

## **URBAN PARK AND EDUCATIONAL BENEFITS OF ECOSYSTEM: CASE STUDY OF TAMAN PERBANDARAN PULAU PINANG**

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**ABSTRACT:** The potential of urban parks in providing education on ecosystem is important as a mean to increase socio-ecological well-being. Sustainable development requires the quality and sustenance of the socio-ecological system which pose a need for knowledge on how ecosystems fulfil social needs. This dependence can be described in the operational definition of ecosystem in providing services, benefits or products to meet human needs, directly or indirectly, which occurred along natural processes and ecosystem structure known as ecosystem services. Hence, the importance of education on ecosystem services to ensure socio-ecological well-being. The article intends to identify ecosystem services that can be found in the urban park and identify potential educational activities to be established in the urban park. Firstly, observations were used to map and identify ecosystem services of the park. Secondly, purposive sampling with two sets of semi-structured interview with 100 urban park visitors and five representatives from five focus groups. The results show that the ecosystem in Taman Perbandaran Pulau Pinang is able to provide benefits to humans in terms of supporting services, regulating services, provisioning of services and cultural services to the users. These services can be used in educational activities to improve knowledge on the importance of ecosystem for social well-being. At present, only labels indicating plants' name are available at the park. Therefore, other forms of ecosystem educational activities could be established in cooperation with various stakeholders and the park management to further enhance the functions of the urban park ecosystem landscape. In summary, urban parks provide educational benefits to urban communities through reinforcing knowledge of ecosystem services that are important for social well-being.

*Keywords:* ecosystem services, urban parks, educational activities

### **INTRODUCTION**

Degradation of ecosystem worldwide has led to greater crisis of ecosystem services for human well-being (MEA, 2005). Theoretically, ecosystem services gives benefits to human but it is not learned practically and have led to various environmental issues, locally or globally. Ecosystem services can be divided into four categories namely: supporting services, cultural services, regulating services and provisioning services (MEA, 2005). At present, more than half of the world's population and human activities are situated in cities, hence urban areas can be considered as major consumers of the ecosystem services and a key source of global environmental impacts in a time when ecosystem are in rapid decline (Wilkinson et al., 2013). In addition, increasing population in Malaysia shows that almost 73% of urban population will share the benefits from recreational park in 2020 (Nor' Aaini and Kamarul Ain, 2007). However, managements of the landscape in urban green spaces are still unable to address urban sustainability in providing opportunities to urban communities to gain benefits from ecosystem services. There is a need to have systematic management and stakeholders' cooperation in ecosystem services in order to meet human needs in term of health, social cohesion, safety and security, education, living standards, leisure time, spiritual and cultural fulfilment, life satisfaction and happiness, and connection to nature (Smith et al., 2013).

Exploring the gap between ecosystem services and human needs, Education for Sustainable Development (ESD) is used as a platform to deliver relevant knowledge on ecology and environment based on knowledge, skills, perspectives, values and issues required for sustainable future. According to the educational services provided by cultural services, it has been seen to address the environmental issues. MEA (2003) states that education on urban environment can influence the attitudes and actions of an individual to the ecosystem and its services. Therefore, the relationship between human and nature is affected by the socio-ecological aspects.

## **LITERATURE REVIEW**

Urban sustainability depends on ecological and human well-being involving the relationship between human and the use of natural resources and their impact on a city (Seitzinger et al., 2012). There is a need to fulfil human needs but it requires decision makers to have ecological and environmental knowledge to manage quality and maintenance of socio-ecological system (Indrawan et al., 2013). However, there is constraint in achieving socio-ecological well-being due to the lack of understanding of relationship between ecosystem services and declining socio-ecological wellbeing. Educational services provided by the ecosystem are able to improve the socio-ecological wellbeing as the green space can provide educational needs besides serving recreational purposes and social relationships (Giffurida, 1996). Wu (2013) states ecosystem services can also improve human well-being and the relationship has been widely accepted by most parties.

Place-based education like bio-physical and social place is crucial in exploring the theory linking an individual experience within the environment and integrating effective, practical and transparent environmental education with environmental factors (Ardoin, 2006). In addition, urban park is seen to have potential in providing education on ecosystem based on its functions, well-equipped facilities and well-structured landscape (Von Kursell, 1997; Farzaneh and Mohammad Rahim, 2012). Therefore, place-based education is important in achieving educational objectives based on existing facilities and ecosystem. Tidball and Krasny (2008) state that environmental education also has led to practical actions or activities involving interaction between social and ecological processes. Eipstein et al. (2013) states the relationship between community experiences towards environment for over 50% of the urban population in the world requires implementation of education in urban green spaces. Although education on ecosystem is important, informal education is difficult, inconsistent, lack cooperation, and has little education policies and strategies for adults and other urban communities (Varkuleviciene and Motiejūnaitė, 2013). Svendsen and Campbell (2008) state that community involvements in environmental education are also being carried out in small scale and have focused at schools and universities involving the formal education.

Therefore, the lack of knowledge on ecosystem services has led to ineffective management where the services are not aligned with the theoretical-based ecosystem services. The low maintenance and poor management can also be major barriers within region areas causing ecosystem functions and other main functions of developed areas not being achieved (Glaser et al., 2008; Zaikanov and Kiseleva, 2008; Wals and van der Leij, 2007). A well-managed landscape can also improve the relationship between ecosystem services and human well-being (Wu, 2013). Walker and Salt (2006) state the range of consistent and systematic organization that exists in society. Scientists, teachers and students contribute to the achievement of the objectives of activities. Besides that, collaboration between academic researchers, civil servants and volunteers of environmental organizations in promoting social learning is seen as crucial in managing the environment. The usage of urban park is dependent on alternative uses and the availability, accessibility and facilities provided by management in the park (Harnick, 2003). Apart from that, McCarthy (2006) found that the integration of knowledge is important in social learning process involving planning and environmental management

## **METHODOLOGY**

Through observation, the researcher has conducted an ecosystem mapping of the study area. The ecosystems were mapped based on the land cover including concrete landscape and abstract landscape. Respondents have been categorised into groups of park visitors and focus groups using two different sets of questions, semi-structured interviews and in-depth interviews. A total of 100 park visitors were randomly selected and were interviewed on environmental and ecosystem aspects including their importance, types of activities that can be carried out, planning and implementation of activities, roles of respondents, and challenges in implementing the activities. Meanwhile, a total of five focus group representatives consisting of an urban park management personnel, three members representing three different Non-Governmental Organizations (NGO), and an academic, were interviewed about the same aspect but more on their roles and functions.

## **MAPPING OF ECOSYSTEM SERVICES AT TAMAN PERBANDARAN PULAU PINANG**

Diversity of ecosystem has been found at Taman Perbandaran Pulau Pinang based on its land use as an open space. Figure 2 shows the land use of Taman Perbandaran Pulau Pinang in three main zones where the recreational area is in Zone A and field, surrounded by trees is in Zone B. Meanwhile, Zone C is Laman Flora with a large variety of plants. Taman Perbandaran Pulau Pinang is fully equipped with exercise facilities as it is a popular site for recreational activities with basic facilities such as parking lot within the CP1 and CP2 zone. Besides that, the urban park is surrounded by forests in order to preserve the diversity of ecosystem, which is also one of the attractions of the urban park.

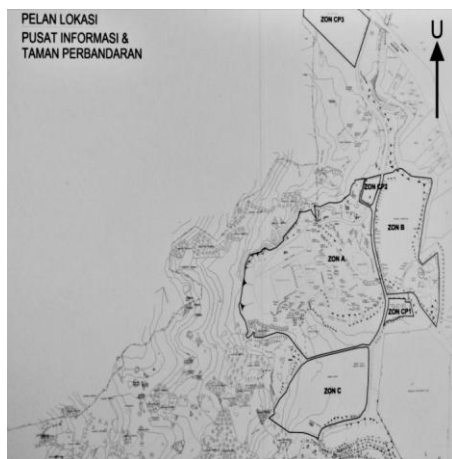


Figure 1: Location Plan of Pusat Informasi and Taman Perbandaran Pulau Pinang  
Source: Jabatan Rekreasi, Pelancongan dan Perhubungan Antarabangsa

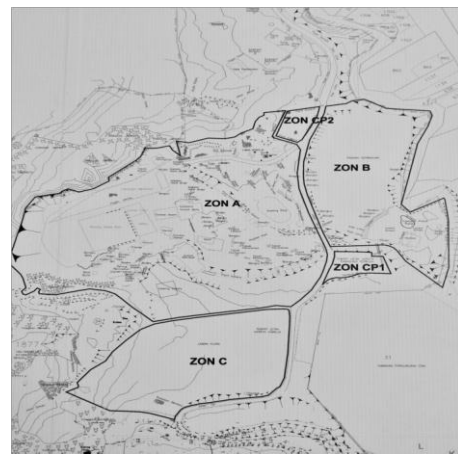


Figure 2: Land use at Taman Perbandaran Pulau Pinang  
Source: Adapted from Location Plan of Pusat Informasi & Taman Perbandaran Pulau Pinang

Theoretically, the diversity of ecosystem in Taman Perbandaran Pulau Pinang is able to provide benefits and services in terms of provisioning of services, regulating services, supporting services and cultural services to the community. However, realistically, the results of the mapping valuation illustrates that none of the 39 ecosystem services coded were found in every zone of Taman Perbandaran Pulau Pinang, as summarised in Table 1.

The findings indicate that almost all respondents agreed that the urban park has the potential in providing educational activities on ecosystem to the communities. Although the urban park did not specify its role in providing educational services or educational activities on ecosystem, nonetheless, it provides the range of services and benefits that can be implemented as educational activities based on ESD such as acquisition of knowledge, skills, values, perspectives and issues. It is important to note that the interaction between environmental and learning aspects can lead to positive results as place-based education like bio-physical and social place reinforce the integration of these aspects (Ardoin, 2006). Although the results show that urban park has the potential in providing educational activities on ecosystem, it also provides other benefits such as recreational, aesthetic, spiritual, and health. In fact, cultural services are the biggest benefits provided by urban park as urban green space, including educational activities (Chiesura, 2004). Furthermore, the benefits obtained is influenced by the function of urban park itself, which is as a recreational area with diversity of ecosystem as the use of urban park depends on accessibility and management of the park (Harnick, 2003).

Meanwhile, the study found several challenges in implementing educational activities on ecosystems. One of them is the lack of knowledge about the ecosystem services, thus, led to ineffective management and narrow services and benefits to meet human needs. In this case, ecosystem services can fulfil the human needs by having effective management and stakeholders' cooperation (Smith et al., 2013). Thus, communities in urban park are concerned about improving the wellbeing as well-managed landscape can improve the relationship between ecosystem services and human well-being.

The management and planning of ecosystem services in urban parks should take social (stakeholder), environmental (ecosystem) and economic (financial aid) aspects into account due to the sustainability of the ecosystem services as it is seen as playing an important role in improving the quality of life (Mat et al., 2009). The quality of life is dependent on the ecosystem services apart from social, ecological and economic aspects. The stakeholders should cooperate and play their roles in implementing educational activities on ecosystem in the urban park as learning process provide a framework of community involvement instead of individual involvement (Lave and Wenger, 1991). It is important to note that most of the respondents do not have broad knowledge of ecosystem services and do not explore the concept of ecosystem services as it is still relatively new. However, the results show that the respondents are aware of the importance of environment in their lives despite the lack of knowledge on ecosystem services.

Table 1: Ecosystem services at Taman Perbandaran Pulau Pinang

<b>Supporting Services</b>		<b>Zone A</b>	<b>Zone B</b>	<b>Zone C</b>	<b>Zone CP1</b>	<b>Zone CP2</b>
A1	Water cycling	x	x	x		
A2	Soil formation	x	x	x		
A3a	Nutrient cycling – carbon cycle	x	x	x		
A3b	Nutrient cycling – nitrogen cycle					
A3c	Nutrient cycling – sulfur cycle					
A3d	Nutrient cycling – phosphorus					
A4	Primary production	x	x	x		
A5	Photosynthesis	x	x	x		
A6	Biodiversity	x	x	x		
Subtotal – Supporting		5	5	5	0	0
<b>Provisioning Services</b>						
B1	Food – agriculture					
B2	Food – commercial fishing					
B3	Food – wild					
B4a	Water – fresh water	x	x			
B4b	Water – energy					
B4c	Water – transportation					
B5	Biochemicals/ genetic resource	x	x	x		
B6	Fiber	x	x			
B7	Fuel	x	x			
Subtotal – Provisioning		3	3	0	0	0
<b>Regulating Services</b>						
C1a	Climate regulation – local	x	x	x		
C1b	Climate regulation – global					
C2	Air quality regulation	x	x			
C3	Water purification/ waste treatment	x	x			
C4	Water regulation	x	x			
C5	Disease regulation	x	x	x		
C6	Pest regulation					
C7	Natural hazard regulation	x	x	x		
C8	Erosion regulation/ soil retention	x	x	x		
C9	Pollination	x	x	x		
C10	Seed dispersal	x	x	x		
C11	Noise regulation	x	x	x		
Subtotal – Regulating		10	10	7	0	0
<b>Cultural Services</b>						
D1	Social relations	x	x	x		
D2	Cultural landscape, heritage values	x	x	x		
D3	Sense of place	x	x	x		
D4	Aesthetic	x	x	x		
D5	Inspirational	x	x	x		
D6	Recreation and eco-tourism	x	x	x		
D7	Educational and knowledge	x	x	x		
D8	Health	x	x	x		
D9	Spiritual and religious values	x	x	x		
Subtotal – Cultural		9	9	9	0	0
Total		27	27	21	0	0

Source: Adapted from Abdul Rahim and Abu Bakar (2014)

This is consistent with Chiesura (2004) who found the experience acquired from the urban environment to be positive and fulfils non-material needs. The importance of environment in human lives is not just a reflection of what they felt, observed and experienced. In fact there are many other benefits and services provided by the ecosystem. However, community well-being in urban park has been declining due to lack of knowledge regarding how ecosystem services can improve human well-being (Wu, 2013). Issues of biodiversity and climate change have been noticed worldwide based on global assessment. This study has identified some active and passive educational activities based on ESD. In exploring the active educational activities related to issues of biodiversity, the range of activities that can be done include: identifying the types of flora and fauna (knowledge), using the plants as medicine (skill), preserving the heritage values of plants (value), and realising the importance of flora and fauna (perspectives). Educational activities related to climate change is used to explore how plants can overcome the climate change (knowledge), planting trees (skills), fostering awareness of the importance of trees (value), and regulating climate change (perspective). Meanwhile, the provision of signage for each plant allows individuals to learn about the types of trees (knowledge), explore the benefits of the plants after knowing the names (skill), acquire knowledge themselves (value) and understand plants extinction based on the knowledge obtained. This type of activity is known as passive educational activity.

## **CONCLUSION**

The results show that urban parks can provide a wide range of ecosystem services including supporting services, regulating services, provisioning of services and cultural services based on its function and structure, which occurred along the natural process. These services can be used in educational activities to enrich knowledge on the importance of ecosystem for socio-ecological well-being. However, poor understanding about ecosystem services has created barriers for communities to receive the benefits and services. This is despite most respondents indicating that urban parks has potential in providing educational activities on ecosystem based on community needs and in cooperation with various stakeholders and the park management. Overall, informal educational activities have great potential in the urban park. At the same time, well-planned management will further enhance the functions of the urban park in achieving objectives of the educational activities. All stakeholders should play their roles and functions regarding the educational activities on ecosystem in the urban park that provide benefits to urban communities as it is important for socio-ecological well-being. Other case studies of urban park in Malaysia are required to provide more insights of the phenomenon in Malaysia and also to provide a model to integrate educational benefits of ecosystem with urban parks management.

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