

ASSESSMENT OF INLAND NAVIGATION AT KENYIR LAKE TO SAFEGUARD SOCIETAL WELLBEING

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Abstract: This paper examines the navigation system at Kenyir Lake, Malaysia where it is reported that there is a gradual and steady increase of about 100,000 tourists to Kenyir Lake since 2009 to 2015. Naturalistic and participant observation, comparison method and secondary data were used to determine the status of navigation on the lake. It was found that there were 200 water crafts serving tourist and other users on the lake and that non conventional aids to navigation were available on some parts of the lake. It was discovered that the regulatory framework for navigation is inadequate and differs from those applied elsewhere in Malaysia. Kenyir Lake was also contrasted with Putrajaya Lake and Great Lakes to highlight navigational practices and diversity of lakes used for navigation. Without a proper safety navigation system and increasing number of users, societal well-being is at risk. It was concluded that there are gaps and local authority and other vested parties should consider steps to enhance navigational safety practices on Kenyir Lake especially for tourism management and sustainability and thus safeguard the societal well-being of its user.

Keywords: Tourism sustainability, navigation system, maritime tourism, societal wellbeing, Kenyir Lake.

Introduction

Kenyir Lake is Malaysia's largest man-made lake located in Terengganu, bordering Kelantan in the west and Pahang in the south including parts of the National park area. Sungai Terengganu is the main feeder with an additional 15 rivers draining into the lake resulting in 37,000 ha of water surface area which is broken up by 340 islands. Thus, apart from its primary function as a power generator, it is also a popular water-based tourist destination. KETENGAH reports that there is a gradual and steady number of tourists to the lake, from 221,302 in 2010 up to 706,222 in 2015, on average increasing 100,000 users per year. These are made up of primarily local visitors with about 10% international tourists (Lembaga Kemajuan Terengganu Tengah, 2016).

Lake based ecotourism has become one of the biggest drivers of the local economy. Ecotourism is spurred by the range of geographical and man-made attractions within

the immediate catchment of the lake. Kenyir Water Park, Tropical Park, Orchid Park, Bird Park to name a few (Lembaga Kemajuan Terengganu Tengah, 2017). These attractions are spread out and are mainly accessible by water transport. Apart from that, there are water-based activities that are growing in popularity including houseboats, fishing, water sports and aquaculture. KETENGAH focuses on potential development activities, identifies tourism products for local and international markets and prepares strategic plans to optimize the use of the resources. Though direction and distance signages have been put up, currently there are no specific navigation safety system implemented at Kenyir Lake. Movement of over water are based on the most basic criteria which is by sight not by convention and that it can only be done during daylight hours as there are no proper aids to navigation system for restricted visibility or night navigation.

Table 1: Navigation system and user safety for Kenyir Lake

Nav. System	Good	High Risk Good Nav. System Low user safety	Enhanced Safety Good Nav. System ↑ High user safety ↑
		Very High Risk Poor Nav. System Low user safety	High Risk Poor Nav. System High user safety
Poor/ Low		User Safety High	

Navigation in this context includes safe routes, markers, directional and guidance system aimed at providing a safe and efficient transport on water at all hours. Without a proper safety navigation system coupled with an ever-increasing number of users and the intention of turning Kenyir Lake into a major tourist destination, societal well-being is at risk.

The objectives of this research were to ensure societal well-being of Kenyir Lake users by establishing the status of navigation system at Kenyir Lake by observation, comparison to other established lakes and provide recommendation to reconcile gaps for a safer, more efficient and sustainable Kenyir Lake as illustrated in Table 1, matrix of desirable enhanced safety instead of very high risk situation.

Navigation System of Kenyir Lake

Kenyir Lake began its life simply with the two major goals of hydroelectricity and flood mitigation, only to see a multiplicity of roles imposed on it (Mohd Sharoum *et al.*, 2015). Built in 1985, Kenyir Lake came with the construction of a dam across the Sungai Terengganu at Jenagor. The lake is located 16 km from Kuala Berang and 70 km from Kuala Terengganu, bordering Kelantan in the west and Pahang in the south including part of national park area. Sungai Terengganu is the main feeder with an additional 15 rivers also draining into the lake resulting in about 380 km² of water surface area which is broken up by 340 islands (National Hydraulic Research Institute of Malaysia, 2010).

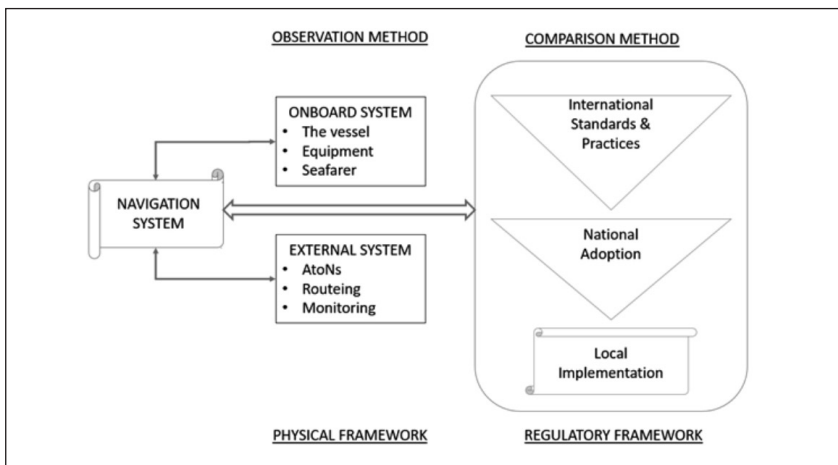


Figure 1: Navigation system observation and comparison

The Central Terengganu Development Authority (KETENGAH) was incorporated on 12 April 1973 and is empowered to develop the economic and social standing of areas in Terengganu including Kenyir Lake (Lembaga Kemajuan Terengganu Tengah, 2017). Regulatory matters are administered by Hulu Terengganu District Council (MDHT) which was established on 1 January 1981 as the local authority in charge of quality of life, providing social and recreational facilities as part of its objectives (Majlis Daerah Hulu Terengganu, 2017).

Movement over water or navigation is the nautical art or science of travelling from one point to another or technically the process or activity of accurately ascertaining one's position at any required moment and planning and following a route to a desired point (Kerchove, 1973). Navigation system encompasses the vessel and its components namely its equipment and the seafarers manning it and the environment in which the vessel operates comprising safe routes, markers, directional and guidance system aimed at providing a safe and efficient transport on water (Frost, 1983). According to Lavery and MacElrevey, navigation can be simplified into the onboard system and the external system (Lavery, 1984) (Figure 1). The onboard system represents the vessel while the external system represents the environment in which the vessel operates (MacElrevey, 1988). The institutional framework necessary for navigation is outlined by the International Maritime Organisation (IMO) of which Malaysia is a member (International Maritime Organisation, 2017). Another major advocate of navigational safety is the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) of which Malaysia is also a member (International Association of Lighthouse Authorities, 2017). IALA's objective is to foster the safe and efficient movement of vessels through the improvement and harmonisation of marine aids to navigation worldwide and by other appropriate means (International Association of Lighthouse Authorities, 2017).

Under current regulatory measures, the onboard system at Kenyir Lake is well covered. The requirements for the vessel, equipment and seafarers are outlined under the Merchant Shipping Ordinance 1952 Section 474 to 485 (MSO, 1952). For registration and licensing of boats, it would require the owner to furnish details of the boat driver and certificate of competency as mentioned in the River Traffic Rules 1989 (Majlis Daerah Hulu Terengganu, 1989). This is based on the requirements of Marine Department Malaysia, the agency responsible for implementation of maritime standards in Malaysia (Marine Department, Malaysia, 2017). However, it should be noted that these may not apply to local or "one boat" owner on Kenyir Lake i.e. boats used by the local, aborigine or other unlicensed user. For the external navigation system at Kenyir Lake, information needs to be established in view of an ever-increasing number of users which includes international tourists and boats plying on the lake. For example, the use of nonstandard aids to navigation (AtoN) may provide unnecessary risk to wellbeing of users, tourists and even Kenyir Lake itself. The notion of societal well-being is generally accepted that health, despite its importance to the public, is not viewed explicitly as the goal of organized societies. Rather, societies strive towards a positive and sustainable state of well-being (World Health Organisation, 2012). In the context of this study, societal well-being stands for the total well-being of the entire society using Kenyir Lake and touches on notions of safety and quality of life attached to the movement over water and navigation system as the primary activity carried out at Kenyir Lake and to put emphasis on Kenyir Lake as a responsible, proactive and world class major tourist destination.

Methodology

To determine the status of navigation system at Kenyir Lake, this study will be based on a combination of the observation and comparison method. The first step is to carry out observation on site to gather information as outlined in Table

2, second step to compare applicable regulatory matters relating to navigation and finally to look at other lakes where navigation is practiced and contrast with Kenyir Lake. This is to establish the status of navigation system at Kenyir Lake and provide recommendation to reconcile gaps for a safer, more efficient and sustainable Kenyir Lake. Secondary data from the authorities will also be gathered to determine the number of users and water craft of Kenyir Lake.

Observation Method

A planned and methodical systematic viewing of a specific phenomenon in its proper setting for the specific purpose of gathering data for a particular study was carried out. To collect qualitative and quantitative data, human conduct and gain insight of the situation. The activity was done in natural environment with no control of the surroundings (Mohapatra, 2017).

Table 2 summarizes the observations that will be done for this study at Kenyir Lake.

Both naturalistic and participant observation will be employed to gather quantitative data on Kenyir Lake (Kawulich, 2005).

Comparison Method

Comparison is a fundamental tool to sharpen description, plays a central role in concept formation by focusing on similarities and contrasts among cases contributing to inductive discovery and theory building (Collier, 1993). Comparison research methods have long been used to identify, analyse and explain similarities and differences (Hantrais, 1995). This study will look at the regulatory framework relating to navigational safety that are accepted and practiced internationally and nationally, compared to the practices in Kenyir Lake. It will only highlight the main legal instrument applicable to the situation.

This study will also compare Kenyir Lake with other established lakes to identify similarities and differences as far as navigation is concerned. Data on lake size, primary use, type of vessel and AtoNs will be used for comparability. Finally, the combination output of the observation and comparison will be assessed to identify gaps and provide recommendations to enhance safety navigation system at Kenyir Lake for the purpose of safeguarding societal well-being.

Table 2: Navigation system physical framework observation for Kenyir Lake

Main Element	Sub Element	Observation
Onboard System	The Vessel	Type of vessel
	Equipment	Safety equipment onboard
	Seafarer	Activities
External System	AtoNs	Type and availability
	Routeing	Current practices
	Monitoring	Current practices

Table 3: Navigation system regulatory framework comparison for Kenyir Lake

International	National	Local
Organisations	Authorities	Authorities
Conventions	Ordinance	Acts
Standards	Regulation	Rules

Findings

Observation Activities

Naturalistic and participant observations were carried out multiple times at the main focal point of activities and by joining expeditions and trips to various points on the lake. This is to gather information and obtain first-hand experience of movement over water and navigational practices on different types of water craft that are operating on Kenyir Lake. The activities are listed in Table 4.

Table 4 lists major observation activities that were carried out from 2014 to 2016. They comprise different trip utilising different types of water craft. The outcome of the observations would include the type of water craft used on Kenyir Lake, the type of activities that involves navigation or movement over water, the users and the way navigation was practiced. The list does not include day trips, questionnaire and interview sessions that were done at Kenyir Lake.

Kenyir Lake Use Involving Navigation

The primary departure point for the lake is Pengkalan Gawi which caters to all users. Pengkalan Gawi is also near the latest attraction, the Kenyir Water Park on Pulau Poh which is already in operation and the Kenyir Free

Trade Zone Complex (KFTZ) which is being developed. Activities involving navigation out of Pengkalan Gawi are ecotourism, fishing for sports and lake recreation in general. The other departure point would be the Sungai Chomo Jetty though it is more localised and rarely used by tourist. Apart from this, there are other points along the lake that is used to gain access to the water. The movement between departure and destination points is based on demand.

The number of users especially tourist keep increasing as highlighted by record of tourist arrival in Figure 3. This excludes users from the 49 villages populated by 16,119 locals and 334 aboriginals of the Semaq Beri and Batek tribe that exists along the rim of the lake (Mohd Sharoum *et al.*, 2015). The locals and aboriginals of Kenyir Lake also engage in navigation of fish for food, hunt and gather forest product around the lake, however their numbers are negligible compared to those for tourism.

Apart from tourist, local and aboriginal users, there are also business or industry user on Kenyir Lake engaged in activities that involves navigation. Fish farming and logging activities made up the criteria for business or industry. Fish farms are concentrated primarily in the Sungai Chomo area. There are also government boats used for enforcement by Kenyir Rangers which are made up of multi-agency including

Table 4: Observations on Kenyir Lake

	Date	Activity	Area
1	August 2016	Land based observation.	Sungai Chomo and Pengkalan Gawi.
2	March 2016	Houseboat trip for PITA student.	Pengkalan Gawi to Kelah Sanctuary.
3	February 2016	Mobile Lab familiarisation.	Pengkalan Gawi to various points.
4	December 2015	Mobile Lab commissioning and testing.	Pengkalan Gawi.
5	October 2015	Student recreational trip.	Pengkalan Gawi to various points.
6	March 2014	Road trip around Kenyir Lake.	Pengkalan Lawit and Gawi.

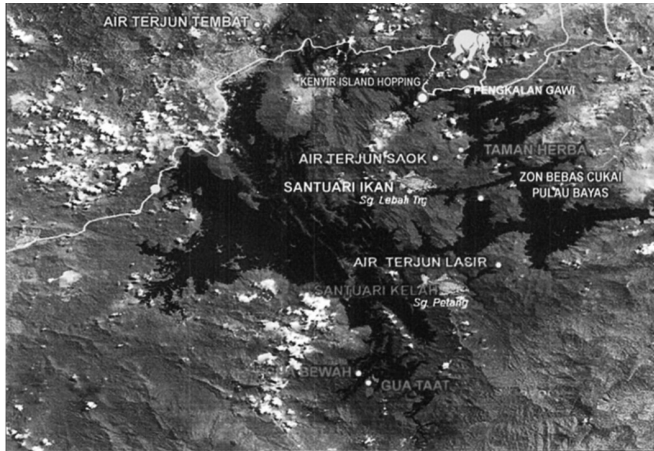


Figure 2: Kenyir Lake tourism products
Source: KETENGAH (2016)

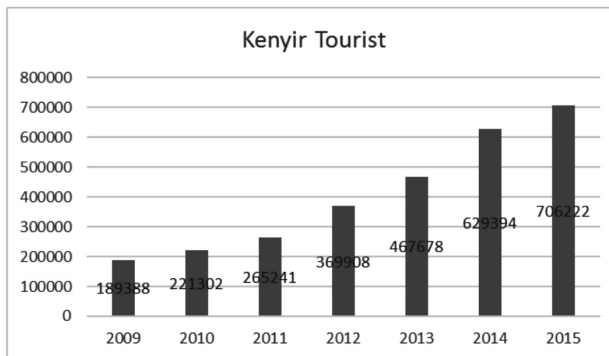


Figure 3: Tourist arrival Kenyir Lake 2009 – 2015
Source: KETENGAH (2016)

KETENGAH, Fisheries Department, Wildlife Department and the Forestry Department among others. Aside from this, there are also research and prospecting activities done at Kenyir Lake and its surrounding areas which uses boats. In summary, users of Kenyir Lake involved in navigation or movement over water can be categorized into five different criteria which are; tourism, personal, business, government and others.

To cater for these users, there are mainly two types of water craft being used, speed boats and house boats. Houseboats are the largest water craft on Kenyir Lake between 18 to 25 meters in length and up to 9 meters wide. The local and aboriginals typically use boats about 4.5 meters in length, powered by either a 15 or 30 horse

power engine while the speedboats used for tourists are up to 7.5 meters in length with more powerful engines. Majority of these water crafts are registered with Hulu Terengganu District Council (MDHT). Their numbers are listed in Table 5.

To aid navigation and ensure the safety of these boats and users, in 2016, KETENGAH deployed 70 buoys illustrated in Figure 3. These buoys are about 1.2 meters high, equipped with solar powered blinking lights and are anchored in position using weights and rope. They are deployed in high traffic areas marking popular routes.

Currently, these buoys are placed about 300 meters apart to mark the route from Pengkalan Gawi to the following attractions, Butterfly

Table 5: Number of boats recorded by the Hulu Terengganu District Council

No.	Type	Quantity
1	Houseboats	73
2	Speedboats	85
3	Recreational/small boats	42
	TOTAL	200

Source: MDHT (2016)

Table 6: Findings of navigation system physical framework observation for Kenyir Lake

Main Element	Sub Element	Observation Findings
Onboard System	The Vessel	Houseboat, speedboat, small boat
	Equipment	All vessel have navigation lights, only houseboats have compasses
	Seafarer	Daylight navigation based on demand.
External System	AtoNs	Non-standard markers
	Routeing	Shortest distance based on sight
	Monitoring	Kenyir Rangers

Park, Saok waterfall, Herbal Park, Kenyir Lake View Resort, Orchid Park and the Tropical Park. In the near future, KETENGAH plans to extend their deployment from Pengkalan Gawi to Lasir waterfall, Bayas Island Free Trade Zone, Kelah Sanctuary and the Chomo river fish farm area (Pers. Comm, 2017). These buoys are non-standard and do not conform to conventions that are applied elsewhere in Malaysia by MARDEP. The summary of the observation is illustrated in Table 6.

Comparison

An established navigational system applied in Malaysia and used worldwide is primarily under the purview of the International Maritime

Organisation (IMO) and the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA). IMO is the United Nations specialized agency responsible for the safety and security of shipping and the prevention of marine pollution by ships. It works through conventions such as Safety of Life at Sea (SOLAS) which is adopted and implemented by its members (International Maritime Organisation, 2017). IALA looks at the AtoNs and its aim is to foster the safe and efficient movement of vessels through the improvement and harmonisation of marine aids to navigation worldwide and by other appropriate means (International Association of Lighthouse Authorities, 2009).

In Malaysian waters, excluding inland waters, these standards are applied by the Marine Department of Malaysia (MARDEP) whose task is to ensure the effectiveness of AtoNs i.e. availability/reliability that meets the standards of IALA (Marine Department, Malaysia, 2016). The primary legal instrument governing matters relating to water transport in Malaysia is the Merchant Shipping Ordinance, 1952 (MSO 1952). However, inland waters not connected nor navigable by seagoing vessels does come under the purview of MSO 1952. For Kenyir Lake, this would be the Acts and By-Laws of the local government. Currently, there are no specific acts or by-laws that covers navigation, movement over water or water-based activities (Majlis Daerah Hulu Terengganu, 2017). In all cases, as mentioned, MDHT will use relevant legal instrument for that particular matter i.e. for navigation and boats, it will refer to Marine Department of Malaysia and the Merchant Shipping Ordinance.

Table 7 highlights the main legal instruments relating to navigation in the context of this study. International instruments are adopted by and implemented by member countries i.e. SOLAS is ratified by Malaysia and implemented by MARDEP. This is done by usurping SOLAS in MSO 52 which is the primary document for matters relating to navigation. For Kenyir Lake, the closest legal document that relates to navigation is the Enactment on River Traffic as amended 1994 which only mentions the need for licensing of boats. In short, the regulatory framework for navigation system currently

applied at Kenyir Lake is not adequate and need to be scrutinised to protect its interest as a major tourist destination.

Lake Comparison


For comparison purposes from the perspective of navigation, this study also looked at Putrajaya Lakes and the Great Lakes of St. Lawrence Waterway. Putrajaya was chosen as it is a newly developed modern lake in Malaysia and Great Lakes because of its nature and use to highlight the diversity and variance of lakes that are in existence today.

The Putrajaya lake system occupies about 600 hectares including manmade wetlands and small-perched lakes located on the major incoming tributaries immediately above the main body of the lake. The 390-hectare primary Putrajaya Lake was created by inundating the valleys of Sungai Chuau and Sungai Bisa. It is characterized by a deep main basin at the south (approximately 9 to 13 metres deep) and a narrow arm of the lake approximately north of the dam (2 to 7 metres deep) with a total length of the shoreline of the main lake at 38 kilometres (Hijjas Kasturi Associate Sdn., 2001). Navigational markers and signage were developed taking into consideration the lights of buildings and structures, reflections and glare from buildings around the lake and to minimize nuisance light pollution to the surroundings. The lake is used primarily for recreational purposes only, i.e. the lake cruise. The number of water craft and lake users are monitored and limited.

Table 7: Navigation system regulatory framework Kenyir Lake

International	National	Local
IMO, IALA	MARDEP	KETENGAH
SOLAS, COLREGS	MSO 52	Enactment on River Traffic as amended 1994.
ATONS	ATONS	Non-standard

Table 8: Lake comparison – navigation perspective

	Putrajaya Lakes	Kenyir Lake	Great Lakes
Lake Size	6 km ²	370 km ²	3700 km
Primary Use	Tourism	Tourism	Transport
Water Craft	Boats	Houseboats Boats	Ships
Navigational System	Modified System	Non-Standard System	Standard System
ATONS			

Source: Perbadanan Putrajaya (2012), The Great Lakes (2016)

The management of the lake falls under the purview of the Landscape and Park Department of Putrajaya tasked with monitoring and enforcing all manner of lake use (Perbadanan Putrajaya, 2012).

At the other end of the spectrum, there is The Great Lakes St. Lawrence Seaway System which is a deep draft waterway extending 3,700 km from the Atlantic Ocean to the head of the Great Lakes in the heart of North America. The St. Lawrence Seaway portion of the System extends from Montreal to Mid-Lake Erie. Ranked as one of the outstanding engineering feats of the twentieth century, the St. Lawrence Seaway includes 13 Canadian and 2 U.S. locks. This water network provides a means of transport for cargo on ships up to 300 meters in

length between Canada and the United States. The U.S. Saint Lawrence Seaway Development Corporation maintains 99 lighted buoys and 112 fixed aids in the U. S. Section of the St. Lawrence River. These aids to navigation are commissioned in late March as ice conditions permit. They are decommissioned in mid to late December during Seaway closing activities. All Canadian aids to navigation are managed by the Canadian Coast Guard and follow approximately the same schedule (GRANDSLACS, 2016).

The three lakes have different features and characteristics however, the similarity is the fact that it is used as a mode of transport whether for business or leisure. The external system, AtoNs, routing and monitoring apart from Kenyir Lake follows IALA standard as illustrated in Table 8.

For differences of these lakes, of the three only Kenyir Lake practices traditional navigation. The AtoNs used in Kenyir Lake is also non-standard which consists of the red buoys that placed in high density areas. By convention, starboard marker is green and port marker is red. If only one buoy only is to be deployed, depending on the criteria of use then either a safe water mark (white and red), special mark (yellow), isolated danger mark (black and red) or cardinal mark (black and yellow) should be used instead (SEALITE, 2017).

Discussion

There is heavy involvement on Kenyir Lake use either for mode of transport, leisure activities and for income generation. This study established that the use of boats and navigation play a key role and is the main economic driver for Kenyir Lake. This is where the primary gap exists in terms of navigation system on the lake. Though the State Government through KETENGAH has been proactive in its development, a proper navigation system is not yet available. Apart from the signboards that was erected to show distance and direction in general, no proper AtoNs exists. The red buoys that was deployed in high traffic areas does not conform to standards and merely functions as route markers.

Incidences such as the capsized catamaran in Sabah involving 28 Chinese tourists with 3 dead and 6 missing will have negative repercussions for Malaysia’s tourism and governance in general (The Star, 2017). Kenyir Lake must eliminate these risks which are associated with navigation and boat safety. Navigational safety of Kenyir Lake is a crucial part in the protection of the lake’s environment and infrastructure, including water crafts but primarily for Lake User’s safety through elimination of risk. This could be remedied by instituting navigation practices that conforms to standards and convention. The use of proper aids to navigation for the lake to ensure safer lake use and by extension helping to preserve the safe and sustainable lake environment which will lead to a more efficient transport system and be beneficial to the tourism industry in general.

Conclusion

Kenyir Lake is a major tourist destination that is continuously being developed with an ever-increasing number of tourists both local and foreign. Commitment and arduous work is required to ensure that Kenyir is developed and remain as a major tourist destination. Developing a regulatory safety navigation framework will

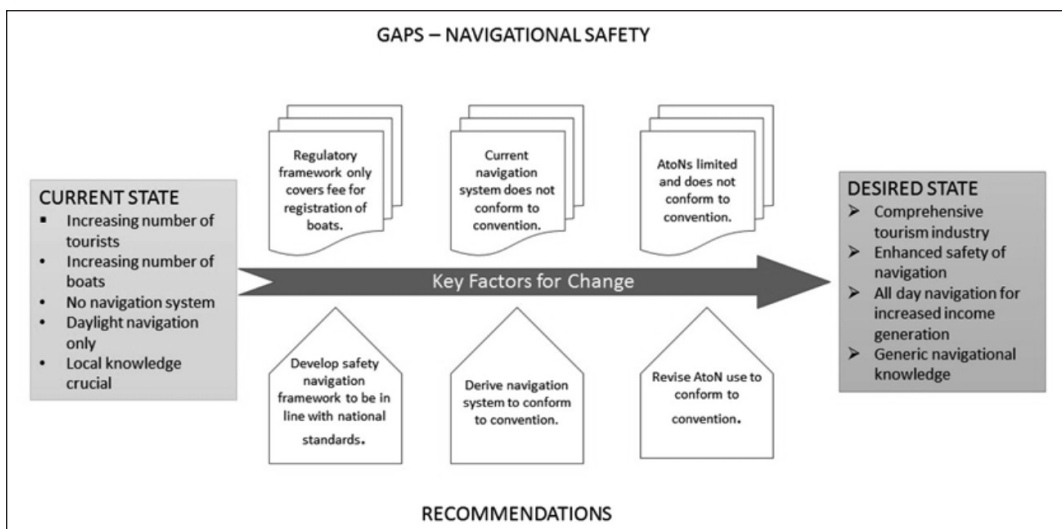


Figure 4: Kenyir Lake navigational safety gaps

take time and effort. In the short term, deriving a safety navigation system and AtoN use that conforms to national standards and convention would be appropriate. Ensuring an innocuous marine environment and inland navigational safety is essential in protecting the national benefits with respect to and inland navigation and societal well-being.

Kenyir Lake will need to consider deriving a standard safety navigation system that is in accordance with accepted convention applied elsewhere in Malaysia. This would provide a systematic approach to lake use and ultimately have positive implication for holistic development of the lake as a major tourist destination that safeguards societal well-being of those engaged in primary activities involving navigation at Kenyir Lake. Local authority and other vested parties should consider steps to enhance navigational safety practices that is the main element on Kenyir Lake especially for tourism management and sustainability and thus safeguard the societal well-being of its user.

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References

- Collier, David. (1993). *The Comparative Method. Political Science: The State of the Discipline II*. American Political Science Association. Washington D.C.
- Frost A. (1983). *The Principles and Practice of Navigation*. Glasgow. Brown, Son & Ferguson.
- Hantrais, Linda (1995). *Comparative Research Methods*. Social research update Issue 13. University of Surrey. England.

- Heycaptain Blog. (2017). *Heycaptain Blog*. Accessed 05 April 2017. <http://blog.heycaptain.fr/entree-et-sortie-de-port-comment-ne-pas-ruiner-son-bateau-en-deux-coups-de-cuiller-a-pot/>
- Hijjas Kasturi Associate Sdn. (2001). *Putrajaya Lake Use And Navigation Master Plan*. Kuala Lumpur.
- House, David J. (2007). *Ship Handling. Ship Handling and Manoeuvring*. New York. Routledge.
- International Association of Lighthouse Authorities. (2009). *IALA Risk Management Tool for Ports and Restricted Waterways Edition 2*. Saint Germaine en Laye, France.
- International Maritime Organisation. (1972). *International Regulations for Preventing Collisions at Sea 1972. Rule 1: Application*. London. IMO.
- International Maritime Organisation. (2017). *About IMO*. Accessed 16 April 2017. <http://www.imo.org/en/About/Pages/Default.aspx>
- Kawulich, B. (2005). *Participant Observation as a Data Collection Method*. Forum Qualitative Sozialforschung / Forum: Qualitative Social Research, 6(2). doi:<http://dx.doi.org/10.17169/fqs-6.2.466>
- Lavery, H. I. (1984). *Shipboard operations*. London: Heinemann.
- Lembaga Kemajuan Terengganu Tengah. (2017). *About KETENGAH*. Accessed 06 February 2017. <http://www.ketengah.gov.my/latar-belakang>
- Lembaga Kemajuan Terengganu Tengah. (2106). *Tasik Kenyir Tourism Information*. Accessed 10 February 2016. <http://www.ketengah.gov.my/>
- Lembaga Kemajuan Terengganu Tengah. (2016). *Tatacara pengurusan dan pengendalian pengangkutan air di Tasik Kenyir*. Terengganu
- MacElverey, D. H. (1988). *Shiphandling for the Mariner*. Maryland. Cornell Maritime Press.

- Majlis Daerah Hulu Terengganu. (2016). *Kategori dan Bilangan Pengangkutan Air Tasik kenyir*. Terengganu.
- Majlis Daerah Hulu Terengganu. (2017). *About Majlis Daerah Hulu Terengganu*. Accessed 06 February 2017. <http://www.mdht.gov.my/ms/mdht/profil/objektif>
- Majlis Daerah Hulu Terengganu. (1989). *Warta Kerajaan. Enakment Lalulintas Sungai 1989*. Terengganu.
- Majlis Daerah Hulu Terengganu. (2016). *Daftar Lesen Bot di Tasek Kenyir Tahun 2016*. Kuala Berang.
- Marine Department, Malaysia. (2016). *Quality Policy – Aids to Navigation Systems*. Accessed 13 February 2016. http://www.marine.gov.my/jlmeng/Contentdetail.asp?article_id=233&category_id=2&subcategory_id=3#.Vr7ucFkld2R
- Marine Department, Malaysia. (2017). *Aids to Navigation Unit*. Accessed 17 April 2017. http://www.marine.gov.my/jlmeng/Contentdetail.asp?article_id=237&category_id=2&subcategory_id=30&subcategory2_id=22#AIDS TO NAVIGATION UNIT
- Ministry of Transport, Malaysia. (1952). *Part I, ORD. 70/1952 Merchant Shipping Ordinance 1952 Incorporating latest amendments - Act A1316/2007*. Kuala Lumpur, Malaysia.
- Mohapatra, Niranjan. (2017). *Observation Method*. Accessed 14 April 2017. <https://www.slideshare.net/NIRANJANMOHAPATRA/observation-method-of-research-by-niranjan-mohapatra-mlisignou-142389253>
- Mohd Sharoum, Faizah, Mohd Tajuddin Abdullah, Che Aziz Ali, & Roslina Ismail. (2015). *Geopark Tasik Kenyir*. Penerbit Universiti Malaysia Terengganu. Terengganu, Malaysia.
- National Hydraulic Research Institute of Malaysia. (2010). *Managing Lakes and Their Basins for Sustainable Use in Malaysia -Synthesis Report of Eight Selected Malaysian Lakes and Reservoirs*. Kusatsu, Japan.
- Perbadanan Putrajaya. (2012). *Laporan Tahunan Perbadanan Putrajaya 2012*. Putrajaya, Malaysia.
- Personal Communication. (2017). *KETENGAH official and Kenyir Lake Association Representative*. Terengganu.
- Rene de Kerchove. (1973). *International Maritime Dictionary*. D. Van Nostrand Company Inc. N.J.
- SEALITE. (2017). *IALA Maritime Buoyage System*. Sealite Pty. Ltd. Somerville Vic.
- The Great Lakes. (2016). *GRANDSLACS. Great Lakes St. Lawrence Seaway System*. Accessed 5 April 2017. <http://www.grandslacs-voiemaritime.com/en/navigating/aids-to-navigation/index.html>
- The Star. (2017). *Sabah boat mishap*. Accessed 01 February 2017. <http://www.thestar.com.my/news/nation/2017/01/30/sabah-rescued-tourists-receiving-treatment/>
- World Health Organisation. (2012). *Health Systems, Health, Wealth and Societal Well-being. Assessing the case for investing in health systems*. Berkshire, England. McGraw Hill Open University Press.