้ำ
อึ่งข้างดำ	Painted Chorus Frog	*Microhyla heymonsi*	สัตว์ครึ่งบกครึ่งน้ำ
อึ่งน้ำเต้า	Ornate Chorus Frog	*Microhyla ornata*	สัตว์ครึ่งบกครึ่งน้ำ
อึ่งลายเลอะ	Noisy Frog	*Microhyla butleri*	สัตว์ครึ่งบกครึ่งน้ำ
กบนา	Common Lowland Frog	*Rana rugulosa*	สัตว์ครึ่งบกครึ่งน้ำ

ตารางที่ 4.3 นกที่พบในพื้นที่คุ้งบางกะเจ้า อำเภอพระประแดง จังหวัดสมุทรปราการ

ชื่อ	ชื่อสามัญ	ชื่อวิทยาศาสตร์	ประเภทสัตว์
นกกระจอกบ้าน	Tree Sparrow	*Passer montanus*	สัตว์ปีก
นกกระจิบคอดำ	Dark-necked Tailorbird	*Orthotomus atrogularis* (Temminck, 183(	สัตว์ปีก
นกกระจิบธรรมดา	Common Tailorbird	*Orthotomus sutorius* (Pennant, 1769)	สัตว์ปีก
นกกระติ๊ดขี้หมู	Scaly-Breasted Munia	*Lochura punctulata*	สัตว์ปีก
นกกระเต็นน้อยธรรมดา	Common Kingfisher	*Alcedo atthis*	สัตว์ปีก
นกกระเต็นหัวดำ	Black-capped Kingfisher	*Halcyon pileata*	สัตว์ปีก
นกกระเต็นอกขาว	White-throated Kingfisher	*Halcyon smyrnensis*	สัตว์ปีก
นกกระปูดใหญ่	Greater Coucal	*Centropus sinensis* (Stephens, 1815)	สัตว์ปีก
นกกวัก	White-breasted Waterhen	*Amaurornis phoenicurus*	สัตว์ปีก
นกกางเขนบ้าน	Oriental Magpie Robin	*Copsychus saularis* (Linnaeus, 1750)	สัตว์ปีก
นกกาน้ำเล็ก	Little Cormorant	*Phalacrocorax niger*	สัตว์ปีก
นกกาเหว่า ดุเหว่า	Asian Koel	*Eudynamys scolopacea*	สัตว์ปีก
นกกินปลีอกเหลือง	Olive-Backed Sunbird	*Nectarinia jugularis* (Linnaeus, 1766)	สัตว์ปีก
นกกินเปรี้ยว	Collared Kingfisher	*Todiramphus chloris*	สัตว์ปีก
นกขมิ้นท้ายทอยดำ	Black-Naped Oriole	*Oriolus chinensis* (Linnaeus, 1766)	สัตว์ปีก
นกขมิ้นน้อยธรรมดา	Common Iora	*Aegithina tiphia* (Linnaeus, 1758)	สัตว์ปีก
นกเขาชวา	Dove Zebra Dove	*Geopelia striata striara* (Linnaeus)	สัตว์ปีก
นกเขาไฟ	Red Collared Dove	*Streptopelia tranquebarica*	สัตว์ปีก
นกเขาใหญ่	Spotted-necked Dove	*Streptopelia chinensis tigrina*	สัตว์ปีก
นกแขวก	Black-crowned Night Heron	*Nycticorax nycticorax*	สัตว์ปีก
นกเค้าจุด	Spotted Owlet	*Athene brama*	สัตว์ปีก
นกจับแมลงสีน้ำตาล	Asian Brown Flycatcher	*Muscicapa dauurica*	สัตว์ปีก
นกแซงแซวสีเทา	Ashy Drongo	*Dicrurus leucophaeus vieillot*	สัตว์ปีก
นกแซงแซวหางปลา	Black Drongo	*Dicrurus macrocercus*	สัตว์ปีก
นกตะขาบทุ่ง	Indian Roller	*Coracias benghalensis*	สัตว์ปีก
นกตีทอง	Coppersmith Barbet	*Megalaima haemacephala*	สัตว์ปีก
นกปรอดสวน	Streak-Eared Bulbul	*Pycnonotus blanfordi* (Jerdon,1862)	สัตว์ปีก
นกปรอดหน้านวล	Yellow-Vented Bulbul	*Pycnonotus goiavier*	สัตว์ปีก
นกพงปากหนา	Thick-billed Warbler	*Acrocephalus aedon* (Pallas, 1776)	สัตว์ปีก
นกยางกรอกพันธุ์จีน	Chinese Pond Heron	*Ardeola bacchus*	สัตว์ปีก
นกยางกรอกพันธุ์ชวา	Javan Pond Heron	*Ardeola speciosa*	สัตว์ปีก
นกยางเขียว	Little Heron	*Butorides striata* (Linnaeus, 1758)	สัตว์ปีก
นกยางโทนน้อย	Intermediate Egret	*Mesophoyx intermedia*	สัตว์ปีก

ตารางที่ 4.3 (ต่อ)

ชื่อ	ชื่อสามัญ	ชื่อวิทยาศาสตร์	ประเภทสัตว์
นกยางโทนใหญ่	Great Egret	*Casmerodius albus*	สัตว์ปีก
นกยางเปีย	Little Egret	*Egretta garzetta*	สัตว์ปีก
นกยางไฟธรรมดา	Cinnamon Bittern	*Ixobrychus cinnamomeus*	สัตว์ปีก
นกสีชมพูสวน	Scarlet-Backed Flowerpecker	*Dicaeum cruentatum* (Linnaeus, 1758)	สัตว์ปีก
นกอีแพรดแถบอกดำ	Pied Fantail	*Rhipidura javanica*	สัตว์ปีก
นกอีวาบตั๊กแตน	Plaintive Cuckoo	*Cacomantis merulinus* (Scopoli) 1786	สัตว์ปีก
นกอีเสือสีน้ำตาล	Brown Shrike	*Lanius cristatus*	สัตว์ปีก
นกเอี้ยง	Common Myna	*Acridotheres fristis* (Linnaeus, 1766)	สัตว์ปีก
นกเอี้ยงด่าง	Asian Pied Myna	*Sturnus contra*	สัตว์ปีก
นกเอี้ยงหงอน	White-Vented Myna	*Acridotheres Gradis*	สัตว์ปีก
เหยี่ยวขาว	Black-Shouldered Kite	*Elanus Caeruleus*	สัตว์ปีก
เหยี่ยวแดง	Brahminy Kite	*Haliastur Indus*	สัตว์ปีก
เหยี่ยวนกเขาชิครา	Shikra	*Accipiter Badius*	สัตว์ปีก
เหยี่ยวรุ้ง	Crested Serpent-Eagle	*Spilornis Cheela*	สัตว์ปีก
อีกา	Large-Billed Crow	*Corvas macrorhynchos*	สัตว์ปีก

ตารางที่ 4.4 ผีเสื้อที่พบในพื้นที่คุ้งบางกะเจ้า อำเภอพระประแดง จังหวัดสมุทรปราการ

ชื่อ	ชื่อสามัญ	ชื่อวิทยาศาสตร์	ประเภทสัตว์
ผีเสื้อกระดำขอบหยัก	Great Darkie	*Allotinus drumila*	แมลง
ผีเสื้อกะทกรกธรรมดา	Leopard Lacewing	*Cethosia cyane* (Fruhstorfer, 1912)	แมลง
ผีเสื้อกะลาสีธรรมดา	Common Plain Sailor	*Nepis hylas* (Moore, 1874)	แมลง
ผีเสื้อกะลาสีลายทึบ	Clear Sailor	*Neptis clinia*	แมลง
ผีเสื้อขมิ้นกับปูนธรรมด	Purple Sapphire	*Heliophorus epicles*	แมลง
ผีเสื้อขาวแคระ	Psyche	*Leptosia nina* (Fabricius, 1793)	แมลง
ผีเสื้อจรกาดำขาว	Magpie Crow	*Euploea radamanthus* (Fabricius, 1793)	แมลง
ผีเสื้อจรกาหนอนยี่โก	Common Indian Crow	*Euploea core* (Lucus, 1853)	แมลง
ผีเสื้อเจ้าชายดำขอบปีกเ	Tonkin Prince	*Ohana tonkiniana*	แมลง
ผีเสื้อเชิงลายธรรมดา	Common Mine	*Chilasa clytia* (Linnaeus, 1758)	แมลง
ผีเสื้อเฉรจิ๋ว	Small Grass Yellow	*Eurema brigitta* (Moore, 1878)	แมลง
ผีเสื้อเฉรธรรมดา	Common Grass Yellow	*Eurema hecabe contubernalis*	แมลง
ผีเสื้อเฉรยอดไม้	Tree Yellow	*Gandaca harina distanti moore*	แมลง
ผีเสื้อเฉรสามจุด	Tree-spot Grass Yellow	*Eurema blanda* (Wallace, 1867)	แมลง
ผีเสื้อเฉรส่าหรี	Chocolate Grass Yellow	*Eurema sari*	แมลง
ผีเสื้อเฉรแอนเดอร์สัน	Andersons Grass Yellow	*Eurema andersonii*	แมลง
ผีเสื้อตาลพุ่มวู้ดเมสัน	Wood Manson's Bushbrown	*Mycalesis suaveolens*	แมลง
ผีเสื้อตาลพุ่มสยาม	Siamese Bushbrown	*Mycalesis siamica*	แมลง
ผีเสื้อตาลพุ่มสี่จุดเรียง	Dark-brand Bushbrown	*Mycalesis mineus*	แมลง
ผีเสื้อถุงทองธรรมดา	Goden Birdwing	*Troides aeacus malaiianus*	แมลง
ผีเสื้อปีกไข่ใหญ่	Great Eggfly	*Hypolimnas bolina* (Linnaeus, 1758)	แมลง
ผีเสื้อแผนที่แดงลายประ	Intermediate Maplet	*Chersonesia intermedia*	แมลง
ผีเสื้อฟ้าดอกหญ้า	Lesser Grass Blue	*Zizina otis*	แมลง
ผีเสื้อฟ้าพุ่มกลางปีกขาว	White-banded Hedge Blue	*Celastrina transpecta*	แมลง
ผีเสื้อฟ้าพุ่มขอบปีกจาง	Pale Hedge Blue	*Udara dilecta* (Moore, 1879)	แมลง
ผีเสื้อฟ้าพุ่มลิมบาตา	Plain Hedge Blue	*Celastrina lavendularis* (Moore, 1879)	แมลง
ผีเสื้อฟ้าวาวสีต่างฤดู	Common Cerulean	*Jamides celeno* (Fabricius, 1793)	แมลง
ผีเสื้อลายซิกแซก	Zigzag Flat	*Odina decoratus*	แมลง
ผีเสื้อสีตาลจุดตาสี่ธรรม	Common Four-ring	*Yphtima huebneri*	แมลง
ผีเสื้อสีอิฐธรรมดา	Common Yeoman	*Cirrochroa tyche* (Moore, 1872)	แมลง
ผีเสื้อสีอิฐเล็ก	Little Yeoman	*Cirrochroa surya*	แมลง
ผีเสื้อหนอนกาฝากจุดแด	Red-spot Jezebel	*Delias descombesi* (Boisduval, 1836)	แมลง
ผีเสื้อหนอนกาฝากใต้ปีก	Red-base Jezebe	*Delias pasithoe*	แมลง

ตารางที่ 4.4 (ต่อ)

ชื่อ	ชื่อสามัญ	ชื่อวิทยาศาสตร์	ประเภทสัตว์
ผีเสื้อหนอนกาฝากธรรม	Painted Jezebel	*Delias hyparete*	แมลง
ผีเสื้อหนอนคูนธรรมดา	Lemon Emigrant	*Catopsilia pomona*	แมลง
ผีเสื้อหนอนคูนเหลือง	Orange Emigrant	*Catopsilia scylla*	แมลง
ผีเสื้อหนอนถั่ว	Peablue	*Lampides boeticus*	แมลง
ผีเสื้อหนอนใบกุ่มขอบต	Chocolate Albatross	*Appias lyncida eleonora*	แมลง
ผีเสื้อหนอนใบกุ่มธรรม	Common Albatross	*Appias albina* c. (1865)	แมลง
ผีเสื้อหนอนใบกุ่มเส้นด	Striped Albatross	*Appias libythea* (Swinhoe, 1890)	แมลง
ผีเสื้อหนอนใบรักขีดยา	Glassy Tiger	*Parantica aglea*	แมลง
ผีเสื้อหนอนใบรักขีดสั้น	Dark grassy Tiger	*Parentica agleoide*	แมลง
ผีเสื้อหนอนใบรักตาลแ	Common Chestnut Tiger	*Parantica sita*	แมลง
ผีเสื้อหนอนใบรักธรรม	Plain Tiger	*Danaus chrysippus* (Linnaeus, 1758)	แมลง
ผีเสื้อหนอนใบรักฟ้าให	Dark Blue Tiger	*Tirumala septentrionios*	แมลง
ผีเสื้อหนอนใบรักลายเสื	Common Tiger	*Danaus genutia* (Cramer, 1779)	แมลง
ผีเสื้อหนอนใบรักสีตาล	Chocolate Tiger	*Parantica melaneus* (Cramer, 1775)	แมลง
ผีเสื้อหนอนใบรักเหลือง	Yellow Glassy Tiger	*Parantica aspasia*	แมลง
ผีเสื้อหนอนพุทราธรรม	Common Pierrot	*Castalius rosimon*	แมลง
ผีเสื้อหนอนมะนาว	Lime Butterfly	*Papilio demoleus*	แมลง
ผีเสื้อหนอนมะพร้าวธรร	Common Palmfly	*Elymnias hypermnestra* (Fruhstorfer,1902	แมลง
ผีเสื้อหนอนละหุ่งธรรม	Common Castor	*Ariadne merione* (Fruhstorfer, 1912)	แมลง
ผีเสื้อหนอนละหุ่งลายหั	Angled Castor	*Ariadne ariadne* (Fruhstorfer, 1899)	แมลง
ผีเสื้อหนอนหนามกะทก	Tawny Coster	*Acraea violae* (Fabricius, 1775)	แมลง
ผีเสื้อหน้าเข็มแถบขาวเ	White-banded Awl	*Hasora taminatus*	แมลง
ผีเสื้อหน้าเข็มปีกมนเขีย	Small Grenn Awlet	*Bibasis amara*	แมลง
ผีเสื้อหน้าเข็มสีตาล	Brown Awl	*Badamia exclamationis* (Fabricius, 1775)	แมลง
ผีเสื้อหางติ่งชะอ้อน	Black and White Helen	*Papilio nephelus* (Pendlebury, 1936)	แมลง
ผีเสื้อหางติ่งธรรมดา	Common Mormon	*Papilio polytes* (Cramer, 1758)	แมลง
ผีเสื้อหางติ่งนางระเวง	Great Mormon	*Papilio memnon* (Linnaeus, 1758)	แมลง
ผีเสื้อหางติ่งเฮเลน	Red Helen	*Papilio helenus* (Linnaeus, 1758)	แมลง
ผีเสื้อหางตุ่มจุดชมพู	Common Rose	*Pachliopta aristolochiae*	แมลง
ผีเสื้อเหลืองสยามธรรม	Orange Gull	*Cepora iudith* (Butler, 1899)	แมลง

ตารางที่ 4.5 แมลงปอที่พบในพื้นที่คุ้งบางกะเจ้า อำเภอพระประแดง จังหวัดสมุทรปราการ

ชื่อ	ชื่อสามัญ	ชื่อวิทยาศาสตร์	ประเภทสัตว์
แมลงปอเข็ม	Damselfly	*Ceriagrion praetermissum*	แมลง
แมลงปอบ้านแดงเหลือง	Greater Red Skimmer	*Crocothemis servilla*	แมลง
แมลงปอบ้านตาลปลายปี	Cleartip Widow	*Neurothemis fulvia*	แมลง
แมลงปอบ้านตาลปลายปี	N/A	*Neurothemis fulvia*	แมลง
แมลงปอบ้านบ่อ	Scarlet Skimmer	*Crocothemis servilia servilia*	แมลง
แมลงปอบ้านปีกแต้มดำ	Black Spot Widow	*Neurothemis fulvia*	แมลง
แมลงปอบ้านส้มเหลือง	Orange Skimmer	*Brachythemis contaminata*	แมลง
แมลงปอบ้านสองสีเขียว	Ground Skimmer	*Diplacodes trivialis*	แมลง
แมลงปอบ้านสีหม่นท้อ	Black-bodied Skimmer	*Orthetrum pruinosum*	แมลง
แมลงปอบ้านเสือเขียว	Green Tiger Skimmer	*Orthetrum sabina*	แมลง
แมลงปอบ้านเสื้อแดงเลื	Bright Blood-red Skimmers	*Orthetrum chrysis* (Selys, 1891)	แมลง
แมลงปอบ้านหางแหลม	Wandering Glider	*Pantala flavescens*	แมลง

ตารางที่ 4.6 สัตว์น้ำที่พบในพื้นที่คุ้งบางกะเจ้า อำเภอพระประแดง จังหวัดสมุทรปราการ

ชื่อ	ชื่อสามัญ	ชื่อวิทยาศาสตร์	ประเภทสัตว์
กุ้งกะต่อม	Dwaef Prawn	*Macrobrachium equidens*	สัตว์น้ำ
กุ้งก้ามกราม	Giant Freshwater Prawn	*Macrobrachium rosenbergii*	สัตว์น้ำ
กุ้งดีด	Snapping Shrimp	*Alpheus sp.*	สัตว์น้ำ
กุ้งดีดขัน	Snapping Shrimp	*Alpheaus euphrosyne*	สัตว์น้ำ
กุ้งตะกาด	Jinga Shrimp	*Metapenaeus affinis*	สัตว์น้ำ
กุ้งฝอย	Lanchester's Freshwater Prawn	*Macrobrachium lanchesteri*	สัตว์น้ำ
จิงโจ้น้ำ	Water Strider, Pond Skaters	*Gerris sp.*	สัตว์น้ำ
ด้วงดิ่ง	Dredacious Diving Beetles, True	*Cybister limbatus fabricius*	สัตว์น้ำ
ด้วงน้ำ	True Water Beetle, Predaceous I	*Cybister limbatus fabricius*	สัตว์น้ำ
เต่าแก้มแดง	Red-eared Slider	*Trachemys scripta elegans*	สัตว์เลื้อยคลาน
เต่าดำ	Black Terrapin	*Siebenrockiella crassicollis*	สัตว์เลื้อยคลาน
เต่านา	Malayan Snail - eating Turtle	*Malayemys subtrijuga*	สัตว์เลื้อยคลาน
เต่าหับ	Asian Box Turtle	*Cuora amboinensis*	สัตว์เลื้อยคลาน
ปลากดเหลือง	Yellow Mustus, Green Catfish	*Hemibagrus filamentus*	สัตว์น้ำ
ปลากระดี่นาง	Moonlight Gourami	*Trihogaster microlepis*	สัตว์น้ำ
ปลากระทิง	Tire Track Eel	*Mastacembelus armatus*	สัตว์น้ำ

ตารางที่ 4.6 (ต่อ)

ชื่อ	ชื่อสามัญ	ชื่อวิทยาศาสตร์	ประเภทสัตว์
ปลากระทุงเหว	Lack-spot Long Tom	*Strongylurus strongylura*	สัตว์น้ำ
ปลากระบอก	Mullet	*Parupeneus cinnabarins*	สัตว์น้ำ
ปลากระมัง	Smith's Barb	*Puntioplites proctozsron*	สัตว์น้ำ
ปลากระสง	Blotched Snakehead, Forest Snal	*Channa lucius*	สัตว์น้ำ
ปลากระสูบขีด	Banded Shark	*Hampala macrolepidota*	สัตว์น้ำ
ปลากระสูบจุด	Eye-Spot Barb	*Hampala dispar*	สัตว์น้ำ
ปลากริม	Pygmy Gourami	*Trichopsis pumila*	สัตว์น้ำ
ปลากะพงขาว	Giant Seaperch	*Lates calcarifer (bloch)*	สัตว์น้ำ
ปลาก้าง	Dwarf Snakehead, Red-tailed Sn	*Channa limbata*	สัตว์น้ำ
ปลาแก้มช้ำ	Red-cheek Barb	*Systomus orphoides*	สัตว์น้ำ
ปลาเข็ม	Wrestling Halfbeak, Malayan Ha	*Dermogenys pusilla*	สัตว์น้ำ
ปลาแขยงใบข้าว	Long-fatty Finned Mystus	*Mystus singaringan*	สัตว์น้ำ
ปลาช่อน	Striped Snake-head Fish	*Channa stiata*	สัตว์น้ำ
ปลาชะโด	Great Snakehead, Giant Snakehe	*Channa micropeltes*	สัตว์น้ำ
ปลาซัคเกอร์	Sucker, Armored catfish	*Hypostomus plecostomus*	สัตว์น้ำ
ปลาซิวควายแถบดำ	Silver Rasnora	*Rasbora paviei*	สัตว์น้ำ
ปลาซิวใบไผ่	Blue Danio	*Devario regina*	สัตว์น้ำ
ปลาซิวหนวดยาว	Flying Barb, Striped Flying Barb	*Esomus metallicus*	สัตว์น้ำ
ปลาซิวหางแดง	Red-tailed Rasbora	*Rasbora borapetensis*	สัตว์น้ำ
ปลาดุกด้าน	Walking Catfish, Batrachian Wa	*Clarias batrachus*	สัตว์น้ำ
ปลาดุกอุย	Broadhead Catfish, Gnther's Wal	*Clarias macrocephalus*	สัตว์น้ำ
ปลาตะโกก	Soldier River Barb	*Cyclocheilichthys enoplus*	สัตว์น้ำ
ปลาตะพาก	Golden Belly Barb	*Hypsibarbus vernayi*	สัตว์น้ำ
ปลาตะเพียนขาว	Common Silver Barb	*Barbonymus gonionotus*	สัตว์น้ำ
ปลาตะเพียนทราย	Golden Little Barb	*Puntius brevis*	สัตว์น้ำ
ปลาตะเพียนทอง	Red-tailed Tinfoil Barb	*Barbonymus altus*	สัตว์น้ำ
ปลาตีน	Mudskipper	*Periophthalmus chysospilos*	สัตว์น้ำ
ปลาทับทิม	Nile Tilapia	*Oreochromis niloticus*	สัตว์น้ำ
ปลานิล	Nile Tilapia	*Tilapia nilotica*	สัตว์น้ำ
ปลาเนื้ออ่อน	Whisker Sheatfish	*Kryptopterus bleekeri*	สัตว์น้ำ
ปลาไน	Common Carp	*Cyprinus carpio*	สัตว์น้ำ
ปลาบู่เขือ	Bearded Worm Goby	*Taenioides cirratus*	สัตว์น้ำ
ปลาบู่ทอง	Marbled Sleepy Goby, Sand Gob	*Oxyeleotoris marmoratus bleeker*	สัตว์น้ำ

ตารางที่ 4.6 (ต่อ)

ชื่อ	ชื่อสามัญ	ชื่อวิทยาศาสตร์	ประเภทสัตว์
ปลาม้า	Soldier Croaker	*Boesemania microlepis*	สัตว์น้ำ
ปลารากกล้วย	Horse-face Loach, Long-noseloa	*Acantopsis choirorhynchos*	สัตว์น้ำ
ปลาแรด	Giant Gourami	*Osphronemus goramy*	สัตว์น้ำ
ปลาลิ้นหมาน้ำจืด	Freshwater Sole, River Sole	*Brachirus panoides*	สัตว์น้ำ
ปลาสร้อยขาว	Jullien's Mud Carp	*Henicorhynchus siamensis*	สัตว์น้ำ
ปลาสลิด	Sepat Siam, Sanke Skin Goursmi	*Trichogaster pectoralis*	สัตว์น้ำ
ปลาสวาย	Striped Catfish	*Pangasianodon hipophthalmus*	สัตว์น้ำ
ปลาเสือตอ	Siamese Tiger Fish	*Datnioides microlepis*	สัตว์น้ำ
ปลาเสือพ่นน้ำ	Common Archer Fish	*Toxotes chatareus*	สัตว์น้ำ
ปลาหมอ	Common Climbing Perch	*Anabas testudineus*	สัตว์น้ำ
ปลาหมูข้างลาย	Tiger Loach	*Syncrossus helodes*	สัตว์น้ำ
ปลาหมูขาว	Yellow - Tail botia	*Botia modesta*	สัตว์น้ำ
ปลาหมูคอก	Skunk Botia	*Yasuhikotakia morleti*	สัตว์น้ำ
ปลาหลด	Spotfinned Spinyeel	*Macrognathus siamensis*	สัตว์น้ำ
ปลาหัวตะกั่ว	Blue Panchax	*Aplocheilus panchax*	สัตว์น้ำ
ปลาไหล	Swamp Eel	*Monopterus albus*	สัตว์น้ำ
ปูก้ามดาบ	Fiddler Crab	*Uca vocans*	สัตว์น้ำ
ปูจาก	Green Tidal Crab	*Varuna litterata*	สัตว์น้ำ
ปูดำ	Serrated Mud Crab, Mangrove C	*Scylla serrata*	สัตว์น้ำ
ปูแสม	Meder's Mangrove Crab	*Sesarma mederi*	สัตว์น้ำ
มวนแมงป่องน้ำ	Nepidae	*Laccotrephes rubber linnaeus*	สัตว์น้ำ
หอยขม	Pond Snail	*Filopaludina martensi*	สัตว์น้ำ
หอยโข่ง	Pila Ampullacea	*Apple snail*	สัตว์น้ำ
หอยเชอรี่	Apple Snail, Golden Applesnail	*Pomacea canaliculata*	สัตว์น้ำ

VITA

I received Bachelor's degree of Landscape Architecture from Thammasat University, Thailand. I have been working as a landscape architect for approximately two years. Currently, I am doing my master's degree in Environment, Development and Sustainability at Chulalongkorn University, Thailand. Last year, I was accepted by Chulalongkorn University to join exchange program in Global Environmental Studies at Sophia University, Tokyo, Japan for six months. I am interested in the relativity of landscape architecture and sustainability; therefore, I am currently working on my research about sustainable landscape management by using ecosystem-based approach.