J-SuNR

http://publisher.uthm.edu.my/ojs/index.php/jsunr
e-ISSN : 2716-7143

Journal of Sustainable Natural Resources

Nature Tourism in Muar River Valley

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DOI: https://doi.org/10.30880/jsunr.2022.03.01.001
Received 02 January 2022; Accepted 30 June 2022; Available online 31 October 2022

Abstract: Sungai Muar or Muar River is special. Passing through three states of Peninsular Malaysia, it originates in Negeri Sembilan, passes briefly in Malacca, into Johor and ends into the Straits of Malacca. Though laden with history and presently undergoing much socio-economic development, the importance of this river remains inconspicuous, as it is simply known as Sungai Muar. This paper proposes that a geographical official entity be recognized for this river and its surrounding areas as Muar River Valley (MRV) or in Malay, Lembangan Sungai Muar to enhance any future planning and development which would be site-based, thus giving due recognition to the river. Essential data was researched. The geophysical information of MRV is gathered, which forms the first objective of the research. To realistically prove its importance as an official entity, the tourism development was chosen. This research examined previous and potentially new nature tourism research. These are then marked on the map and thus a simple visual appreciation to understand the potential of nature tourism of MRV is easily seen. Hence, a map is produced for existing tourism activities and potential tourism destinations and products in MRV. This forms the second objective. To further enhance, a venture such as nature tourism, that could increase the appreciation to the importance of MRV, a nature tourism product development was done and described, forming the third objective. The exemplary product development is based on a newly recognized oyster species, endemic to MRV named as *Crassostrea (Magallana) saidii* sp. nov.. All data for the three objectives were obtained through literature search using search engine like Google. Additional methods include interviewing through phone calls, face-to-face, and also Google Meet to obtain information related to land use, drainage and irrigation systems around Bandar Maharani, along with the topography around the extent of Muar District, as basic requirement for the proposal of MRV. Finally, the newly recognized oyster is developed into a tourism product of which the proposed 3 hours package include activities such as observing traditional harvesting of the oysters and tasting of oyster dishes. To complete the nature tourism product development, prototypes of souvenirs are made from shells of the new oysters. For conservation purpose, souvenirs are also made from common species. This recommendation to officiate the designation of MRV would be made to the state government of Johore, through the Muar District Office.

Keywords: Nature tourism, Muar River Valley, Muar, Oyster Saidii, *Crassostrea (Magallana) saidii* sp. nov., Parit Tiram

1. Introduction

Nowadays, the tourism industry is becoming incrementally crucial worldwide. Malaysia has an outstanding biodiversity along with its impressive picturesque natural environment, where this has made it into a successful nature tourism destination [1]. Muar, also known as Bandar Maharani, is a town and port that is located at the mouth of Muar

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River in the Johor state of Malaysia [2], founded by Maharaja Abu Bakar in the year 1884 [3]. Muar has been awarded the ASEAN Clean Tourist City Standard Award 2017 in Chiang Mai, Thailand [4]. This has recognized Muar as one of the cleanest tourist cities in ASEAN [4]. Muar River flows from Jempol in the state of Negeri Sembilan into the Straits of Malacca in Kuala Muar of Johor [5], which has economic, cultural and environmental importance. Despite having plenty of existing nature tourism sites, there are still a number of studies which have been carried out on potential tourism sites and products in Malaysia. However, there is still a lot more to be done around the Muar River. Limited focus and recognition has been given to the importance of the river, and there are also limited studies being done on the potential sites for tourism development around the river despite it being a river that has large potential for the development of tourism products [33]. With this research, the vacuum is addressed strategically, where geographically the river and the area along the river is given an official entity which we proposed to be named as Muar River Valley (MRV) which also includes the materialization of the MRV concept, where tourists are able to feel, experience or even buy things such as souvenirs or even pay for the participation in tour packages relating to nature tourism in Muar River Valley. More nature tourism products are ready to be tested and marketed in the future as well. This in turn would benefit not only the locals within Muar River Valley, but Muar and the state of Johor as a whole. Being identified and given recognition and established as such an entity, more planning and development would be seen as the way forward by policy makers, researchers and business people as well. Thus, this research aims to point out existing tourism sites and possible tourism destinations and products within the area of Muar River Valley. A map to show the area of interest is also produced. Geophysics is defined as the study of the Earth's physics including its environment in terms of space [6]. Hence, it could consist of many forms such as topography, land use, drainage and irrigation system, and rainfall distribution. The gathering of geophysical information of Muar River Valley and product development are done as well to support the concept.

2. Methodology

Fig. 1 shows the flow chart of the research activities.

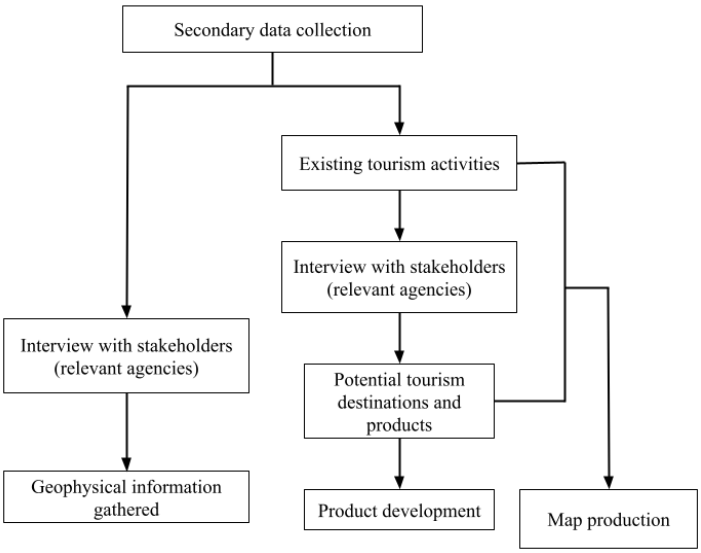

Fig. 1 - Flow chart of research activities

2.1 Data Collection

In this research, there are three main types of information gathered, which is the geophysical information, existing tourism activities, and potential tourism destinations and products that are related to MRV. As for the representatives from the relevant stakeholders involved in the interviews of this research, they are Pn Norshiela Jamaluddin (Penolong Pegawai Tadbir) and Pn Nur Shahirah Ramli (Pegawai Perancangan) from Muar Municipal Council (MPM); En Saadan bin Senin from Jabatan Pengairan dan Saliran (JPS) Daerah Muar; and En Md Saidi bin Mohamed from Tourism Muar.

Understandings of the geophysics of a site are proved to be effective in assessing the site suitability during the planning stage [31], for instance the planning and development process associated with nature tourism in MRV. The geophysical information of MRV includes topography [30], land use [29], drainage system and rainfall distribution [28]. The method for this data collection is the secondary sources through on-line searches such as journals, articles, news, theses, reports, and mass media, by using online search engines like Google. Interviews is also held in three ways, through phone calls, face-to-face, and Google Meet, with the representative for the relevant field in the relevant agencies which includes Muar Municipal Council (MPM), Drainage and Irrigation Department (JPS) Daerah Muar, and

Tourism Muar (NGO). For representative of the stakeholders that has the relevant data, the researcher has meet-up with the relevant officers, where books, records and maps related to the geophysical information are being provided for referencing purposes on the spot. The photos of these related materials are being captured by using a simple phone camera.

Similar to the method used to collect geophysical information, the information for the existing tourism activities in MRV is obtained through secondary sources through online searches as well. The data gathered would be used for the production of a map, where this map is also combined with the data on potential tourism destinations and products of MRV. Fig. 2 shows the map for the study area of this research, which is the approximate extent of MRV.

Fig. 2 - Study area of this research [7], basically from the area around Gerisek and Pagoh, all the way until the area around the mouth of Muar River

The method used for the data collection of potential tourism destinations and products in MRV is interview. The interviews are held in three ways, through phone calls, face-to-face, and Google Meet, with the representative for the relevant field in the relevant agencies which includes Muar Municipal Council (MPM), Drainage and Irrigation Department (JPS) Daerah Muar, and Tourism Muar (NGO). Relevant data are submitted by relevant officers through e-mails (or through other platforms/methods, like WhatsApp) to the researcher. The data gathered are used for the production of a map together with the existing tourism activities in MRV. From all the information about potential tourism and destinations in MRV that are collected from the stakeholders, one of the potential tourism destinations and products would be selected and used for product development, based on the 5 A's criteria for tourism and the 8 criteria for a good nature tourism product.

The 5 A's criteria for tourism includes accessibility, accommodation, amenities, attractions and activities. Accessibility indicates the transport including the infrastructure for the transport used for the convenience of tourists to reach a particular destination or within the destination [34, 35, 36]. Accessibility can also refers to the possibility or the ability to access to a certain destination and it does not have to be any transport like bus, flight or trains, as walking tracks and trails are considered as well [37]. Accommodation refers to the place where tourists relax and stay during their visit to a particular destination [34, 35, 36]. Amenities indicates the facilities that are available in a particular tourism destination, such as good telecommunication network, food and beverages facilities, and many more [34, 35, 36, 37]. Attractions is the major reason for tourists to travel to a particular destination, it ranged from natural, human-made, cultural to social attractions [34, 35, 36, 37, 38]. For activities, certain people would prefer active activities like water sports and hiking, while certain people would enjoy eating, shopping, or just relax [34, 37].

The 8 criteria for a good nature tourism product includes endemism, rarity, reliability of sightings, morphological attractiveness, behavioural enticement, safety, linkage to local cultures, and ecologically importance. Endemism of an organism usually refers to organisms that can be found only in a specific location and cannot be found elsewhere [39, 40]. Rarity refers to the level of abundance, commonness, scarcity, and the encountering frequency of a certain organism [39, 41]. Reliability of sightings refers to the availability of the best observation time where the organisms can be seen presence at a particular time, along with the abundance of the organisms which can be easily seen [41, 43]. Morphological attractiveness refers to the attractiveness of the physical characteristics of an organism [41]. Behavioural enticement can be referred as the attractiveness of the behaviour of an organism [41]. Safety refers to the safety level of a certain organism as a tourism product to the tourists [39]. Linkage to local cultures may refer to tourism product that are able to link with the local's culture, where it may include folklores, local beliefs, local food, and local traditional medications [39, 40]. As for ecological importance, it refers to the importance of a particular organism to the ecosystem [42].

2.2 Product Development

For the making of the storyline for Oyster Saidii, firstly, the target market is decided, it can be adults, kids, families or so on. Then, one or two of the Criteria for a Good Nature Tourism Product are chosen to be focused on. The information for the storyline is searched from secondary sources such as from journals and publications online. This information is then arranged and made into a form of story-telling or presentation that is interesting and fun.

The initial ideas of making prototype souvenir were obtained through online searches and ideas from En Saidi. Various ideas including key chains, ornaments, and jewellery trays utilizing oyster shells were selected for their attractiveness and sustainability. After much deliberation and discussion with En Saidi, the idea settled on jewellery tray due to the suitability of the shape and size of the Oyster Saidii shell. The choice itself possesses advantages including low cost, sustainability of the raw material, as well as being iconic of the area of Parit Tiram.

Two prototype souvenirs including one made from Oyster Saidii shells, and one made from common oyster shells. The raw materials of Oyster Saidii shells were obtained from Encik Saidi, where the obtained shells were already cleaned, dried and devoid of fishy smells, thus can be directly used for souvenir making. The common oyster shells were obtained from the owner of Restoran PakNdak, where the obtained shells were cleaned properly, and were then dried under the sun until the fishy smell was removed.

In terms of souvenir making, the materials required included the Oyster Saidii shells, common oyster shells, watercolour brushes, green, blue and pearl white acrylic colour, a palette, red ribbons, star-shaped decorative flakes, and UHU glue. For the Oyster Saidii shells, green, blue, and pearl white acrylic colours were adjusted to the desired tone and were applied on the inner part of the left valve of the shell in accordance from deep to light tone. The paints were reapplied several times until the black spots in the inner shell were covered to produce an aesthetically pleasant appearance, and it is left to dry. An ornamental red ribbon bow was fixed on the surface of the right valve shell using UHU glue. The right valve from another shell was attached to the jewellery tray as a stand, using UHU glue.

Similarly, the inner part of the common oyster shells was painted with pearl white acrylic paint and was reapplied several times. The margin of the shells were then painted with blue acrylic paint of the desired tone. An ornament red ribbon bow was fixed on the dorsal edge of the painted oyster shell, then star-shaped decorative flakes were fixed on the surface as decoration. Another valve of the oyster shell were then attached to the jewellery tray as a stand, using UHU glue.

For the making of the E-book and promotional brochure, a suitable template from Canva is chosen and used for the production of the E-book and promotional brochure respectively. For E-book, the information in the storyline produced is then inserted into the template in Canva, along with some decorations to make it look more interesting. An attractive title is also used for the E-book. At the back page of the E-book, there is a QR code that can be used for the readers to scan and be linked to an official website of Muar Oyster. As for the promotional brochure, some information is added-in, including a little information about Oyster Saidii (which were searched through secondary sources like journals and publications online), the benefits of joining the oyster-based package, as well as the basic contact information in case tourists are attracted and wanted to book or know more about the package. After both E-book and promotional brochure are done, it is downloaded from Canva in the form of a PDF Document.

For the making of the itinerary of an oyster-based package, as the itinerary includes the activities of watching local fishermen harvesting the oysters using the traditional method, hence it should consider the low tide timing of the Muar River at the Parit Tiram site, as the local fishermen will only harvest the oysters in Muar River during low tide. The time portrayed in the itinerary are just for reference purpose as the timing would change according to the low tide timing throughout the day. The appropriate duration of time for each activity in the itinerary is estimated.

3. Results & Discussions

3.1 Muar River Valley (MRV)

Generally, it can be said that Muar River Valley has easy access to other states like Malacca [9]. It covers the area as shown in Fig. 2, which is approximately from the area around Gerisek and Pagoh all the way until the mouth of the Muar River that extends to the Straits of Malacca. The river in this valley act as a border line between Ledang District (Northern part) and Muar District (Southern part) [10], and a number of activities can be done in this river valley, including recreational activities (like cycling, jogging, and sunset watching) [11], tasting delicious seafood (like oysters) at a local restaurant and birdwatching [11], visiting the mussels farm [12, 13], fish and freshwater prawn catching [14, 5], scenic driving, heritage exploration, fishing competition, duck catching competition, festivals, fireworks, and entertainment shows [15]. Muar River Valley would also be the famous location for food, such as seafood, asam pedas, mee bandung Muar, cendol, and much more, along with local streets which are well-known with a variety of food catering to different customer's preferences. Muar River has outstanding values with the numbers of new businesses initiated around the river valley [2], being an area with many job opportunities open for the locals, an area where local people along the valley are closely reliant on the river for daily use, and rearing of aquaculture, animals and plantations. Within this river valley, local people uses a traditional fishing method to harvest oysters which are distinctive, and this river valley is also home to a rich number of organisms like oysters [16], crab eating-macaques *Macaca fascicularis*, mudskippers, and shore birds [11], as well as "Baung" and freshwater prawn [17]. Muar River

Valley is also famous for herbs and spices-based agro-tourism (Nasuha Herbs & Spice Farm) and herbal tea is one of the most popular products as a souvenir [11]. Overall, the concept of Muar River Valley would (i) give more attention and recognition to the importance of Muar River, which would allow more planning and development being done in the area; and (ii) would be the center for several things, like education, research, and especially nature tourism; where it directly (iv) sustain the income generation of locals; as well as (iii) improving the quality of the local's livelihood. In order to support the Muar River Valley concept, a comparison has been made with river valleys from other countries such as the Shimanto River Valley in Japan, Northern Nile River Valley in Egypt, St. John River Valley in Canada, and Juniata River Valley in the United States. The results of the comparison shows that the concept of MRV is viable as there are much similarities between these river valleys with MRV such as in terms of the characteristics of the river, activities that can be done in the river valleys, as well as the importance of the river to the local communities.

3.2 Geophysical information of Muar River Valley

Geophysical information obtained from secondary sources specifically for MRV could not be obtained, as there is only general information available for Muar River Basin except for topography where the elevation until the extent of Muar District could be obtained. Therefore the geophysical information collected from the secondary sources for Muar River Basin will serve as additional information for this part. Information related to the geophysics of MRV is also collected through interviews and materials provided by the representative of the relevant stakeholders that has the related information.

Beginning with the land use, the overall total land use for Rancangan Kawasan Khas (RKK) area of Bandar Maharani for the purpose of residential activities, business, industrial activities, community facilities, infrastructure and utility, open space and recreational activities, agriculture and husbandry, empty land, streets/roads, and water bodies is 3653.91 ha. Table 1 shows the current land use for the RKK area of Bandar Maharani, there are two of the land uses that is obviously higher among all of the other land use. They are agriculture and husbandry, and residential activities. The land use for RKK area of Bandar Maharani for agriculture and husbandry recorded the highest percentage (31.40 %) with a value of 1147.17 ha, perhaps due to location of Muar River being right next to the RKK area of Bandar Maharani. It has been well-utilised by the locals for the rearing of animals and plantations [5]. Followed by residential activities that recorded the second highest with a value of 1120.77 ha, which is equivalent to 30.67%, which might be due to the reason where more lands are converted to residential areas to cater for the needs of the growing populations [24].

Table 1 - Table that shows the current land use for Rancangan Kawasan Khas (RKK) area of Bandar Maharani [18]

Land use	Width (ha)	%
Residence		
Planned residence	722.93	19.78%
Village residence	397.84	10.89%
Total	**1120.77**	**30.67%**
Business	164.76	4.51%
Industry	16.21	0.44%
Total	**180.97**	**4.95%**
Community facilities		
Education	82.98	2.27%
Health	14.88	0.41%
Religion	20.09	0.55%
Cemetery	7.40	0.20%
Safety	7.19	0.20%
Welfare shelter	5.63	0.15%
Government institution	22.38	0.61%
Other community facilities	6.75	0.18%
Total	**167.30**	**4.58%**
Infrastructure & Utility		
Electric supply	8.60	0.24%
Water supply	3.42	0.09%
Irrigation & Drainage	0.62	0.02%
Telecommunication	2.55	0.07%
Sewerage	4.21	0.12%
Total	**19.40**	**0.53%**
Field & recreational land		
Field	42.09	1.15%

Facilities for sports & recreation	32.62	0.89%
Green areas	0.37	0.01%
Total	**75.08**	**2.05%**
Agriculture & livestock		
Oil palm	6.28	0.17%
Other agriculture types	1115.41	30.53%
Idle land	25.48	0.70%
Total	**1147.17**	**31.40%**
Vacant land	**95.53**	**2.61%**
Streets/Roads	**593.90**	**16.25%**
Water bodies	**253.79**	**6.95%**
Total	**943.22**	**25.81%**
Overall total	**3653.91**	**100.00%**

For drainage system, there is a total of 24 main rivers that irrigates Bandar Maharani, which includes Parit Tok Kadzi, Parit Perupok, Parit Haji Baki, Parit Khalidi, Parit Long Baru, Parit Ngah Jalil, Parit Padang Golf, Parit Abdul Rahman, Parit Jalan Sulaiman, Parit Othman, Parit Sayang, Parit Bakri, Parit Tiram, Sungai Abong, Parit Setongkat, Parit Mohd Derus, Parit Beting, Parit Buaya, Parit Masjid, Parit Long Mohd, Parit Jalan Bukit Treh, Parit Temiang, Parit Bachang, and Parit Lee Rubber [18]. Majority of the *outlet* of the rivers are in Muar River and Straits of Malacca [18]. As seen in Fig. 3, the part of Muar River within the scope of Muar District does not flow in a straight pattern, but it meanders, perhaps as the result from the characteristics of the land around the river, which is flat especially near the river mouth. This causes the velocity of the river water around certain parts to slow down thus making the course of the river to meander (En Saadan pers. comm. 2021).

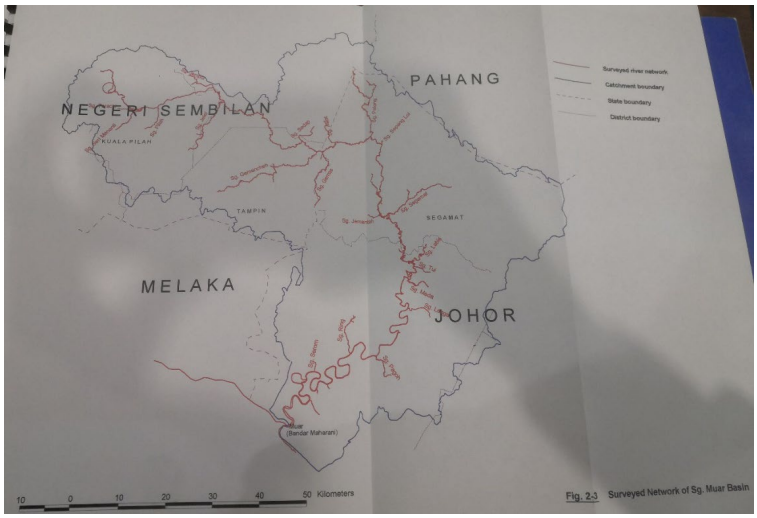

Fig. 3 - Map that shows the Muar River as a whole [23]

For topography, a majority part of Muar District, which is about 131,047.92 hectares (94%) of the area, falls under the category of lowland or flat land, having a height under 150 meter (as seen in Table 2) [19]. A comparison has been made with the elevation classification by the Forestry Department of Peninsular Malaysia (as shown in Fig. 4). From Fig. 4, it can be seen that the elevation of 0 - 300 m is considered as lowland, 300 - 750 m is hill land, 750 - 1200 m is upper hill, 1200 - 1500 m is montane, and above 1500 m is considered as upper montane. Therefore, under Table 2, the elevation of 0 - 150 m and 150 - 300 m should be combined, and both are categorized under the same category of lowland, which means the width of lowland in Muar District should be the combination of both 131,167.51 ha (94.19 %) and 6,187.31 ha (4.44 %). This results in the total width of lowland for Muar District to be as 137,354.82 ha, approximately 98.63 % of the area, where this makes any planning and development of the area easier to be done (En Saadan pers. comm. 2021). No part of the area could be categorized as montane as the area is lower than 1200 m.

Table 2 - Table that shows the elevation of Muar District [19]

Elevation	Elevation Category	Width (hectare)	Percentage (%)
0 - 150 m Lowland	• Can be considered for all types of development subjecting to	131,167.51	94.19

	Rancangan Tempatan		
150 - 300 m Hill land	• KSAS Highland Level 3 • Controlled development where the types and intensity of development will be controlled according to the obstacles characteristics • Development can be considered subject to Pihak Berkuasa Negeri with the condition of land gradient <15 degrees	6,187.31	4.44
300 - 1000 m Highland	• KSAS Highland Level 2 • No development or agricultural activities allowed • Sustainable logging and nature tourism with low impacts are allowed depending on the local barriers/obstacles and with a land gradient of not more than 35 degrees	1,903.18	1.37
> 1000 m Mountain	• No development, agricultural activities or logging activities are allowed except for low-impact nature tourism activities, research and development	-	-
Total		**139,258.00**	**100.00**

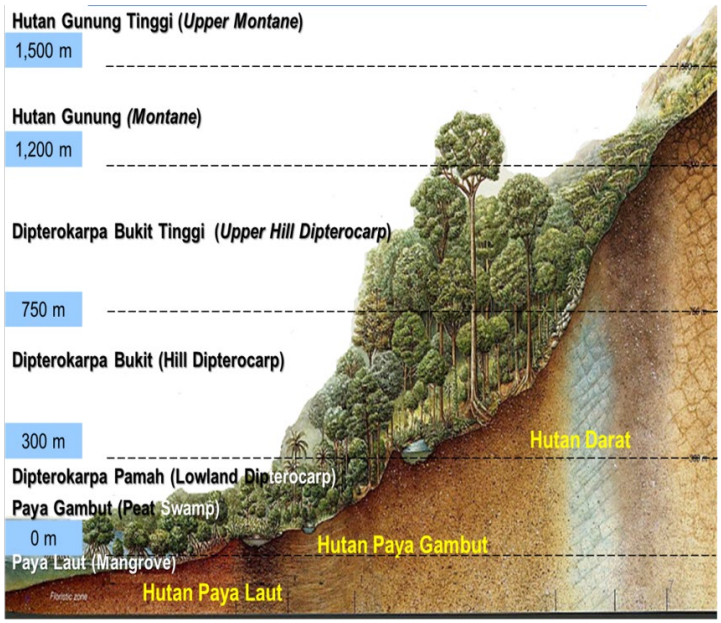

Fig. 4 - Classification of elevation [32]

The information for rainfall distribution specifically for MRV could not be obtained from the secondary sources, and only the general rainfall distribution of Muar River Basin as a whole is available. This might be due to the lack of information available online that is related to the rainfall distribution specifically focusing on the area of MRV. The information for the rainfall distribution for MRV could not be gathered from either the interview or from materials provided by the representatives of the relevant stakeholders. This perhaps is due to miscommunication, insufficient number of stakeholders being involved, and the lack of information available.

3.3 Existing Tourism Activities and Potential Tourism Destinations and Products in MRV

From the secondary data collected for existing tourism sites in MRV and comparing it with the information gathered from the stakeholders (regarding potential tourism destinations), along with detailed analysis of the information, it is found that a number of the existing tourism sites that are found through secondary sources are actually

potential tourism destinations due to varying reasons. For instance, tourism destinations which were thought to be the existing tourism sites through secondary searches like Panchor Jetty and Pulau Penarek, although there are already tourism-related activities being held at the site (which thought to be existing tourism sites), these destinations have not been commercialized for tourism yet. As such, it should be categorized as potential tourism destinations. For destinations like Desa Keroma Eco Resort, although there are already tourism-related packages available at the site, it is still categorized as potential tourism destinations, as it was mentioned in the suggestions obtained from the stakeholders as having potentials. As a result, there are only 4 destinations found through secondary sources that could be categorized as existing tourism sites, and they are Pagoh Stone Hill, Tawar Farm & Plantation, C&C Mushroom Cultivation Farm Sdn Bhd, and Nasuha Herbs & Spice Farm. The rest of the destinations found through secondary sources are categorized as potential tourism destinations along with the suggestions from the stakeholders. In total there are 18 potential tourism destinations identified and recorded, which includes Pulau Penarek, Panchor Jetty, Sawah Ring, Tanjung Emas, Tanjung Ketapang, Kubu Bentayan (Bentayan Fort), Masjid Sultan Ismail Tangkak, Masjid Jamek Sultan Ibrahim Muar, Parit Tiram, Bukit Treh, Desa Keroma Eco Resort, Taman Awam Tepian Sungai Muar Tanjung Agas, Jeti Nelayan Parit Karang, and Laman Tepian Sungai Grisek, along with additional potential tourism sites suggested by the stakeholders such as Makam Sultan Alauddin Riayat Shah, Makam Panglima Mat Berani, Masjid Lama Kampung Olak Sepam, and Biawak Busuk and Kota Buruk. Note that only potential tourism destinations (suggested by the stakeholders) that are closer and nearer to the river (within 5 km distance from the Muar River) and are related to nature tourism within the scope of study of this research are included here as some of the potential tourism destinations mentioned by the stakeholders are far from the Muar River.

As for the potential tourism products in MRV, there are only two potential products that are mentioned by the stakeholders, that are fish rearing and oysters. However, the specific location for the potential product of fish rearing is unclear due to insufficient information obtained from the interview. As for the potential product of oysters, it could be found in places like Parit Tiram. The map for existing tourism activities and potential tourism destinations and products of MRV is produced by using My Maps application (by Google).

3.4 Selection of Potential Tourism Destinations and Products for Product Development

All the three stakeholders unanimously agreed that Kubu Bentayan (Bentayan Fort) and Parit Tiram are two of the potential tourism destinations in MRV. Pn Shiela mentioned that Bentayan Fort is a good spot for tourism and they are putting more focus on oyster tourism, where Pn Shahirah said that efforts have been put-in to improve the location for oyster tourism in Muar (such as Parit Tiram), making it more convenient and viable to tourists. This is supported by En Saadan where a floating jetty has already been established at Parit Tiram for the establishment of a floating restaurant in the future, along with new roads provided and cleanliness of the site are being taken care of for the convenience of visitors.

As for the suggestions on potential tourism products, all the three stakeholders mentioned about oysters. This is supported by En Saadan and En Saidi who described oysters found in the Muar River (in a location such as Parit Tiram) are considered as one of the best oysters worldwide, in terms of its taste and nutritional values. Furthermore, En Saidi also mentioned the new species of oysters, *Crassostrea (Magallana) saidii* which is endemic in the Muar River. This would put more limelight on the oysters within this area. En Saidi also added that an oyster-based restaurant and an exclusive website for the oysters are also in progress and would be available soon. All three stakeholders also agreed that the traditional oyster harvesting method used by local fishermen in Muar River is marvellous as well. This has firmed up the suggestions from the stakeholders that oysters had the potential for tourism in MRV. Hence, the selection for the potential tourism destinations is Parit Tiram, and the selected potential tourism product is the oyster, specifically Oyster Saidii, which are chosen for product development.

The selected *Crassostrea (Magallana) saidii* (Oyster Saidii/Tiram Putih) as shown in Fig. 5 has complied with five of the 8 criteria for a good nature tourism product, which are ‘endemism’ where it is endemic only to Muar River [25]; ‘safety’ as it is generally safe because usually, oysters do not cause any harm to humans physically (and for the potential harm, it usually came internally in terms of infections like vibriosis through consumption of raw oysters [26]); ‘reliability of sightings’ as this species of oyster can be easily found in the Muar River at a location like Parit Tiram (which can be seen in the map shown in [16]); ‘ecologically importance’ where oyster are generally filter feeders, where they are good in helping to remove excess nitrogen from waters [20], which are important in providing healthier water ecosystem; and ‘linkage to local culture’ where this oyster has been used by the locals as a source of food for many years [16]. While the selected location of Parit Tiram acts as a location for the itinerary of the oyster-based package to be carried out, it has complied with 3 criteria out of 5 A’s criteria for tourism, which includes attractions where at this location, visitors are able to watch the local fishermen harvesting the oysters during low tide by using traditional method without any usage of diving equipment which is very interesting [27]; amenities where there is local restaurant (such as Restoran Asam Pedas PakNdak) available at the site along with surau and toilet; and activities where visitors that visits this site may spend their time to relax and enjoy the breeze at the river side while having the fresh oysters available at the local restaurant.

Fig. 5 - Shells of *Crassostrea (Magallana) saidii* sp. nov. [25]

3.5 Product Development

The product development for this research project includes the prototype souvenir, e-book, promotional brochure, and itinerary for the oyster-based package. Tourists that visit historical and natural sites are more prone to buy local arts and handicrafts that represent the sites that they have visited, as a souvenir [21]. Souvenirs can be in many forms, such as postcards, key chains, clothes, jewellery, magnets, mugs and much more. For this research, the jewellery tray (as shown Fig. 6) produced would act as a prototype souvenir for those who visit Parit Tiram, Muar. It is made using the shell of Oyster Saidii (obtained from En Saidi) which makes this souvenir unique and precious. As every oyster shell is unique in its own way, the selected shells of common oysters from Restoran PakNdak with desired shape and size are also made into prototype souvenir as well. Example of common oysters that could be found in the MRV are Tiram Kapak and Tiram Selipar [27]. A similar prototype souvenir of jewellery tray (as shown in Fig. 7) is also made from the common oyster shell obtained. This could also add-up to the choices of prototype souvenirs available, as well as bearing in mind aspects of conservation.

Fig. 6 - Jewellery tray made from the shell of Oyster Saidii

Fig. 7 - Jewellery tray made from the shell of common oysters found in MRV

A travel brochure (or referred to as the promotional brochure) is one of the most important and widely utilized promotional methods among many others [22]. Thus, the promotional brochures that are produced in this research (as shown in Fig. 8) shows the highlights of Oyster Saidii and the benefits of joining the itinerary of the oyster-based

package along with attractive designs. An example of a simple itinerary for a One-Day oyster-based package is shown in Table 3, acting as a reference for any further development of package related to the oyster in the near future. Note that the specific time for the itinerary of the package is for reference only and the time would be determined and changed according to the time of the low tide of Muar River, as the activity of traditional oyster harvesting by the local fishermen would be done during low tide only.

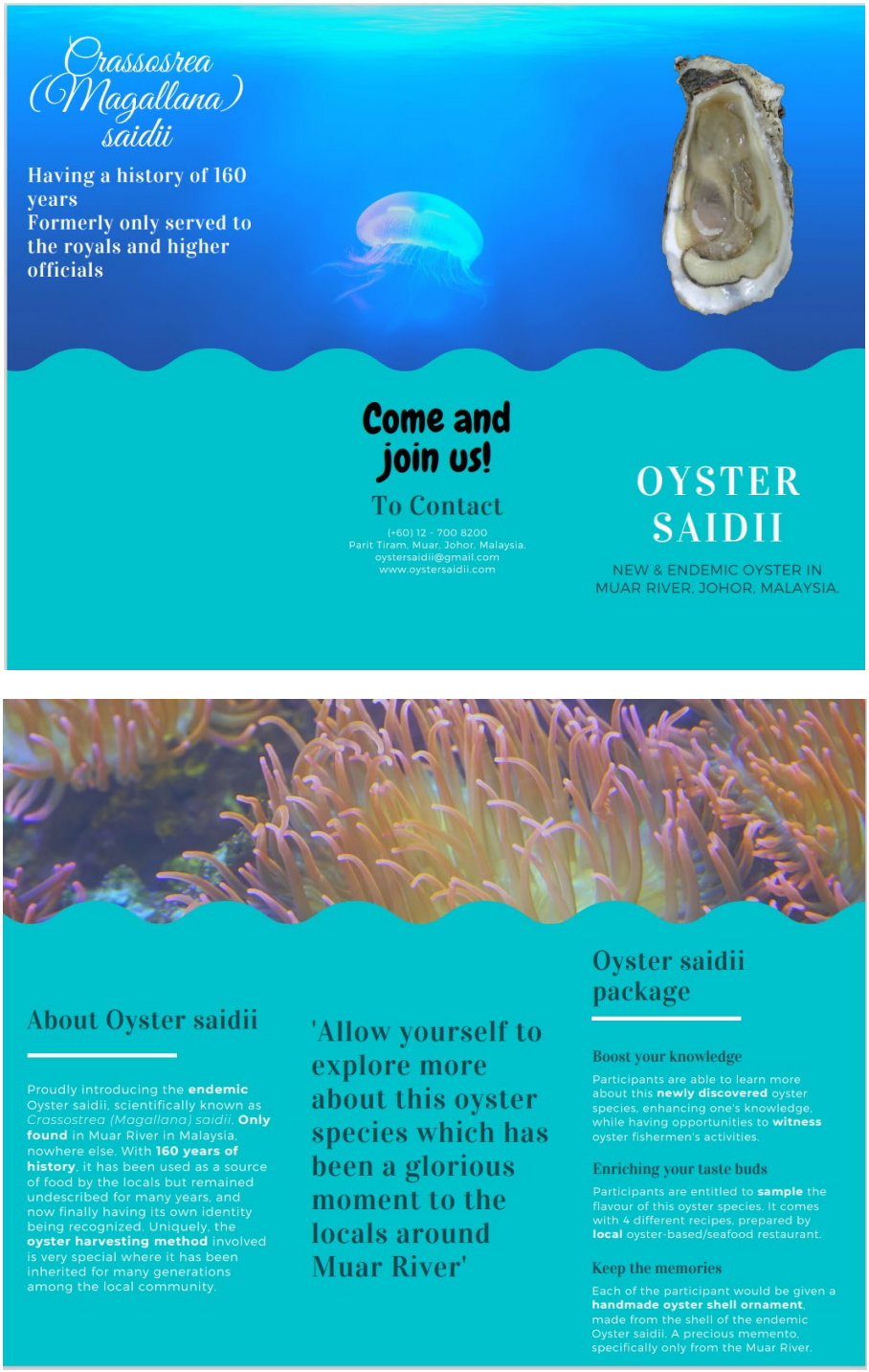

Fig. 8 - Content of the promotional brochure produced for Oyster Saidii

Table 3 - Itinerary for the oyster-based package

Time	Activities
Day 1	
2:00 pm	Assemble at a local oyster-based or seafood-based restaurant in Parit Tiram, Muar. Everyone is seated.
2:30 pm	Presentation of educational slides by PIC.
3:00 pm	Serving of oyster platter. Additional dishes could be added at own expenses.
4:00 pm	Assemble beside Muar River and watching local fishermen harvest oysters using traditional method. Photos and videos could be taken.
4:40 pm	Watching how oysters are shucked. An opportunity to try the freshly shucked oysters.
5:20 pm	Distribution of souvenir. Group photos will be taken.
5:50 pm	Everyone would be dismiss.

An E-book has also been produced, where it contains the information about Oyster Saidii in a manner of a storyline (that has been produced in this research project as well) to make it sound more interesting as if the readers are reading a storybook that could amaze them and at the same time boosting their knowledge on Oyster Saidii.

4. Conclusion

This research has managed to fulfil the objectives. The objective to produce map for existing tourism activities and potential tourism destinations and products of MRV is produced, by using My Maps application (by Google). The objective to do product development of the new species of oyster, innovate prototype souvenir, produce an e-book, and promotional brochure which is related to oyster are also achieved. The objective to gather geophysical information of MRV is achieved, however, further work is required for the information of rainfall distribution of MRV. Tourism, both existing and potential future development, are possible all along the Muar River (within the study area). Further research needs to be done, and more stakeholders should be involved (as the stakeholders from Tangkak should be considered as well as part of the area of Tangkak near to the Muar River is included in MRV), allowing more comprehensive data collection. It is recommended that local communities should be involved in any nature tourism that are held.

Acknowledgement

The authors would like to address utmost gratitude to CorSUNR UTHM, Ts. Dr. Nor Azizi bin Yusoff, Pn Norshiela Jamaluddin (Penolong Pegawai Tadbir) and Pn Nur Shahirah Ramli (Pegawai Perancangan) from Muar Municipal Council (MPM), En Saadan bin Senin from Jabatan Pengairan dan Saliran (JPS) Daerah Muar, En Md Saidi bin Mohamed from Tourism Muar, the owner of Restoran PakNdak, and everyone who involved in this research for their assistance, commitment, support, encouragement, and guidance throughout the process of this research.

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