



**THE RIVERFRONT REDEVELOPMENT FRAMEWORK
BASED ON THE RIVERFRONT ECOLOGICAL
CHARACTERISTICS FOR SUNGAI LANGAT,
SELANGOR**

BY

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ABSTRACT

Channelization of river and landscape beautification occurred along the riverbank are parts of the development that occurred in the urban cities around the world, including urban cities in Malaysia. Many redevelopments done were a solution to prevent natural catastrophe such as flood from worsening and cater people's needs without considering the nature of river. However, the redevelopments were still not enough to bring back the natural condition of the river. Hence, realizing the adverse effects towards the riverfront, many developed countries have started to redevelop the riverfront ecologically in order to ensure the developed riverfront in urban areas can be closely restored to its natural condition. However, the incorporation of principles of ecological riverfront design in redevelopment of riverfront is still minimally addressed especially in Malaysia. Hence, this research aimed to develop a riverfront redevelopment framework based on the riverfront ecological characteristics, with a case study of Sungai Langat, Selangor. There are three (3) main research objectives that need to be achieved, which are (i) to identify the principles of the ecological riverfront design that is suitable for the urban ecosystem in Sungai Langat, Selangor, (ii) to examine the current characteristics of the riverfront development in the urban ecosystem of Sungai Langat, Selangor; and (iii) to generate the framework that complements the redevelopment of riverfront in the urban ecosystem based on the riverfront ecological characteristics for Sungai Langat, Selangor. Qualitative method using case study as part of qualitative research was employed. All data were collected through secondary data such as books, journals and reports; and primary data collected through content analysis and structured interviews conducted among the selected experts. Content analysis was also used to analyse the data, which led in identifying the principles of the ecological riverfront design that is suitable for the urban ecosystem in Sungai Langat, Selangor, and examining the characteristics of riverfront development in the urban ecosystem of Sungai Langat, Selangor. The findings indicated that the principles of ecological riverfront design were classified into four stages of principles, which are the general, planning, design and implementation. Not all principles of ecological riverfront design developed by other developed countries were suitable to be applied in a Malaysia context. The current characteristics of riverfront development played an important role in guiding the experts on suggesting the suitable principles in Sungai Langat, Selangor. According to the experts, there were three general principles, seven planning principles, eight design principles and four implementation principles identified suitable for Sungai Langat, Selangor. Thus, the riverfront redevelopment framework could be developed based on the riverfront ecological characteristics in Sungai Langat, Selangor according to the experts' opinions, as their expertise is important in developing the framework. In summary, the methodology of developing the framework could become a reference for architects, planners, engineers and other related professional bodies to reconsider the ecological aspect of riverfront while planning and creating the urban spaces along the riverbank, hence, promoting ecological redevelopment of riverfront in the urban cities.

خلاصة البحث

تمثل عملية توجيه القنوات النهرية وتجميل مناظرها الطبيعية على طول ضفة النهر جزءاً من التطور الذي حدث في المدن الحضرية في جميع أنحاء العالم، بما في ذلك المدن الحضرية في ماليزيا. فالتعدد من عمليات إعادة التطوير كانت قد أقيمت لتكون بمثابة حل للوقاية من الكوارث الطبيعية مثل الفيضانات وذلك للحد من التدهور وتلبية احتياجات الناس بغض النظر عن طبيعة النهر. ومع ذلك، لا تزال هذه العمليات المرسومة غير كافية لإعادة الحالة الطبيعية للنهر. مع إدراك التأثيرات المعاكسة للواجهة النهرية، بدأت العديد من البلدان المتقدمة في إعادة تطويرها إيكولوجياً من أجل ضمان ترميم الواجهة النهرية المتطورة في المناطق الحضرية إلى حالتها الطبيعية. ولكن دمج مبادئ التصميم الإيكولوجي للنهر في إعادة تطوير الواجهة النهرية لا يزال يتم التعامل معه بشكل ضئيل خاصة في ماليزيا. فمن ثم، يهدف هذا البحث إلى تطوير إطار إعادة تطوير الواجهة النهرية بناء على أساس الخصائص الإيكولوجية، ودراسة الحالة عن سوغاي لاغت، سلاغور. هناك ثلاثة أهداف رئيسية للبحث يجب تحقيقها: (i) تحديد مبادئ التصميم الإيكولوجي للواجهة النهرية المناسبة للنظام البيئي الحضري في سوغاي لاغت، سلاغور، (ii) فحص خصائص تطوير الواجهة النهرية الحالية ضمن النظام البيئي الحضري لسوغاي لاغت، سلاغور؛ (iii) توليد الإطار الذي يكمل إعادة تطوير الواجهة النهرية في النظام البيئي الحضري على أساس الخصائص الإيكولوجية النهرية لسوغاي لاغت، سلاغور. وقد أجري هذا البحث باستخدام الطريقة النوعية كجزء من البحث النوعي. وتم جمع جميع البيانات من خلال بيانات ثانوية مثل الكتب والمجلات والتقارير. وكذلك البيانات الأولية التي تم جمعها من خلال تحليل المحتوى والمقابلات المنظمة التي أجريت بين الخبراء المختارين. وجرى استخدام تحليل المحتوى أيضاً لتحليل البيانات، مما أدى إلى تحديد مبادئ التصميم الإيكولوجي للواجهة النهرية المناسبة للنظام البيئي الحضري في سوغاي لاغت، سلاغور، وفحص خصائص تطوير الواجهة النهرية في النظام البيئي الحضري للنهر. ذلك وقد أشارت النتائج إلى أن مبادئ التصميم الإيكولوجي للنهر قد تم تقسيمها إلى أربع مراحل من المبادئ، وهي العام والتخطيط والتصميم والتنفيذ. ولم تكن مبادئ التصميم الإيكولوجي للواجهة النهرية التي طورتها البلدان المتقدمة الأخرى مناسبة لتطبيقها في ماليزيا. لعبت الخصائص الحالية للتنمية النهرية دوراً هاماً في توجيه الخبراء حول اقتراح المبادئ المناسبة في سوغاي لاغت، سلاغور. وقد حدد الخبراء ثلاثة مبادئ عامة، وسبعة مبادئ تخطيطية، وثمانية مبادئ لتصميم وأربعة مبادئ للتنفيذ تناسب سوغاي لاغت، سلاغور. وبالتالي، فإنه يمكن تطوير إطار إعادة تطوير الواجهة النهرية على أساس

الخصائص الإيكولوجية النهرية في سوغاي لاغت، سلاغور مستعينا بآراء الخبراء، حيث أن خبرتهم مهمة في تطوير الإطار. باختصار، فمن الممكن أن تصبح منهجية تطوير الإطار مرجعا للمهندسين المعماريين والمخططين والمهندسين والهيئات المهنية الأخرى ذات الصلة لإعادة النظر في الجانب البيئي للواجهة النهرية أثناء تخطيط المساحات الحضرية على طول ضفة النهر وإنشائها، ومن ثم تعزيز إعادة تطوير البيئة النهرية في النهر المدن الحضرية.

APPROVAL PAGE

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“Some people can’t believe in themselves until someone else believes in them first.”

My dearest Fitri and Ily,

Thank you for inspiring mummy to dream big!

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CHAPTER ONE

INTRODUCTION

1.1 RESEARCH BACKGROUND

This research addressed the redevelopment of riverfront framework based on the riverfront ecological characteristics in Malaysia, with a case study of Sungai Langat in Selangor. Rapid urban development that occurs around the world gives great impact to the environment especially towards the riverfront treatment, where Sungai Langat in Selangor is currently facing. However, realizing the effects towards the riverfront, most of the developed countries had started to redevelop the river in the cities ecologically, where the riverfront redevelopment focused on the ecological development in order to bring back the natural condition of river (Palmer et al., 2014; Rong, 2011). This has led to the development of principles of ecological riverfront design.

Unfortunately, the redevelopment of riverfront ecologically is minimally integrated in Malaysia (Md. Yassin et al., 2012). Yet, the current riverfront development is more focused on flood mitigation, recreational uses and mixed-use development (Razali et al., 2014). This indicated that the implementation of riverfront development in Malaysia is focused more on investment needs rather than environmental needs. Hence, identifying the principles of ecological riverfront design that is in line with the natural characteristics of riverbank based on the current river development in Malaysia, with a case study of Sungai Langat, Selangor is crucial in order to develop the framework.

For a better understanding of research, the research attempted to empirically study the characteristics of natural riverbank and current riverfront development in Malaysia with a case study of Sungai Langat, Selangor. Principles of ecological riverfront design that is suitable to be applied in Sungai Langat, Selangor were identified in order to achieve the findings of research.

Hence, redevelopment of riverfront framework based on the riverfront ecological characteristics is important in order to have a healthier environment, which reflect a safe, secured and attractive places to live (Cengiz, 2013; Trzyna et al., 2014). The findings of redevelopment riverfront framework also will be able to be used as a framework in assisting the authorities and other professional bodies such as architects, developers and engineers in Malaysia to ecologically redevelop the existing riverfronts.

1.2 PROBLEM STATEMENT

Rapid development and changes on the function of river in the urban ecosystem over the history due to the human activities has eroded the natural riverbank characteristics. It can be seen especially in the urban cities where developed urban areas caused the riverbanks to lose its forms and functions (Govorushko, 2007; Liao, 2012). The main purpose was to prevent the river from flooding into the city. This situation is a common phenomena all over the world; including Malaysia.

According to I. Abustan (personal communication, November 24, 2015), all rivers in the urban cities in Malaysia have been channelized and it is hard to find any rivers that still have its natural characteristics. The case study of Sungai Langat in Selangor represents one of the examples for such situation as urban development occurred along the river. The channelization of river channel was the fastest solution

to prevent the city from flooding and widely done in other countries as well (Cengiz, 2013; Moggridge et al., 2014; Zhang et al., 2006). Malaysia has a tropical rainforest climate and being categorised as hot and humid throughout the year made such high flow event occurs every year. In Selangor, urban areas located along Sungai Langat are the most frequently affected areas during the event (Ariffin, Razak, & Shamsudin, 2014; Department of Irrigation and Drainage (DID), 2005) and this has caused immediate actions to be taken. Widening and channelizing of river took place and that clearly explained the current water edge treatment not only in Sungai Langat, Selangor but all rivers in Malaysia as well. However, channelized riverbank made the city to be fully dependent on flood-control infrastructure (Liao, 2012) without realizing it actually washed away the natural existence of riverbank.

Meanwhile, the current riverfront redevelopment in the urban ecosystem in Malaysia that has transformed to fulfill people needs has led to the great demand of development that concentrated within the riverfront area; causing river in the city to have new roles and characteristics in the urban ecosystem. Growth of population, economic, urbanisation and technology have transformed many Malaysian river systems from water industries into non water industries (Yassin et al., 2011). Development of urban cities in Malaysia has taken advantage of available riverbank and incorporated as a feature of ‘selling point’ of the development (Md. Yassin et al., 2012; Md. Yassin et al., 2009). Due to these changes, the function of riverfront areas has also changed and the current pattern of riverfront development in Malaysia now focuses more on mixed-use development and recreation, while incorporating Malaysian cultural and historical values (Yassin et al., 2011). The case study of Sungai Langat in Selangor showed similar condition where the developed urban areas along the riverfront resembled mixed-use development (Ariffin et al., 2014; History

Department, 2013). This shows that natural riverbank characteristics are elusive especially in the urban ecosystem as it has been replaced and shaped with the new characteristics of riverfront development. It can be stated that the redevelopment of riverbanks nowadays are not mainly aiming for environmental riverbank improvements.

Other than that, incorporation of the natural characteristic of riverbank system into the development of riverfront in the urban ecosystem is still lacking, especially in Malaysia as most of the riverfronts were developed due to cater people's activities and safety more than to bring back its natural features (Md. Yassin et al., 2010; Razali et al., 2014). This is due to the existing guidelines of riverfront development provided by Malaysian Department of Drainage and Irrigations that only established after the riverfront has been developed. This means that alteration of riverbank such as channelization of river were conducted without referring to any guidelines and solely for preventing heavy flow from entering the urban city. This matter has also affected Sungai Langat in Selangor as well because any riverfront development needs to be referred to the guidelines provided by the Department of Drainage and Irrigation. However, the existing guidelines still did not specifically include any riverfront development that focused on ecologically bringing back the natural setting of riverbank and the types of riverfront development that according to the riverfront areas. According to I. Abustan (personal communication, November 24, 2015), channelized river in urban areas have made it difficult to fully incorporate the natural riverbank characteristics into the development of riverfront. This explained why there is minimal riverfront development that based on the river's natural existence in Malaysia.