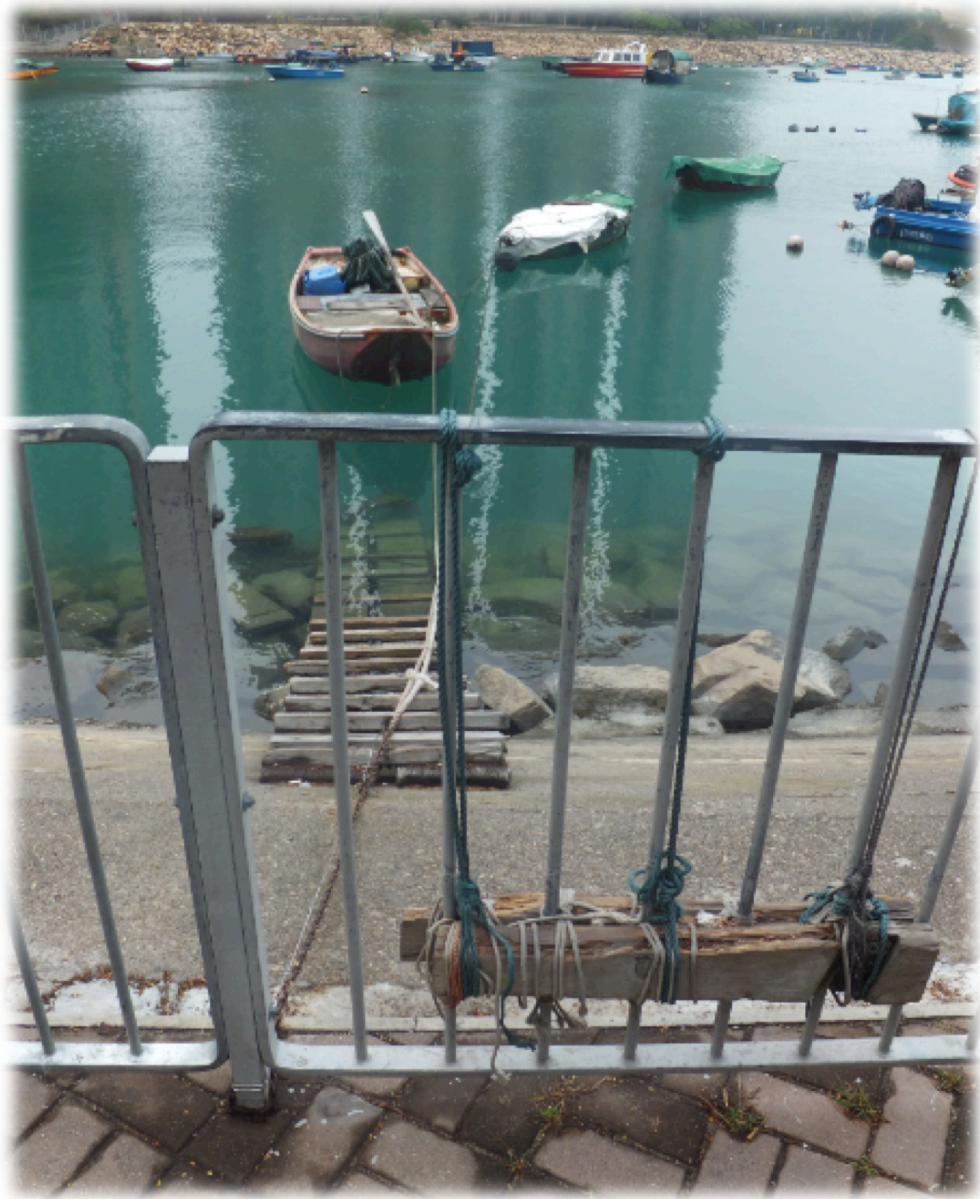


Boating Left High and Dry: A Feasibility Study of Publicly Accessible Boat Facilities in Hong Kong



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ABSTRACT

In Hong Kong, private boating facilities cater to the elite and public mooring areas serve age-old boating communities, but few mooring options for residents falling between these two categories exist. Additionally, almost all moorings are full. This project sought to make the vibrant waterways of Hong Kong accessible to a larger percentage of the population by determining the feasibility of public-access boat storage facilities. To do so, we recommended feasible locations, operational strategies, and a boat storage facility model.

ACKNOWLEDGEMENTS

The completion of this report would not have been possible without the contributions from many knowledgeable individuals over the past four months.

First, we would like to thank Designing Hong Kong and the Harbour Business Forum for arranging and supervising our project. More specifically, we would like to acknowledge Mr. Paul Zimmerman (DHK), Ms. Brenda Fung (HBF), Mr. Stephen Bradley (HBF), and Mrs. Margaret Brooke (HBF) for all of their guidance, knowledge, and ideas, which helped the team think about our project from different angles.





We also want to thank Sunny Sun and Jane Wang for their help with translating and interviews; without their help the team would have been unable to interview boat owners effectively and efficiently.




Additionally, appreciation is due to the six representatives from various areas of the marine culture in Hong Kong who took time to sit down with us and served as a primary source of information for this project.

Lastly, we would like to thank our three WPI professors, Professors Chrysanthe Demetry, Creighton Peet, and Richard Vaz, who oversaw and helped guide our project. The contributions of Professor Creighton Peet helped guide the team throughout the first two months of the project. Furthermore, our advisors, Professors Chrysanthe Demetry and Richard Vaz, contributed useful comments and guidance to help push our project to evolve into something better.

GLOSSARY

We have prepared a list of words to help visualize and understand terminology utilized frequently throughout the report.

ANCHORAGE	AN AREA CONSISTING OF MANY MOORINGS.
BREAK WATER STRUCTURE OF ROCKS OR CONCRETE (TYPICALLY) THAT IS PUT IN PLACE IN ORDER TO PROTECT AN AREA FROM HARMFUL AND LARGE WAVE ACTION	 <p>(Moatway's Photos, 2007)</p>
BOLLARD USED TO TIE BOAT TO MOORING	 <p>(GeographBot, 2011)</p>
CLEAT USED TO TIE BOAT TO MOORING	 <p>(Shelmet Precision Casting, 2009)</p>
DINGHY SMALL BOAT, TYPICALLY UNDER 15FT (5M) IN LENGTH. THIS COULD BE A MOTOR OR NON-MOTOR BOAT.	 <p>(Boatdesign.net, 2007)</p>

<p>FORKLIFT</p> <p>USED TO MOVE BOATS BETWEEN DRY STACKS AND WATER SLIPWAY.</p>	 <p>(Direct Industry, 2012)</p>
<p>LINES</p> <p>ROPE</p>	 <p>(Cakitches.com, 2012).</p>
<p>SLIP/BERTH</p>	<p>AREA WITHIN A PONTOON MOORING TO PARK A BOAT.</p>
<p>STACKER CRANE</p> <p>USED TO MOVE BOATS BETWEEN DRY STACKS AND WATER SLIPWAY.</p>	 <p>(Lakeshore Dry Storage Marina, 2008)</p>

EXECUTIVE SUMMARY

The English translation of Hong Kong is “fragrant harbour,” and with good reason; Hong Kong is rich in vibrant waterways. These waterways are home to many commercial and recreational boating activities, although the growth of the Hong Kong recreational boating industry has come to bottleneck over the past decade. New marinas or boat mooring facilities have not been built in Hong Kong since a boating industry boom in 1990. The existing mooring facilities are all left over from the industry boom; these facilities include expensive private clubs, catering to the elite of Hong Kong, public mooring areas that cater to the communities in existence for many years, and a limited number of marine department private moorings. Currently, all of the berths at private facilities are nearly full and the Marine Department private moorings are 95% full.

Designing Hong Kong and the Harbour Business Forum believe that a potential solution to the lack of berthing space would be implementing a public-access boat club. In order to help lay the framework for this future solution, we sought to **determine the feasibility of public-access boat storage facilities in Hong Kong.**

METHODOLOGY

In order to fulfil our project goal, we completed the following research objectives:

1. *Determine feasible operational models for a public-access boat storage facility, including costs, revenues, and operational strategies.*
2. *Characterize the demand for a public-access boat storage facility from the present, but not yet apparent, market.*
3. *Identify locations suitable for sustaining a public-access boat storage facility.*

To determine feasible financial models, we conducted interviews with representatives from existing private boat clubs in Hong Kong. Additionally, we asked these representatives for their berthing wait list. We used this as one method to analyse latent demand for boating access. Our second method to analyse the latent demand was to conduct interviews with current Hong Kong boat owners. Lastly, to identify suitable locations for a public-access boat club, we used a location analysis rubric to analyse different locations throughout Hong Kong based on the following criteria: water condition, land area, latent population, accessibility, and environmental & urban impacts.

Limitations to the approaches taken included only conducting interviews with a small number of boat facility representatives and only analysing ten sites throughout Hong Kong.

FINDINGS

The following findings emerged from our analysis:

- 1. Of the ten analysed locations, five have promising characteristics for sustaining a public-access boat club.** Of the ten locations analysed around Hong Kong, we concluded that Science Park, Sam Mun Tsai, Kwun Tong, Causeway Bay-Wan Chai, and Tai Tam Harbour are the most promising locations for sustaining a public-access boat club based on the selection criteria (see Table 1 for more details).

Table 1: Description of promising features and challenges of each recommended location

Location	Promising Features	Challenges
Tai Tam	Large Water Area	Nearby Environmental Protection Areas truly
Causeway Bay-Wan Chai	Easily Accessible Moderate Water Area	Construction of Wan Chai Bypass Existing Recreational Boating Facility
Kwun Tong	Large Water Area Available Land Existing Breakwater	Promenade plans
Sam Mun Tsai	Existing Breakwater Moderate unused water area Promotion of tourism	Lacking repair facilities
Science Park	Large unused water area, Lacks environmental concerns developer interest	Lacking repair facilities Needs a breakwater

- 2. Owners of boats moored publicly/informally do not see the need to protect their boats from degradation, because their boats are inexpensive and easily replaced.** These boat owners are currently satisfied with their mooring situation and do not see the need to pay for boat storage at a public-access storage facility.
- 3. Owners of boats not moored at private clubs have an interest in an affordable public-access boat facility.** These boat owners currently spend little money to store their boats in Marine Department private or public mooring areas. These boat owners expressed an interest in using a public-access boat facility and in maintenance services if available.
- 4. The demand for moorings seen from private club waiting lists is very high and the private clubs currently do not have the capacity to accommodate all boats on the list.** The waiting lists data shows that there is a great demand within the private clubs for moorings.

5. **There is a large potential market in Hong Kong for boats 16ft to 25ft.** Statistics from Turkey and Florida's boat industry show the ratio of family size boats (16-25ft) to large boats (26-39ft) is ~6:1, but the ratio in Hong Kong is ~1:4. If Hong Kong had more public storage options, there may be a potential for an untapped market of over 13,000 boats in the 16-25ft range.
6. **Major costs associated with a boat facility include the initial construction of moorings and repair & maintenance of marine hardware.** The largest cost associated with a boat club is the initial cost of construction and purchasing new materials and hardware. This will cost at most ~HK\$1.2 million per berth. After the initial construction, repair and maintenance of marine hardware is the biggest operational expense; this hardware must typically be replaced every 10-20 years.
7. **There are four commonly used mooring strategies in Hong Kong, each with its own distinct benefits.** The strategies are dry stacking, swing mooring, fore and aft mooring, and pontoon mooring. Dry stacking is best for small boats (<35ft); swing mooring is the least expensive strategy; fore and aft is the most space efficient; and pontoon mooring offers the most safety.
8. **Skilled workers are becoming scarce in the Hong Kong boating industry.** We found that there are few pathways for the younger generation of Hong Kong to enter the boating industry. Currently, the youngest skilled workers at private facilities we visited are around 30 to 35 years of age.

RECOMMENDATIONS

Our findings have helped develop the following conclusions and recommendations for Designing Hong Kong, the Harbour Business Forum, and any other interested party.

1. **We concluded that a service gap exists between free public mooring areas and private clubs.** There are currently free public moorings areas for communities that have been in existence for many years, and private clubs serving the elite of Hong Kong. The Marine Department's private moorings fit the gap between these two options but the moorings are operating at 95% capacity. The Marine Department also has no plans to expand the private moorings. Therefore, there is an existing gap between the high-end and low-end facilities.
2. **We concluded that start-up costs will be high and will require the cooperation of government and charitable organizations.** The start-up cost for a boat storage facility is exorbitant without any financial backing, because of the high cost to construct the necessary infrastructure. By creating a hypothetical scenario, we estimated the start-up cost for a 200-berth dry rack facility will be ~HK\$18.3 million.

3. **We recommend that Tai Tam Harbour, Kwun Tong, Causeway Bay-Wan Chai, Science Park, and Sam Mun Tsai be considered as locations for public-access boat clubs.** Each location was determined as suitable because of its promising features described in Table 1. To overcome locations' challenges, we made additional recommendations to improve feasibility.
 - a. *A new boating facility in Tolo Harbour be supported by expanded boat maintenance facilities.* There are inadequate repair facilities in Tolo Harbour and boats in this region must go to Sai Kung for repairs. Therefore, Tolo Harbour would be a more feasible location if a maintenance facility were established nearby.
 - b. *A new boating facility in Tai Tam Harbour be designed to avoid harming the local community and environment.* Due to nature areas nearby, such as country parks, the construction of a public-access boat club should warrant care to not disturb the pre-existing environment and community.
 - c. *Further research into the Causeway Bay-Wan Chai area before construction of the Wan Chai Bypass is complete due to demand for the area.* The Causeway Bay typhoon shelter is a suitable location, but is nearly full. Although we were unable to analyse due to a current construction project, archival research suggests the former Wan Chai cargo-handling area located next to the typhoon shelter would be equally favourable. Marine manager interviews have also said that this area is being looked at for a marine facility. Therefore, we recommend further research before the current construction of the area is completed.
4. **We recommend that any public-access boat club provide dry racks for boat storage, if the land area is sufficient.** Dry stacking is the preferable method for boat storage up to 35ft, amongst boat owners and representatives of boat facilities. This strategy helps preserve boats and is safe for the vessel and its owner.
5. **We recommend fore and aft mooring be used as the primary wet mooring strategy or be used to reorganize current swing moorings.** Fore and aft needs to be implemented in sheltered waters and is double the cost of swing mooring, but it uses 40% less area than swing mooring making it the most efficient method to increase boat density of an anchorage.
6. **We recommend pursuing discussions to encourage the Hong Kong government to formalize the current unauthorized boat anchorages located throughout Hong Kong.** Regularizing informal moorings will cost the government a minimal amount of money and time implementing basic hardware like concrete stairs and bollards. Formalization will provide also a simple way to produce more safe mooring areas.
7. **We recommend further investigation into the willingness of organizations to finance and operate a new public-access boat facility.**

We were only able to speak with a few organizations on their interests in financing or operating a public-access boat club. Some of these facilities showed interest in being involved, but further research into other organizations willing to finance or operate this new type of facility should be conducted.

- 8. We recommend further study into the lack of skilled marina workers in Hong Kong.** With no new generation of skilled workers coming into the industry, it will be difficult to find skilled workers for a public-access boat club. Therefore we recommend further research into ways to train skilled marina workers in hopes of solving this problem.

We hope that these suggestions can aid Designing Hong Kong and the Harbour Business Forum by providing the necessary framework for their pursuit to make the Hong Kong waterways more enjoyable and accessible to a larger percentage of the region's population.

CONTRIBUTIONS

Each member of the team contributed in completing the entirety of this report. Below briefly explains each member's contributions.

Chelsea Cook

Chelsea served as a primary source for writing drafts. She contributed in writing every chapter and making substantial edits to every draft. She also served as the secretary of the team, compiling sections into full chapters, sending emails to contact sources, and taking notes during interviews and meetings.

Gregory Freeman

Gregory used his knowledge of GIS mapping and understanding of land and structures to contribute a significant amount of knowledge for our location analysis. He also helped a great deal with writing and editing a number of sections in the Background, Methodology, Findings, and Conclusions & Recommendations.

Tyler Wack

Tyler contributed most to being the voice of the team by running a great deal of meetings and interviews. He also used his voice to share many ideas for the team to incorporate into the writing. Tyler contributed to writing and editing some sections of the Background, Methodology, Findings, and Conclusions & Recommendations.

Yanxin Zhou

Yanxin acted as the quiet brains of the team. She had many great ideas to input into her sections. She contributed to writing and editing parts of each chapter. She further contributed a great deal to our data collection by taking responsibility for the boat owner interviews and defining our location analysis rubric.

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1. INTRODUCTION

The world's vast and beautiful coastlines provide opportunities for many businesses, homes, and water recreation. Unfortunately, there is an “overwhelming bulk of humanity concentrated along or near coasts... and as of 1998, over half the population of the planet — about 3.2 billion people — live and work in a coastal strip” (Hinrichsen, 1998). With the bulk of the world's population living near the coast, Goudarzi (2006) says that local governments of harbour cities are finding it challenging to provide the additional infrastructure necessary to meet the demand for waterfront access.

Hong Kong is a densely populated region with vibrant waterways, but is also struggling to meet the demand for waterfront access. Hong Kong has not built any new marinas or boat mooring facilities since a boating industry boom in 1990.



Figure 1-1: Hong Kong resident untying informally moored boat from a fence on a steep slope

According to CNBC/Sail-World Cruising (2011), Hong Kong's stagnant boating industry is causing the region to “lose business...and miss a golden opportunity.” The current existing mooring facilities left over from the industry boom include expensive private clubs and free public mooring areas. Due to few options available, residents not falling into those categories lack formal mooring options to store their vessels. The lack of available boat berths has led to informal mooring strategies, including mooring boats under bridges or tying to trees and fences, as seen in Figure 1-1. Additionally, there is a lack of access to recreational boating activities, further holding back the Hong Kong boating industry.

Some areas of the world have taken strides to make coastline more accessible to the recreational boating community and a larger percentage of the population. One example of this is in the United States, where a boat facility was created to serve as an affordable option to the expensive private clubs of the area in order for everyone in the community to access the water (WPSA, 2011). Another example is in Malaysia, where a number of low cost public marina berths have been constructed in order to encourage more Malaysians to take part in water activities and sports (Ramachandran, 2009).

In Hong Kong, a 2010 study found that urban planners of the region did not collaborate with waterway users in Victoria Harbour during waterfront development, resulting in a scarcity of sheltered anchorages (Bernard, Fallon, Lora, Muir, Rosendahl, Scotta, and Yang, 2010). Lana Lam of the South China Morning Post

(2011) has claimed that prospective boat owners are discouraged by the lack of mooring in Hong Kong and will not buy a boat unless the boat seller or private organization can guarantee a mooring space. Adding to the problem, the Marine Department has stated that the typhoon shelters serve as a “sufficient alternative to marinas” (CNBC/Sail-World Cruising, 2011), suggesting that the government does not see a problem and has no plans to increase boating access. Aside from these few options, little to no research has been conducted to increase berthing space in Hong Kong.

The goal of this project was to determine the feasibility of new public-access boat storage facilities in Hong Kong. This was accomplished by interviewing boat owners to find the demand for public-access boat clubs, interviewing existing boat facility representatives in order to understand the operational aspects of a boat club, and determining suitable locations capable of sustaining a boat club by using a location analysis rubric. The results of this work are intended to help Designing Hong Kong and the Harbour Business Forum make the vibrant waterways of Hong Kong accessible to a larger percentage of the population.

2. BACKGROUND

The Hong Kong Special Administrative Region (S.A.R.) is an area with a rich maritime culture consisting of commercial and recreational boating. This rich maritime culture once had a thriving recreational boating industry, but recently water recreation has become less accessible to the public. There are few facilities that provide secure and affordable organized mooring space; a 2010 Designing Hong Kong study shows that there were 3,700 berths for approximately 9,000 vessels. These numbers prove that there is a lack of berthing space in Hong Kong. Therefore, this chapter seeks to describe boating in Hong Kong and its associated problems, highlight some worldwide attempts to improve boating access, and introduce a vision to increase access in Hong Kong

Throughout this chapter, *public-access boat club* will be used to mean a facility that is accessible, affordable, and usable by the general public. Additionally, *boat club* and *boat facility* will be used interchangeably.

2.1 BOATING IN HONG KONG

The organized and secure boat moorings that exist in Hong Kong are not within the means of most boat owning residents because the number of available berths is far fewer than the number of existing boats (DHK, 2010). The government provides some water access facilities; however, these facilities do not offer any services providing boat storage. In this section, we will look into available boat access options and how they relate to the shortage of berthing space in Hong Kong.

2.1.1 PRIVATE BOAT FACILITIES

In Hong Kong, private boat clubs are commonly used for boat recreation and storage. Byron Perry (2010), writer for Super Yacht Asia Magazine, states that Hong Kong private facilities offer the most secure options for boat storage because their berths are protected from typhoons, theft, and damage. Perry also says that while private clubs are the most secure option for boat storage in Hong Kong, they are also the least available: all of them are nearly full. Private boat club berths, like those operated by Gold Coast Yacht and Country Club in the New Territories West and Hong Kong Marina in Sai Kung, are open to members only; even if one becomes a member of a private marina, berthing space is not guaranteed (DHK, 2010). Private boat facilities that do not have berthing space available defer members to waiting lists, most of which have waits of a few years. The status of waiting lists can be seen in Table 2-1.

Table 2-1: Private boat facility capacities in Hong Kong (DHK, 2010)

Boat Club / Marina Club	Capacity	Status
Aberdeen Boat Club <i>(including Aberdeen, Middle Island)</i>	~200 berths (16' – 65')	Full
Aberdeen Marina Club	170 wet berths (29' – 98') 157 dry berths (14' – 36')	Full
Clearwater Bay Golf & Country Club Marina	300 wet berths (up to 100') 120 dry berths	A few berths (<45') available
Discovery Bay Marina Club	220 berths (29' – 115')	Full
Club Marina Cove	~200 berths (19' – 90')	20 berths (<47') available
Gold Coast Yacht & Country Club	200 berths (up to 230')	6 berths (55' – 61') available
Hebe Haven Yacht Club	213 moorings (14' – 60') 53 berths (32' – 60') 200 <u>hardstanding</u> spaces	Full
Hong Kong Marina	233 berths (16' – 155')	Full
Royal Hong Kong Yacht Club <i>(including Causeway Bay, Shelter Cove, Middle Island, Aberdeen)</i>	~350 moorings (16' – 92') 46 pontoons (16' – 69')	Full
Tai Po Boat Club	~20 moorings ~30 dry berths (up to 19')	2 moorings (19' – 26') available

An article in IBIPPLUS (2011) says that the shortage of berths has caused slip prices to rise to record levels, making private boat facility storage unaffordable to most Hong Kong boat owners. Philip Wong, a spokesperson of the Hong Kong Marine Department, told CNBC “the rental price of berths is justified by the demand” (para. 7). Currently, the monthly mooring fee for a 50ft motor yacht is equivalent to the rental price of a studio apartment in downtown Hong Kong (IBIPPLUS, 2011). Although prices could not be found listed online, a Designing Hong Kong (DHK) study suggests high-end private boat facilities, like Hong Kong Marina in Sai Kung, have an entry fee of HK\$250,000 (2011b). Although the actual mooring fees remain unlisted, an entry fee of this magnitude makes secure moorings at Hong Kong Marina, and other similar facilities, may be unaffordable for middle-to-low income Hong Kong boat owners.

Adding to the problem of mooring shortage, Wong argues that typhoon shelters have already provided sufficient alternatives to marinas in Hong Kong (IBIPPLUS, 2011). Perry (2010) states that the lack of berthing space could be solved through the construction of additional boat storage facilities; however, the Hong Kong government is reluctant to allow commercial developers to build more marinas to increase berthing space. He says this because the government views boating in Hong Kong to be an elite activity, and the construction of additional boat facilities could be viewed as reserving more of the public water bodies and shoreline for the higher socioeconomic classes.

2.1.2 LCSD WATER SPORTS CLUBS

Hong Kong’s extensive coastline is home to a number of water sports centres supported by the government’s Leisure and Cultural Services Department (LCSD, 2005). The LCSD administers five water sports centres across the New Territories and Hong Kong Island. These water sports centres are located in Sai Kung, Stanley

Main Beach & St. Stephen's Beach in Stanley, Tai Po, and High Island Reservoir in Sai Kung (shown in Figure 2-1).



Figure 2-1: Map of Water Sports Centres administered by the LCSD of the Hong Kong S.A.R. Government (data acquired from LCSD, 2005)

The LCSD (2005) centres offer a membership program called the Water Sports Membership Scheme. For an annual fee of HK\$100 per person, members are given free access to the centres' day camping facilities, discounts from some equipment suppliers, a newsletter, a calendar, and access to other amenities. Additionally, the LCSD (2005) water sports centres provide access to boats and equipment rental, training programs for children and adults, camping facilities, and tour activities. While the LCSD water sports clubs offer Hong Kong residents a way to enjoy water sports and cater to recreational activity, they do not provide affordable moorings or storage to boat owners.

2.1.3 MARINE DEPARTMENT PRIVATE MOORINGS & PUBLIC MOORING AREAS

The Hong Kong Marine Department (2011a) currently administers two different mooring types: private and public.

Private moorings are moorings rented out by the marine department to either a boat owners or private clubs. Private moorings cost HK\$73-670 per month to rent depending on the length of the boat and water body the mooring is located in (Marine Department 2011a).

A Marine Department representative stated that as of February 2012, there were 41 private mooring areas throughout Hong Kong, collectively providing 1,869 private

moorings; of these 41 areas, only 87 moorings were available, all in Shuen Wan Hoi. The representative further stated that 883 of private moorings are leased to private clubs, including the Royal Hong Kong Yacht Club and the Hebe Haven Yacht Club. The representative stated that there are plans to no longer lease private moorings to the private facilities, in order to open more moorings to the public.

The Marine Department private moorings that are not leased to private clubs are available to any boat owner by application, says a representative. Those who obtain a private mooring are charged fees based upon location and boat length. The fees typically range from HK\$73 per month for a 5-metre boat moored outside of a typhoon shelter to HK\$670 per month for an 11-metre boat moored inside a typhoon shelter (Marine Department, 2011a). The representative mentioned also that the Marine Department is not responsible for the upkeep of private moorings; the users of the moorings are responsible for all maintenance and repair costs on top of the monthly fees. The full breakdown of the Marine Department's private mooring fees can be viewed in Appendix E.

A Marine Department representative stated (Appendix C): *Public moorings* are mooring areas set up by the government many years ago for the protection of vessels during typhoons. Over the years these areas have evolved into locations for free boat moorings storage, with remnants of the old boat villages. Currently, all moorings located within a typhoon shelter are considered to be public mooring areas, with the exception of Causeway Bay and Aberdeen. These two locations have both private and public Marine Department moorings. Public mooring areas are different than private because the Marine Department currently has no specific regulations over who gets a mooring space in the public mooring areas; a representative says they operate on a "first come, first serve" basis. Additionally, the representative said that the only regulations that the Marine Department enforces over the publicly moored vessels are the prohibition of dangerous goods on-board and obstruction of marine traffic.

2.2 EFFORTS TO PROVIDE BOATING ACCESS WORLDWIDE

Public access to recreational boating is becoming increasingly scarce in many locations around the world. An example of this can be seen in the U.S. state of Florida, which like Hong Kong has an extensive, densely populated coastline. In Florida, developers have bought out most of the once existing marinas and have converted them into private slips for condo owners. An article in the Tampa Tribune states that the citizens of Tampa Bay are speaking out and saying "we need to have more access to the water" (Moncada & Wade, 2005, p. 1) and are fighting for more public marinas.

Not only is the lack of public marinas preventing some boat owners from enjoying the water but it is also affecting the commercial fishing industry in Florida (Moncada & Wade, 2005). One citizen from Tampa Bay said "marinas aren't just places where people dock boats. They're centres of coastal commerce — where seafood, fuel, bait, tackle, and other gear are bought and sold" (p. 1) and the commercial fishermen are being pushed out and can no longer survive.

This is just one example of many throughout the world of places in need of a public-access boat facility. There have been solutions to increase recreational boating access throughout the world and some of these solutions will be described in the sections below.

2.2.1 MALAYSIAN GOVERNMENT OPENS UP THE COASTLINE

Being richly endowed with long and spectacular coastlines, Malaysia is a destination for water sports enthusiasts. In order to encourage more Malaysians to take part in water-sporting activities and attract international yachting communities to their shores, the Malaysian government has constructed a number of public marinas (Ramachandran, 2009).

Sonia Ramachandran (2009), journalist for the New Straits Times, says the Marine Department of Malaysia is responsible for managing all the public marinas in Malaysia and is also responsible for maintaining a low cost for public marina berths. She says the public marinas only charge up to 300 Malaysian Ringgit (RM) (~HK\$740) per month or RM20 (~HK\$49) per day to berth a 10-metre yacht. This is in inexpensive compared to the average Malaysian annual salary of RM46,000 (~HK\$ 118,000) (Average Salary Survey, 2012). This means the Malaysians average monthly salary is ~RM4,000 (~HK\$10,000) and a maximum of RM300 is affordable.

In addition to the Marine Department managing public marinas, Ramachandran (2009) says that the private marinas in Malaysia are taking part in the idea of running public marinas. A few Malaysian private organizations have already shown interest in operating some of the public marinas. With private facilities operating public facilities comes a fear of charging excessive fees, but Ramachandran (2009) says that the Malaysian government will ensure that this does not happen. This means that the private facilities will be unable to convert public marinas into for-profit marina facilities and be responsible for running the facility as public.

Although Ramachandran (2009) says that the Malaysian government believes the public marinas are just as safe and secure and “are much cheaper compared with private marinas” (p.1), non-Malaysians are the largest audience utilizing these public marinas. She later states that the Malaysian government is not giving up and is still continuing to encourage Malaysians to get involved in boating activities and to promote sailing as a competitive sport. It is also working on finding new locations and funding for promotional activities (Ramachandran, 2009). The government is still working to promote recreational boating amongst Malaysians by creating boat facilities accessible by the public.

2.2.2 LONG ISLAND BOAT CLUB SERVES AS AN ALTERNATIVE TO EXPENSIVE PRIVATE FACILITIES

Some successful public facilities are capable of running effectively because they utilize volunteers. Wet Pants Sailing Association (WPSA), a sailing club located on

the south shore of Long Island, is an example of a facility that serves as a volunteer-based alternative to the expensive boat clubs in the area. The treasurer of WPSA says that this club is located in an area that is middle-to-high income but was built to serve the middle income families (Questionnaire Response). As found on their website, WPSA's mission is to "provide an affordable opportunity for all people in the community to access the waters of the Great South Bay..." (WPSA, 2011). Therefore, WPSA opens its doors to anyone who is interested in sailing for a reasonable price.

The WPSA Treasurer says that the facility is capable of charging an affordable price because WPSA is "strictly a volunteer organization" (Questionnaire Response). Additionally, the commodore of the facility adds that the club is funded not only by membership dues and sailing school tuition but also by additional fees collected from members who choose to store their boat on the facility grounds (Questionnaire Response). WPSA serves as an alternative option to the existing private clubs in the area, having the main focus of being an affordable organization for people with the common interest of sailing, but cannot afford the expansive private clubs.

Like WPSA, the Port of Egypt Marina Inc., located in Southold on the North Fork of Long Island, is a public boat facility that wants to open up the shorelines to the public. The Port of Egypt Marina Inc. takes the approach of providing inexpensive access to boat rental, without providing storage space for boat owners (Zeller, 2011).

Gregory Zeller (2011), journalist for the Long Island Business News, says that the club aims to get more residents to experience the waters off the northern coast of Long Island. He says that the club was created based on the fact that most people can no longer afford to be boat owners because of the recent recession in the United States. The club owns and maintains the boats and rents them out to members (Zeller, 2011), which can serve as way to increase water access.

2.2.3 PORT HURON, MICHIGAN ESTABLISHES A PUBLIC/PRIVATE PARTNERSHIP

The River Street Marina is a city-owned marina located in Port Huron, Michigan run through a public/private partnership between Acheson Ventures and the city of Port Huron. Anna Townshend (2010), senior editor for Marina Dock Age magazine, says that there could be many benefits of having a public/private partnership. She gives the example of the River Street Marina in Port Huron Michigan; within two years of becoming a public/private partnership, the marina was able to turn a US\$200,000 (~HK\$1,550,000) deficit into a profit.

In the public/private partnership that the River Street Marina operates under, the city of Port Huron and Acheson Ventures seemed to take equal responsibilities (Townshend, 2010). Acheson Ventures maintained the facility in terms of management, administration, maintenance and repair costs while the city handled the major capital improvements. At first, the company funded part of the original upgrades for the marina at the time it took over management while the city was

responsible for funding future upgrades such as electricity service for the marina. The profits from the facility were shared equally between Acheson Ventures and the city of Port Huron.

According to Townshend (2010), the River Street Marina has the capability of continuing to solve the problem of coastal crowding because of good relations with local businesses in the area. She also mentioned that good relations are important because they lead to more of the local population utilizing the facility. Townshend gives the example of the River Street Marina providing boaters with a booklet of information on local merchants and vouchers to attract boaters to visit them. The company also planned to have a shuttle service to transport boaters to those sites.

The success of the River Street Marina and Acheson Ventures is an example of how public/private partnerships can perform in the boating industry. The River Street Marina also serves as another solution to the problem at hand: crowded coastlines leading to a lack of mooring space.

2.3 PUBLIC BOATING AND ITS CHALLENGES IN HONG KONG

Designing Hong Kong (DHK) has a vision for public-access boat clubs and the specific areas that would benefit most. Additionally, there are challenges a public-access boat club will be faced with. Both the vision and challenges will be explained further below.

2.3.1 VISION FOR A SOLUTION: PUBLIC-ACCESS BOAT CLUBS

There is a lack of mooring space available on the coastline of Hong Kong and one solution would be to offer alternatives to the expensive private options. DHK has a vision for an alternative option, a public-access boat club. In a 2010 study, titled *Public Boat Clubs*, completed by DHK, they consider the following list of requirements that satisfy the definition of a public boat club:

- ⇒ Services/Functions
 - Anchorage or rack for boat storage
 - Seabed rights for moorings
- ⇒ Management/Operation
 - Proper management model
 - Operated by a non-profit organization
- ⇒ All of the above available at a low cost

To summarize DHK's definition, a public boat club has wet and/or dry berths for storage (p. 12) and should be operated as a non-profit organization by an existing private organization, the government, or a developer at an affordable price for common users. DHK (2011c) presented Figure 2-2 as an example of the possible features a public-access boat club could have, such as a clubhouse and a slipway. DHK points out that what is shown in this Figure is not representative of all

necessities for a public-access boat club; rather, it shows what an idealized boat club might consist of.

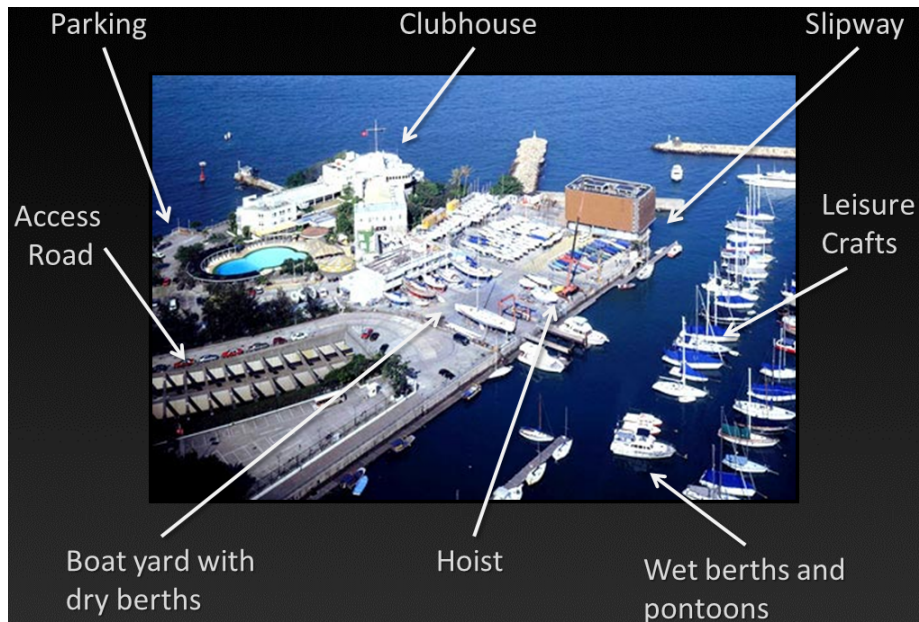


Figure 2-2: Possible Features of a Boat Club (DHK, 2010)

2.3.2 AREAS OF HONG KONG IN NEED

Tolo Harbour, Sai Kung & Clear Water Bay, Victoria Harbour & Junk Bay, Hong Kong Island South, New Territories West and Lantau Island are the six main coastal areas identified by DHK (2010) to be in need of affordable boating facilities. The different regions are pictured in Figure 2-3.



Figure 2-3: Water Bodies in Hong Kong (DHK, 2010)

According to DHK (2010), there are currently twenty-nine facilities offering recreational water activities in Hong Kong: three in Tolo Harbour, ten in Sai Kung &

Clear Water Bay, three in Victoria Harbour & Junk Bay, eleven in Hong Kong Island South, one in New Territories West, and one in Lantau Island. Some of these facilities are owned and operated by the LCSD of the Hong Kong government, some are owned by non-governmental organizations (NGOs), and some are privately owned (DHK, 2010). The location of these water facilities helps to identify regions that might be suitable for sustaining a public access boat club.

2.3.3 CHALLENGES FOR HONG KONG BOATING

According to Byron Perry (2010), the biggest issue facing the Hong Kong marine industry is the shortage of berths. Perry suggests that the government will be the largest obstacle to overcome because they have been unsupportive of any proposed boat club plans due to their view that boating is as an elite activity. Perry adds to that statement by saying that to overcome this challenge, any new marine plan must consider the average Hong Kong resident.

Another challenge will be balancing the different laws and regulations from the four governmental agencies that control boat owners, boat facilities, and the water & seabed that a boat facility will utilize. These four governmental agencies are The Marine Department, the Lands Department, the Development Bureau, and the Agriculture, Fisheries, & Conservation Department (AFCD). The ports of Hong Kong are controlled by the Marine Department (2011a); the Lands Department (2012) indirectly affects boat storage costs. The Development Bureau (2011) focuses on the planning of Hong Kong's development and the AFCD (2012) controls the marine parks and protects the local ecology from development and overfishing. With all of these government organizations having an influence over boating, it can be a challenge to meet the demands and needs of each.

Additionally, a study completed by DHK in 2010 forecasts that the demand for berths is expected to exceed supply by 2015 (see Figure 2-4) suggesting that the mooring areas open to the public will not serve as a solution to the shortage of berthing spaces. DHK (2010) suggests that the challenge will be overcoming this demand. This is because Marine Department representatives (Appendix C) say that Hong Kong has enough private and public moorings to meet the demand until 2025 and there are no plans to implement more moorings in the near future.

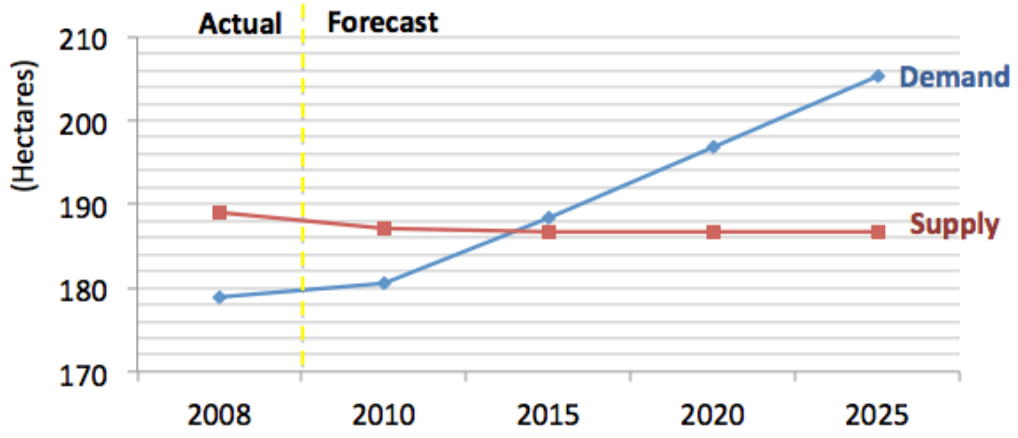


Figure 2-4: Forecast of demand and supply of sheltered space for pleasure vessels (DHK, 2010)

3. METHODOLOGY

The goal of this project was to determine the feasibility of public-access boat storage facilities in Hong Kong. To achieve this goal, we set the following research objectives:

1. *Determine feasible operational models for a public-access boat storage facility, including costs, revenues, and operational strategies.*
2. *Characterize the demand for a public-access boat storage facility from the present, but not yet apparent, market.*
3. *Identify locations suitable for sustaining a public-access boat storage facility.*

The sections below detail the methods we used to achieve these objectives during our project.

3.1 DETERMINING THE OPERATIONS OF A BOAT CLUB

The successful operation of a public-access boat club is dependent on two factors: a feasible financial strategy and an organization willing to operate the facility. For a financial strategy to be feasible, the facility's operational expenses need to be supported by sufficient revenues such as berthing fees or membership dues. To determine the necessary revenue required to make this facility financially feasible, we sought to estimate the approximate start-up and operational expenses of a boat storage facility by answering the following questions:

1. *What are the start-up expenses associated with wet berthing boat storage?*
2. *What are the start-up expenses associated with dry berthing boat storage?*
3. *What are the operational expenses involved in boat storage facilities?*
4. *What are the revenue streams available to boat storage facilities?*

In order to explore the willingness of an organization to operate a public-access boat storage facility, we further looked to answer the following question:

5. *Who would be willing to operate a public-access boat club in Hong Kong?*

To answer these questions, we identified various existing boat clubs throughout Hong Kong and approached representatives from each for interviews. In the following sections, we will explain our interviews with these experts in detail.

3.1.1 EXPLORING COSTS AND REVENUES OF BOAT CLUBS

To gain an understanding of the financial obligations of a boat club, we contacted ten Hong Kong boat facilities in order to complete interviews with representatives or members of their facilities. We chose boat facilities covering each of the five regions designated by Designing Hong Kong: Hong Kong Island South, Victoria Harbour & Junk Bay, Sai Kung & Clearwater Bay, Tolo Harbour, and the New

Territories West. By choosing facilities from all of these regions, we sought to obtain a more diverse set of responses.

We developed an interview protocol to facilitate gathering the following information from each boat club representative:

- **Major areas of expense for marine operations.** We asked each representative, who is also expert in marine facilities, to identify the major areas of expenses within the initial set-up and operations of a boat storage facility. We expected that these areas might come from the cost of wet berth and dry berth maintenance and construction, leasing fees for land and seabed, and marine personnel salaries. To account for unanticipated expenses, we conducted this section of the interview using open-ended questions. We also asked which expenses could be considered optional to the core operations of a boat club because a public-access boat storage facility needs to be financially efficient to run feasibly.
- **Revenue streams for marine operations.** We asked each representative to identify the various revenue streams for their marine operations. We paid specific attention to what proportion of marine revenue is obtained through membership fees and if other areas of the boat club needed to subsidize the marine operations.

The full boat facility representative interview protocol can be found as Appendix A.

In analysing the financial information gained during interviews, we compared the expenses and revenues associated with the essential boat storage services (e.g. various boat mooring strategies) to those associated with the optional services (e.g. boat-side electricity, and food & beverage). This enabled us to compare the different levels of service that boat clubs can offer to the price for membership and berthing at the facility. This information made it possible to evaluate what level of service is feasible for a public-access boat club to offer (different levels of service can be viewed in a spectrum in Appendix I.)

We saw the limitations of our approach to be the number of facilities we were able to interview. We casted our net wide and approached ten facilities but only three granted us interviews. Another limitation of our approach was the sensitivity of boat clubs' exact expense and revenue figures; therefore we expected clubs might only be able to offer estimates of their finances.

3.1.2 DETERMINING WILLINGNESS TO OPERATE A PUBLIC-ACCESS BOAT CLUB

To deduce the existing facilities' willingness to operate a public-access boat facility, we conducted interviews with representatives from existing boat facilities in Hong Kong. In these interviews, we posed the question "for the sake of interest only at this point, would your club be willing to operate a new public boat club?" Thus, we were able to understand the existing facilities' willingness to operate a new public-access

boat club. We also were able to understand what these facilities believe are the most important factors in running a public-access boat facility.

Being able to meet with only a few representatives from existing facilities in Hong Kong served as a limitation to our approach. Additionally, the facilities the interviewees represented are high-end facilities, which limited the amount of information that was useful towards a public-access boat club.

3.2 IDENTIFYING THE TARGET MARKET FOR A PUBLIC-ACCESS BOAT CLUB

For a public-access boat club to be feasible, it must have enough paying users to support its operations. To ensure that there are enough users, we sought to identify and characterize a target market of boat owners by answering the following research questions:

1. *What type of boats do Hong Kong boat owners use?*
2. *How do Hong Kong boat owners use their boats?*
3. *Where do Hong Kong boat owners currently store their boats?*
4. *How much do Hong Kong boat owners spend on boat storage?*

To gauge the market size, meaning both existing and potential boat owners, we used the following research question:

5. *What is the scale of demand for berthing by Hong Kong boat owners/potential boat owners?*

Finally, to determine the level of revenue a public-access boat storage facility might expect from its users, we found answers for the following research question:

6. *What is the willingness to pay of Hong Kong boat owners/potential boat owners for organized moorings?*

We took three approaches to answer our research questions: conducting interviews with existing boat owners, analysing waiting list data of existing private boat facilities, and performing research into international boating trends. The details of these approaches are explained in the following sections.

3.2.1 CHARACTERIZE DEMAND OF EXISTING BOAT OWNERS

To characterize the demand of existing boat owners, we conducted interviews at several public mooring areas and typhoon shelters in Victoria Harbour & Junk Bay, Hong Kong Island South, and Tolo Harbour. Using our interviews we sought to gather information in following areas:

- **Vessel Characteristics:** We asked boat owners what the lengths of their vessels were to estimate the length of berths that are in demand. To classify

- boat owners as recreational users and commercial users, we asked them what they used their boats for and how frequently they used their vessels.
- **Current Boat Storage Conditions:** We asked boat owners where they currently moor their boats and how much they pay to store their boat. This information helped characterize the storage conditions of existing boat owners.
 - **Interest in Public-Access Boat Clubs:** We asked boat owners how much they might be willing to pay for an organized mooring space, such as in a public-access boat club. This help gauge boat owner interest in public-access boat clubs. Boat owner willingness to pay also helped to estimate what would be a feasible berthing fee for a public-access boat club.

The full boat owner interview protocol can be found in Appendix B.

Since we did not have any source of contacting boat owners, we decided to walk around coastal areas where boats are currently moored in order to catch boat owners to interview when they came off of/went to their boats. In order to better communicate with boat owners, many of whom speak Cantonese, we had our interviews translated into traditional Chinese characters.

We used the information gathered above to create simple profiles of existing boat owners based on their: current storage situation, typical boat type, typical boat uses, boat length, and current monthly berthing fee. This made it possible to divide boat owners into groups in order to analyse their willingness to pay and the potential demand for a public-access boat club.

Due to our inability to visit all the mooring areas in Hong Kong, we were limited in the diversity of the responses we could gather from boat owners. Therefore, the information we gathered was not representative of all boat owners in Hong Kong.

3.2.2 CHARACTERIZE DEMAND OF POTENTIAL BOAT OWNERS ON WAITING LISTS

To supplement our characterization of existing boat owners, we sought to gather information from waiting lists of private boat facilities. We believed that people on waiting lists are potential boat owners, meaning they either want to buy a boat if a mooring becomes available, or they want to move their vessel to another facility/better berth. We also believe that these people represent a demand for moorings. We asked the three interviewed private boat facility representatives for information on their waiting lists, including boat length, requested berth length, boat type, and mooring location.

We sought to gather different information from the waiting lists than from our interviews because we were unable to speak to the people on the waiting lists. From the waiting lists, we looked to extract the following information:

- **Market Size:** We estimated the market size of the potential boat owners by counting the number of entries on each waiting list. In doing so, we hoped to

determine if the market size could support a new public-access boat storage facility.

- **Demand for Berth Type:** By examining the desired berth length on waiting list, we hoped to determine the scale of demand for berth size. We also looked at the type of boat in order to determine the appropriate mooring strategy.
- **Willingness to Pay:** Since the potential boat owners must be members of the club to be on the waiting list, we assumed that they have financial ability to afford the club's moorings fees. We researched the private facility's berthing fee for each size of berth. We considered this fee, without the monthly club fees, as their willingness to pay for boat storage.

We sought to determine the feasibility of a public-access boat clubs from a demand perspective by using the previous method. We also created a profile for these potential boat owners in order to compare it to our profile of existing boat owners mentioned in the previous section.

The limitation of this approach is that we were only able to obtain waiting list information from the three private boat facilities we interviewed. In addition, these three facilities are representing the elite of the Hong Kong boating facilities, and therefore their waiting lists are not representative of potential boat owners in Hong Kong.

3.2.3 CHARACTERIZING TRENDS IN BOATING

Our research suggests the high price of mooring may be discouraging potential boat owners from purchasing a boat, therefore we researched vessel length data from areas throughout the world in order to characterize berth size demand. The data from these regions were used to understand a market segment that we were not able to fully characterize using the previous methods.

Once the boat length distribution data was gathered, we could estimate what a typical boat length distribution might be elsewhere in the world. Then, using the registered number of sampans and the private waiting list data we estimated the Hong Kong distribution of boat lengths. We compared the international distributions with Hong Kong's estimated distribution to see how the trends differ.

The limitation of this method is that each boating region has a unique history. This approach means that we assume that each region has a similar level of access to the water, and a similar level of water access may not be the case in all the regions.

3.3 IDENTIFYING SUITABLE LOCATIONS

In order to determine suitable locations for a new public-access boat storage facility, we evaluated ten potential locations identified by Designing Hong Kong. Our evaluations assessed the quality of a location using a set of criteria we developed. This set of criteria included water conditions, land area, accessibility, and the latent

market present at each site. In the following sections, the criteria and how they were evaluated will be explained in detail.

3.3.1 CRITERIA OF LOCATION ANALYSIS

To aid in our evaluation of the ten potential locations, we developed a set of criteria to organize our findings. These criteria are as follows:

- ⇒ **Water Conditions:** To evaluate the water body at each location we looked at four different qualities of water condition:
 - **Area:** The total water area of a location affects the number of boats that a facility could potentially store using wet mooring strategies. The water area also affects the allowable level of boat traffic at the site.
 - **Depth:** The water depth at a site influences what type of mooring is possible and how many boats can fit in the area. If there is insufficient water depth, moorings cannot be implemented and therefore boats cannot be moored. Water depth also affects the type of boat that can be stored. Inboard engine boats need deeper water than outboard engine or non-motor boats. This could be a limiting factor for a boat storage facility because it would prevent certain types of boats or moorings from being used.
 - **Wave Action:** Wave action is an important factor because the wave attenuation in a location could damage a boat moored there; boats can be damaged either by hitting other boats or hardware, or by breaking free of the moorings. Further, Hong Kong experiences typhoons and a location within a typhoon shelter would reduce the wave action and protect the boats in an area year-round.
 - **Water Quality:** We defined water quality to be the cleanliness of the water body. We observed the amount of garbage present in and around the water body, and the proximity of sewage drains to the water body. We also observed whether or not the water was clear or it was polluted by oil or fuel. The smell and any other information we could gather regarding the toxicity of the water was also taken into account.

- ⇒ **Land Area:** The land area affects the number of landside support facilities a site could accommodate and the feasibility of dry mooring. We estimated the amount of land available based on the visual inspection of the land, and used of the Hong Kong government's planning GIS site to determine how the available land was zoned.

- ⇒ **Accessibility:** A site's accessibility was defined by two factors: accessibility to the location via public transportation and the number of water-to-land interfaces present to access the water.
 - **Public Transportation:** We gauged access from public transportation because few people in Hong Kong have access to private automobiles; consequently buses and the MTR are the most utilized method of transportation. During analysis, we considered the walking time from the closest MTR station and the length of the bus ride to the location.

Additionally, any location requiring a bus ride was considered less accessible because it decreases the convenience of access.

- **Water Access:** To define water access, we considered the ease of transition to the water through hardware like ladders or pre-existing piers. A full list of the land-water interfaces we looked for can be found as Appendix F.

⇒ **Latent Demand:** In order to estimate an area's existing interest in a public-access boat storage facility, we sought to estimate latent demand. To do this, we took a rough count of the number of boats present in a location during analysis. We also estimated the recreational population in the area by looking for existing recreational facilities, like harbour-front promenades or boat rental facilities.

⇒ **Other (Ecology & Urban Plan):** Within this criterion, we judged how a new boat storage facility might affect the local ecology or conflict with the city's urban plan. If the ecology of the area would be affected by a new facility, then building approval might be difficult to obtain. Any building conflict would negatively affect the feasibility of the location because the plans would need to be changed.

3.3.2 LOCATION ANALYSIS RUBRIC

Using our location criteria we developed a simple rubric that we call the Location Analysis Rubric (LAR). We used the LAR as an organizational tool to sort our ratings of each location. In the rubric, each criterion is rated on a scale from 1 to 5, with a score of 1 indicating unfavourable conditions and a score of 5 indicating extremely favourable conditions. A description of each section of the rubric and what each number relates to can be found in Appendix D.

When we visited each location, we conducted a walking analysis using our LAR. At each location, at least two of our group members filled out a blank location analysis form and scored the location on each criterion based on observation. When we could not reasonably rate a criterion from observation, we performed archival research to fill in the gaps (e.g. investigating urban plans, examining government surveys of water depth, using GIS maps to estimate boat densities). This enabled us to clarify the observations of qualities of each location.

During our study, we only visited 10 possible locations across Hong Kong that were identified by Designing Hong Kong (2010) to have "high potentiality" for a new boat club. For this reason, our list of possible locations was not comprehensive and there may be additional potential locations that we did not analyse.

4. FINDINGS

In this chapter we begin by presenting a characterization of current and potential boat owners in an effort to identify the market segments that are not being well served by current boat storage facilities in Hong Kong. We then discuss what operational aspects of a boat facility are needed for success. After, we describe five locations in Hong Kong that we determined to be feasible for sustaining a public-access boat club. Lastly we created a hypothetical scenario to show the financial feasibility of a new public-access boat facility.

4.1 LATENT DEMAND FOR ADDITIONAL BERTHING SPACE

In this section, we characterize the latent demand for additional berthing space in Hong Kong. We provide a classification of current boat owners in Hong Kong and their boat storage solutions based on our interviews with them. Then we look at the waiting lists of two private clubs and finally look at profiles of boating length trends around the world that could be applicable to Hong Kong.

4.1.1 CHARACTERIZATION OF CURRENT BOAT OWNERS

Through our interviews and analysis of waiting list data we were able to identify three distinct categories of boat owners in Hong Kong. Table 4-1 summarizes our characterization of current boat owners in Hong Kong. The rest of this section will provide the evidence for those findings.

Table 4-1 Classification of current Hong Kong boat owners and their storage solutions

Group Name	Owners of Boats Moored Publicly/ Informally	Owners of Boats not Moored at Private Clubs	Owners of Boats Moored at Private Clubs
Current Storage Solution	Public mooring areas, Informal mooring areas	Public mooring areas/Marine Department private moorings	Private boat clubs
Typical Boat Uses	Transport between shore and other boats, small-scale commercial fishing	Recreational fishing, diving, wakeboarding, boat rental	Recreation
Boat Length	5ft - 12ft	20ft - 35ft	26ft - 65ft
Current Monthly Berthing Fee	HK\$ 0	HK\$ 0 - HK\$ 670	>HK\$ 1210

Owners of boats moored publicly/informally are satisfied with their current conditions because they store their boats at little or no cost.

We interviewed 23 owners of boats moored publicly or informally. Most of the interviewees belong to a low-to-middle income level, which means that they had little extra money to spend on recreational boating activities. One older man interviewed mentioned that many boat owners like him are retired, so they have more time for recreational boating activities but no longer make enough money to afford monthly storage fees (see Appendix B-F).



Figure 4-1: Boat owners fishing on their boats for money

About half of the interviewed owners of boats moored publicly/informally used their boats for fishing to earn money, as shown in Figure 4-1. During interviews, the boat owners consistently emphasized the fact that they do not spend any money right now on storing boats. Interestingly, when they told us what factors are important for boat storage, a few of them said price was unimportant. However, they explained this was because that they could still store their boats in some areas for free, no matter what the price of organized storage was. These interviewees made clear that they want to continue to use the unorganized but free moorings.

Owners of boats moored publicly/informally do not see the need to protect their boats from degradation, because their boats are inexpensive and easily replaced.

By choosing informal mooring areas like beaches or under bridges to store the boats, owners of boats moored publicly/informally leave their vessels open to water degradation. However, most of their boats are around 5 meters in length, have outboard motors, and are very inexpensive. One of the interviewees said, “my boat is only a bit more than HK\$1,000. It’s impossible for me to pay the same money for monthly boat storage as my boat.”(Appendix B-F) To these boat owners, it was wiser to purchase a new boat instead of paying to carefully maintain the old one.

Owners of boats not moored at private clubs have an interest in affordable public-access boat facility.



Figure 4-2: Boat owner polishing his speedboat

The four interviewed owners of boats not moored at private clubs used their boats for purely recreational water activities like recreational fishing, wakeboarding, and diving. This group has a different use for their vessels from the mixed commercial and recreational use of owners of boats moored publicly/informally. A small yacht owner we interviewed, who currently spends HK\$7,000 monthly on boat storage, said, “I would like to store my boat in the public club for HK\$2,000 – 3,000 per month. I know that what I spend now is almost the lowest in Hong Kong. I am wondering if there really could be such a cheap club.” (Appendix B-C-1) From his words we infer that he would like a cheaper mooring space like those that might be offered at a public access boat club. His willingness to pay was much higher than the willingness to pay of most of the interviewed owners

of boats moored publicly/informally.

We also saw, in the interviews with owners of boats not moored at private clubs, that there was an interest for dry berths. One interviewee, who is a wakeboarding coach, said that dry berthing is extremely helpful for extending the service life of a boat. He said that boats that are stored in water have to be cleaned, waxed and fixed at least once every six months. Dry berthing prevents water from degrading boats when they are not in use. Figure 4-2 shows a wakeboarder carefully fixing and polishing his speedboat.

Another group that fits in the category of owners of boats not moored at private clubs are the boat rental services. These boat owners rent their vessels to others when they are not personally using them. In Sai Kung, we saw many speedboats and junk boats for rental. However, we didn’t have chance to talk to any of this group of boat owners, so we cannot make any speculations about their interests.

The classification of the boat owners was limited by the small number of boat owners we were able to interview and may not be representative of all boat owners in Hong Kong.

4.1.2 DEMAND FROM EXISTING FACILITY WET AND DRY BERTH WAITING LISTS

We gathered information on waiting lists from two of the three boat facilities we interviewed. This information allowed us to perform further analysis on the latent demand for additional berthing space. Figure 4-3 shows the distribution of boats on the waiting list of the Royal Hong Kong Yacht Club (RHKYC) by berth size and Figure 4-4 shows the distribution of boats on the (wet berth) waiting list of the Hebe Heaven Yacht Club (HHYC) by berth size. As can be seen from the charts, around 30% of boats on the waiting list of the RHKYC are 35ft or smaller; and for the HHYC, the number is 12%.

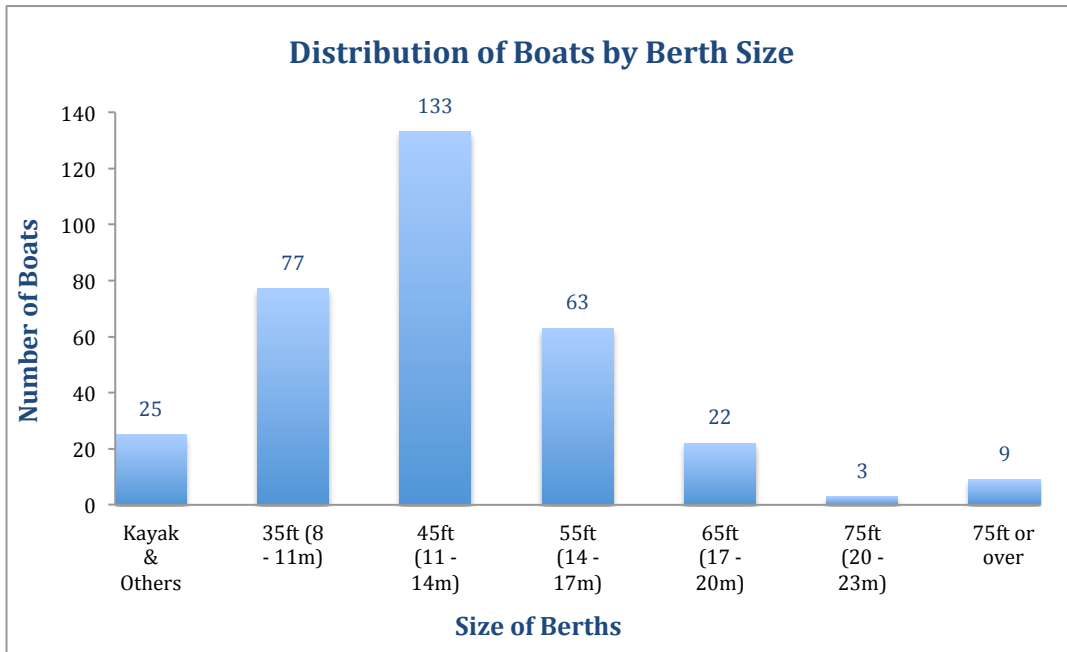


Figure 4-3: Distribution of boats on waiting lists of RHKYC by berth size

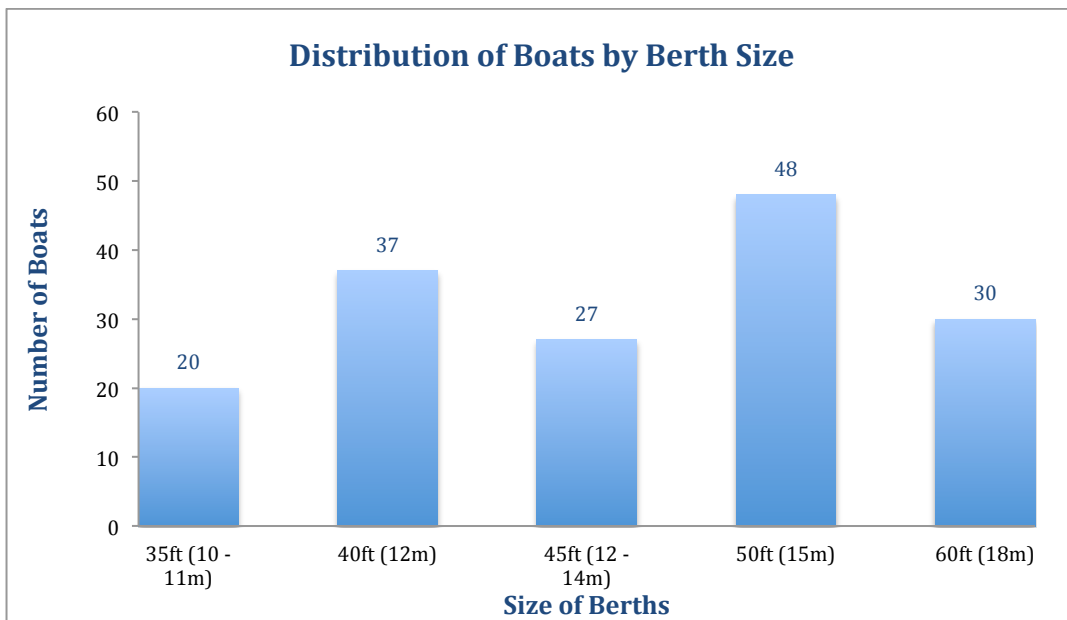


Figure 4-4: Distribution of boats on waiting lists of HHYC by berth size - wet berth

Owners of boats moored at private clubs tend to have larger boats than the other two types of boat owners, and do not represent the low-to-middle income boat owners that DHK/HBF seeks to serve.

By looking at Figure 4-3 and Figure 4-4, we found that most owners of boats moored at private clubs tend to have boats of length around 50ft (15m). The price of a 50ft motor yacht is over HK\$1.5 million at Saffron Marina in Hong Kong (Saffron Marina Limited, 2012). This is not affordable for low-to-middle income Hong Kong residents. As a result, we put more focus on boat owners who request berth sizes of less than 35ft when we make recommendations.

The demand for moorings seen from waiting lists is very high and the private clubs currently do not have the capacity to accommodate all boats on the list. The RHKYC has over 300 entries on its waiting list and around 400 wet berths in total. The HHYC also has over 300 entries on its waiting list and around 400 berths, wet and dry combined. Since these clubs have full berths, neither club can currently provide accommodations for vessels on their waiting lists.

Figure 4-5 below shows the distribution of boats on the (dry berth) waiting list of the HHYC. As can be seen, there are as many boats waiting for dry berths as boats waiting for wet berths in the HHYC; those boats are small and can be affordable for low-to-middle income people. This suggests dry berthing facilities are also in need to accommodate more boats, especially boats under 35ft.

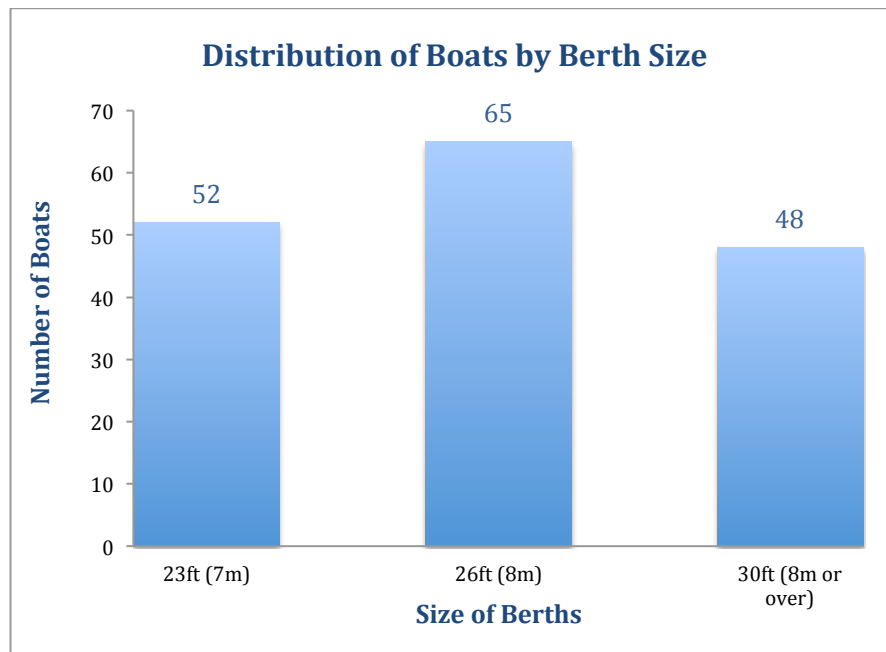


Figure 4-5: Distribution of boats on waiting lists of HHYC by berth size – dry berths

One important factor to note is that some entries on the waiting lists may come from the same individual. This happens because the boat clubs have several different mooring options. Therefore, one person may be waiting for two different mooring options. The RHKYC informed us it has around 95 individuals on the waiting list, accounting for duplicate entries.

4.1.3 CHARACTERIZING THE POTENTIAL MARKET BY BOAT LENGTH

In this section we make the claim that there is a large enough number of potential boat owners in Hong Kong, creating an untapped market for mooring between the private clubs and public mooring areas.

There is a large potential market in Hong Kong for boats in the 16ft to 25ft length range.

We illustrate boating data from other regions into charts showing the number of pleasure vessels in a region by boat lengths. To allow for comparison of the data, we

organized the boating data into a standard set of boat length intervals. Some of the boating data used boat length intervals that overlapped our standard intervals. For these sets, we placed the data from the original length interval into the higher (i.e. longer) overlapping standard length interval. (e.g. *original interval: 10-15ft, standard intervals: 8-12ft & 13-18ft*. The data from the *original interval* would be placed into the *13-18ft* interval of the standard set.)

Organizing Hong Kong’s boating data required additional analysis because Hong Kong does not register boats by length but rather by boat type e.g., sampan or cruiser. From our interviews of marine professionals, we learned that sampans typically are between 9ft and 15ft long. To organize sampans into our standard intervals, we split the number of registered sampans between the <12ft and 12-15ft intervals. To organize the registered pleasure vessels, we assumed that the waiting list from the private clubs were representative of the overall distribution of pleasure vessels in Hong Kong. Using this assumption, we applied the distribution to the number of registered pleasure vessels in order to organize them into our standard boat length intervals.

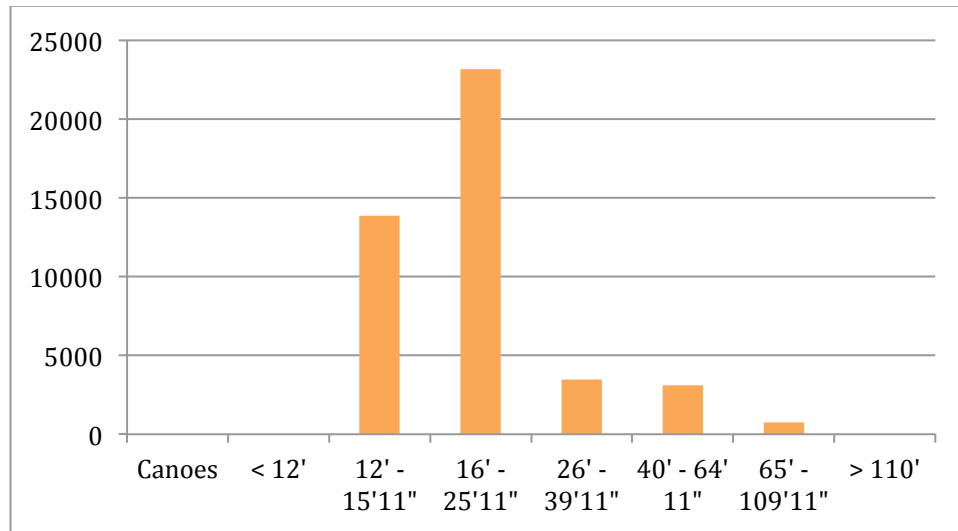


Figure 4-6: Number of registered pleasure vessels in Turkey by boat length (data from Innovation Norway, 2010, p.62)

Florida and Turkey are two regions with long coastlines and presumably abundant access to boating. Figures 4-6 and 4-7 show that, in Florida and Turkey, the pleasure vessel lengths that are most prevalent fall within the 16-26ft range. This implies that, in regions where boating is accessible, the 16-26ft range may be the most common size of pleasure boat to expect within the market.

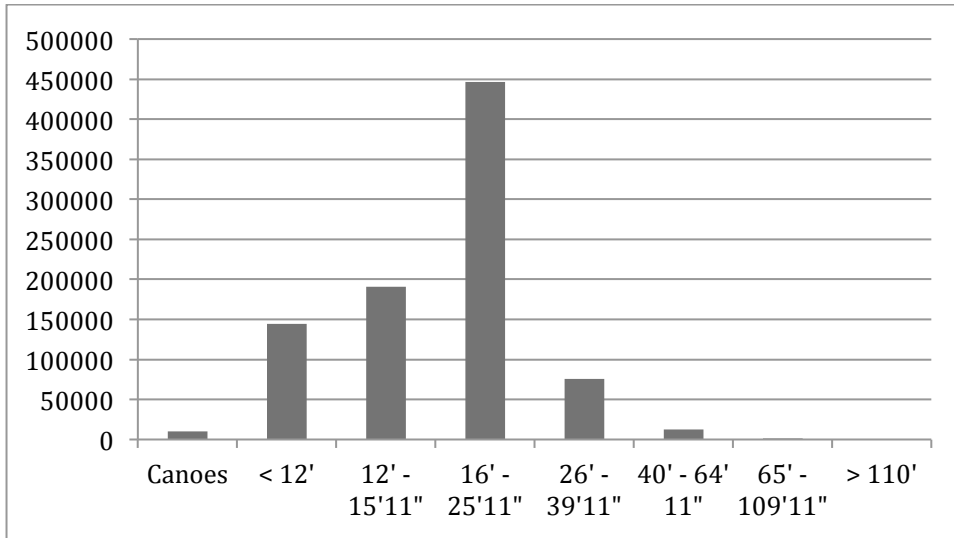


Figure 4-7: Number of registered pleasure vessels in Florida by boat length (data from Florida Office of Highway Safety and Motor Vehicles, 2011)

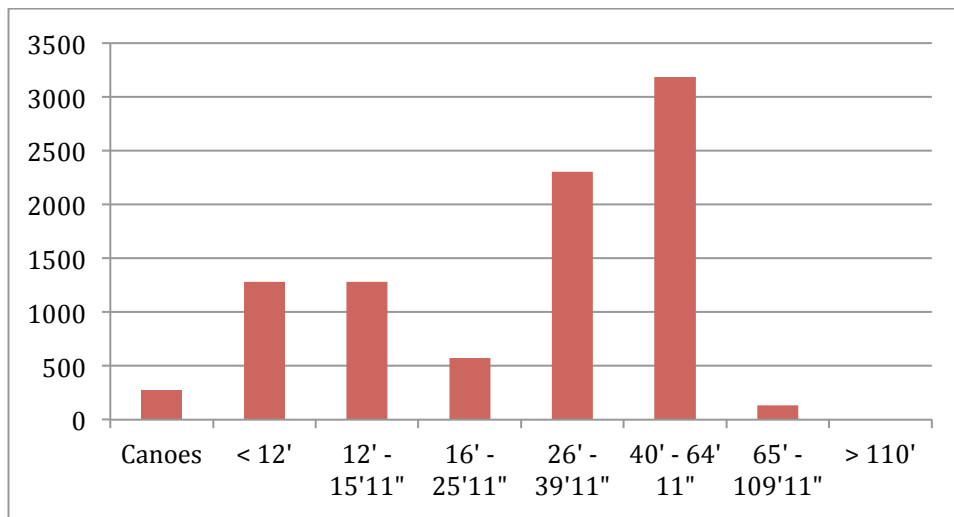


Figure 4-8: Estimated number of registered pleasure vessels in Hong Kong by boat length, assuming private boat club waiting lists are representative of the overall distribution

Figure 4-8 shows an estimate of number of pleasure vessels and sampans in Hong Kong by their length. This estimate is based on the assumption that the distribution of boat lengths on waiting lists from private boat clubs is representative of the overall distribution of pleasure vessels in Hong Kong. Using the waiting lists, we determined what percentage of boats on the waiting list fall into each of our standard boat length intervals. By applying these percentages to the number of registered pleasure vessels from Marine Department statistics, we were able to create the estimate shown in Figure 4-8.

Hong Kong's distribution of pleasure vessel lengths in Figure 4-8 shows that the most common pleasure vessel lengths appear to be within the 26-40ft and 40-65ft ranges. Unlike Turkey and Florida, Hong Kong's 16-26ft range is much lower than the other ranges. The ratio of 16-26ft to 26-40ft boats is also vastly different between Hong Kong and Turkey & Florida. In Turkey and Florida, the ratio is about 6:1 (6.6 in Turkey, 5.9 in Florida) whereas in Hong Kong this same ratio is 1:4. Thus,

if boating in Hong Kong were more accessible, then one could expect a similar ratio and distribution. Assuming this expectation is true, Hong Kong's 600 registered 16-26ft pleasure vessels could hold a potential untapped market of over 13,000 additional pleasure vessels.

4.2 ASPECTS OF BOAT FACILITY OPERATIONS

In this chapter we will describe different mooring strategies and their associated costs, and give a brief description of costs and revenues involved with a boat facility. We will also briefly discuss management interest in operating a public access boat club.

4.2.1 MOORING FEES AND STRATEGIES

In this section we present an explanation and comparison of the four different mooring strategies commonly used in Hong Kong.

There are four commonly used mooring strategies in Hong Kong, each with its own costs and benefits.

There are four primary types of moorings used in Hong Kong: swing, fore and aft, pontoon, and dry racks. Each mooring strategy involves different costs and requires a different amount of space per berth. For a clear comparison of berth size, cost per berth, total cost of a 400 berth facility, and amount of area utilized for each mooring strategy, refer to Table 4-2 below. The numbers in this table are all very rough estimates based off of the marine manager interviews. The table is also based on 35ft berths because we assumed this was the largest berth size that might be used for a public access boat club.

Table 4-2: Costs and comparison for different mooring strategies for 400 berths of 35ft (assuming sheltered waters)

	Cost per berth (HK\$)	Area per berth (m ²)	Cost of 400 berths (millions HK\$)	Area for 400 berths (ha)
Swing	~25,000	110	10	4.55
For & Aft	~50,000	45.5	20	1.82
Dry*	~84,000	16.75	33.6	0.67
Pontoon	~800,000	74.25	320	2.97

***Dry berths are 4 stacks high**

As seen in the above table, each type of mooring strategy is unique relative to cost and space, below we give a more descriptive comparison of each.

- **Swing mooring is the cheapest but least space effective mooring option.** A *swing mooring* has a single buoy anchored to the seabed to which the vessel is attached, as shown in Figure 4-9. Swing moorings are relatively inexpensive to construct (HK\$25,000 per berth). Although swing-moored boats are secure and will not drift into open waters, the boat is free to swing

around the buoy 360°. This vastly increases the water area needed per swing mooring, which makes this mooring strategy space ineffective.

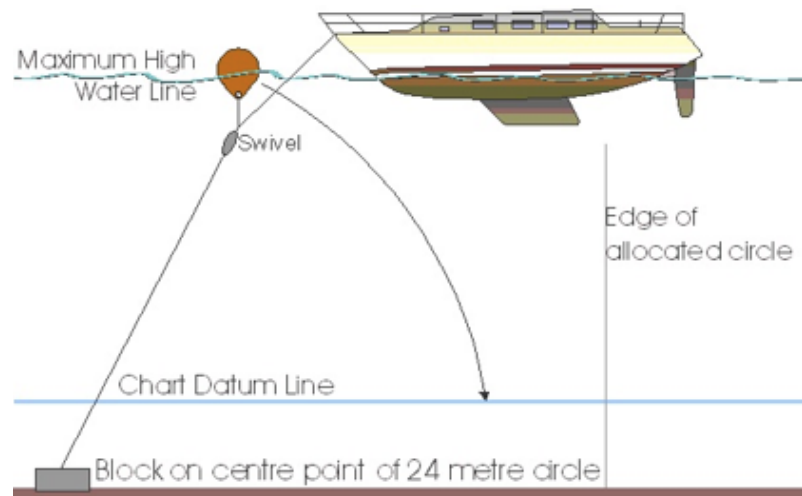


Figure 4-9: Diagram of Swing Mooring (William Hackett Chains Limited, 2012)

- **Fore and aft mooring is the most space effective wet mooring method, but requires a breakwater.**

Fore and aft mooring is similar to a swing mooring except there are two buoys tied together to form an 'X' under the moored vessel, as shown in Figure 4-10. This type of mooring prevents the boat from swinging around when there is a current change in the water, allowing many boats to be moored in close proximity without risk of damage. Fore and aft mooring is extremely space effective, but a breakwater is needed to keep wave action minimal and prevent the moorings from breaking.

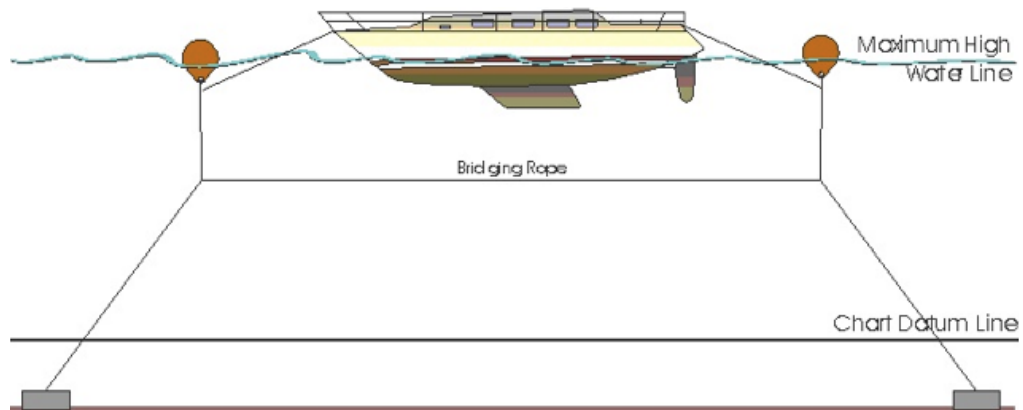


Figure 4-10: Diagram of Fore and Aft Mooring (William Hackett Chains Limited, 2012)

- **Pontoon mooring is the most expensive mooring option but offers the most safety and security.**

Pontoon mooring is essentially a floating dock (shown in Figure 4-11). It is utilized within a marina where the moorings can be protected by a breakwater. Pontoons offer safety and security to boats and boat owners due to having a direct walking path, and having space to not swing into other boats. The hindrance to this strategy is that it takes up more space than fore

and aft mooring, but less space than swing mooring (view Table 4-2 for estimated numbers).



Figure 4-11: Pontoon mooring (Nautic Expo, 2011)

- **Dry berthing requires the least amount of boat maintenance and is the most efficient storage method for boats 35ft and under.**

Dry berths are the fourth common mooring strategy in Hong Kong. Dry berths are safe moorings, protect boats from saltwater corrosion, and typically store boats up to 35ft. Although the cost of construction is inexpensive, dry storage requires a forklift, hoist, or stacker crane in order to manoeuvre vessels to and from the water. The interviewed marine managers did not supply exact costs for a hoist, forklift, or stacker crane, but did say that this machinery is expensive and makes dry rack construction more expensive than swing or fore and aft mooring. A dry rack and forklift can be seen in Figure 4-12.



Figure 4-12: Dry rack and forklift

4.2.2 COSTS AND REVENUES INVOLVED WITH BOAT FACILITY OPERATIONS

In this section we put forward costs and revenues associated with boat facilities.

Major costs associated with a boat facility include the initial construction of moorings and repair and maintenance of hardware.

The initial cost of constructing a basic boat facility is driven largely by the costs of moorings, which depends on the type and quality of materials used. Roger Eastham, marine manager of the Royal Hong Kong Yacht Club, said that in 2004 the cost to construct one pontoon mooring was approximately HK\$400,000. Today, in 2012, the construction of one pontoon berth would cost HK\$800,000-1.2 million.

After construction of a boat facility, the hardware and materials will need maintenance and repair. Figure 4-13 depicts some aspects of hardware maintenance. The cost of repair and maintenance (R&M) cycle has been referred to as a “mid-life refit” by Roger Eastham, the marine manager at the Royal Hong Kong Yacht Club. This refit cycle has been described as: after 5 years of facility operation the R&M budget will be low; due to degradation, after 10 years there will be a significant increase in the R&M budget; after 20 years all materials and hardware will have needed replacing. A typical annual budget for R&M could be ~HK\$50,000, but the amount you budget for varies depending on the materials used. Additionally, a marine professional we interviewed said that paying for 10-15 staff members for marine operations, including repairs, may cost HK\$3-4 million annually.

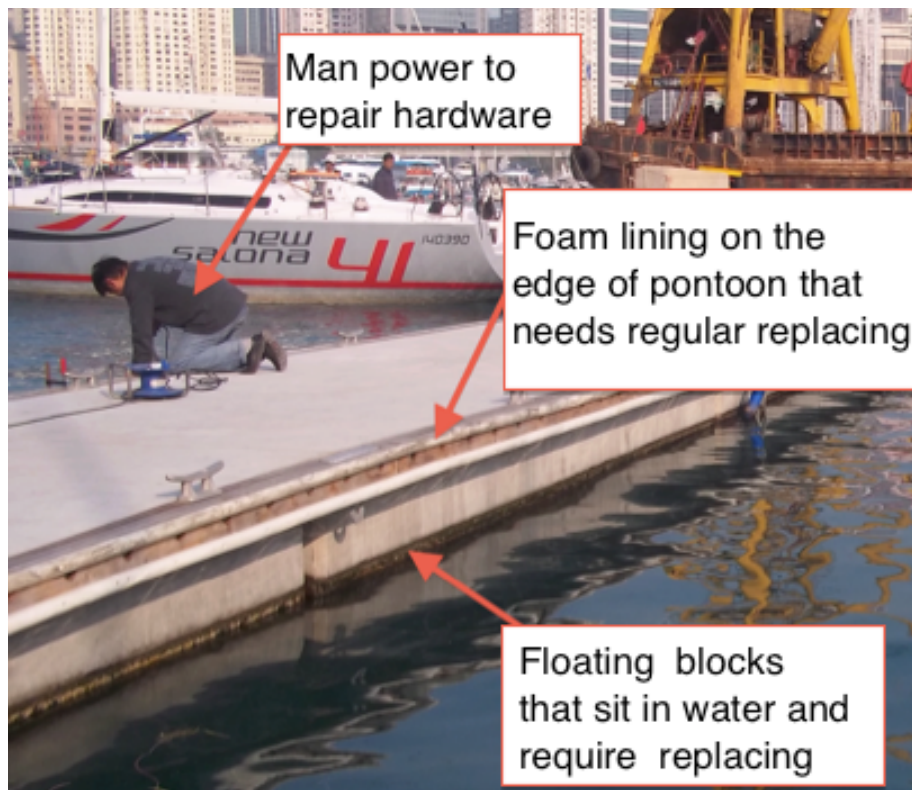


Figure 4-13: Description of Hardware Replacement

Boat facilities pay two sets of recurring annual fees to the government.

An important cost boat facilities incur is governmental fees; clubs have to pay two fees, Short Term Tenancy fee (STT) and a Rateable Value fee (RV). The STT is the same for all existing boat clubs, no matter how large or small the land is; the RV is charged per square foot of land the facility owns. One existing facility currently pays an annual STT of ~HK\$1,000, and annual RV of ~HK\$350,000. The interviewed boat facility managers said that political pressure from residents believing these fees are inexpensive is the reason that the STT fees will probably be increasing in the near future.

Private boat Clubs defer costs through mooring fees, membership fees, and optional services; whereas mooring fees are likely to be the significant revenues of a public-access facility.

Boat facility managers explained that there are three major self-sustaining revenue streams currently being used by the private clubs. Facilities charge membership fees in order to cover the R&M budget and serve as a person’s commitment to the club. Membership fees are approximately 50% of facility revenue. The second revenue stream comes from optional services offered to members, such as food and beverage. This revenue does not affect the total operational budget of a facility, and will likely not be suitable for a public-access boat club. Mooring fees are the third revenue stream, and can serve as approximately 30% of total facility revenue. For a public-access boat club, it is likely that the only significant revenue stream will be mooring fees. A simplified table of existing private facility revenue streams percentage of the total revenue can be seen in Table 4-3.

Table 4-3: Percentage of total revenues of two existing private boat facilities

	Hebe Haven Yacht Club	Royal Hong Kong Yacht Club
Membership Fees	34% Total Revenue	50% Total Revenue
Boat Storage Fees	33% Total Revenue	10% Total Revenue
Fees for Optional Services	33% Total Revenue	40% Total Revenue

4.2.3 MANAGEMENT AND EMPLOYEES

This section will present information on who might manage and work at a public-access boat club.

There is interest among private clubs in helping promote public-access boat clubs, but reluctance to assume an active operational role.

The interviewed private club representatives expressed concern that the lack of boat storage in Hong Kong is a serious problem affecting the entire boating industry. Although representatives did not directly speak on behalf of their clubs, the importance of the problem appeared to motivate them to help promote a solution. Roger Eastham, the marine services manager for the Royal Hong Kong Yacht Club, said “we’d rather be on the inside looking out than on the outside looking in.”

Although the facilities are interested in helping promote such facilities, they are reluctant to assume an active operational role. This appeared to be due to concerns about intermixing private and public operations.

There is currently a lack of manpower for a boat club or marina in Hong Kong. Boating professionals we interviewed consistently noted a lack of skilled workers available in the Hong Kong boating industry. Michael Franco, general manager of the Hebe Haven Yacht Club, said that currently the youngest group of skilled workers is approximately 35 years old. Multiple boating experts observed that Hong Kong does not have any programs in schools to teach the type of skills needed for a boat facility. They also mentioned that the old fishing villages where the boat clubs used to get their skilled workers from have been disappearing because the younger generation is working office jobs.

Most of these findings are based on a small number of interviews. While the interviewees were very knowledgeable about the Hong Kong boating industry, their views are not necessarily representative of the industry as a whole.

4.3 PROMISING LOCATIONS FOR A PUBLIC-ACCESS BOAT CLUB

In this section, we describe five promising locations for a public-access boat club. Our findings are divided into the separate regions of Hong Kong we investigated; each sub-section includes our findings for one or two of the high potential sites for that region. Using the Location Analysis Rubric (LAR) categories as guidance, we described the characteristics of each location and also noted other important concerns of the location that do not fit into our LAR, such as potential boat density. The completed LARs for every site we visited can be found in Appendix D.

4.3.1 HONG KONG ISLAND SOUTH



Figure 4-14: Map of Hong Kong Island South with Tai Tam Harbour Indicated (Google Maps, 2012)

Of the potential sites listed by DHK (2010) for the Hong Kong Island South region, *Tai Tam Harbour* (see in Figure 4-14 and 4-15), near the village of Tai Tam Tuk, was a promising location. Tai Tam Harbour scored very high in each criterion. This location has sufficient water conditions for boating, areas of undeveloped land, great water accessibility, moderate public transport accessibility, and no known conflict with Hong Kong's urban plan. Tai Tam Harbour is also part of the Tai Tam Tuk Water Heritage Trail, which makes the area a tourist destination with an affluent recreational boating community; furthermore, there is a small wake boarding facility in the nearby village. The coach of this facility believes that the creation of a public-access boat club in Tai Tam Harbour would be desirable (Appendix B-G-3). Currently there are 45 boats moored in the Marine Department private moorings in Tai Tam Harbour, and we estimate that the site could hold as many as 368 berths if fore and aft mooring is used. Details of estimation can be found in Appendix G.



Figure 4-15: Tai Tam Harbour

However, there is no breakwater currently in Tai Tam Harbour. Therefore only swing mooring or dry berthing can currently be used there despite generally calm water. Another complication with Tai Tam Harbour is that the access road down to the location is not wide and has no sidewalks. Although Tai Tam is a short walk from a bus stop, it is unlikely that the current road and walkway would be able to handle the increased traffic that is likely to result from a new boating facility.

4.3.2 VICTORIA HARBOUR & JUNK BAY

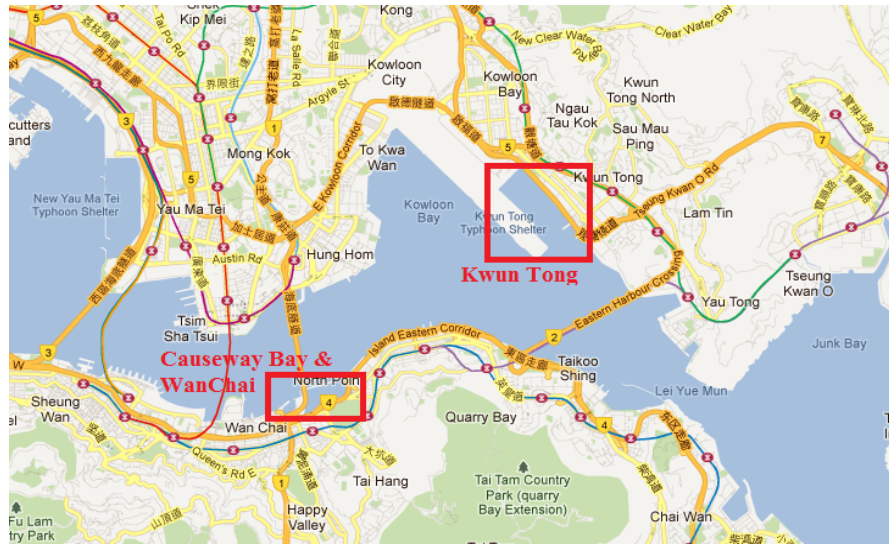


Figure 4-16: Map of Victoria Harbour and Junk Bay with Causeway Bay & Wan Chai, and Kwun Tong Indicated (Google Maps, 2012)

A promising location in the Victoria Harbour-Junk Bay region is the *Causeway Bay typhoon shelter* and *Wan Chai former cargo-handling basin* (see in Figure 4-16). We were unable to analyse the Wan Chai former cargo-handling basin due to on-going construction of the Wan Chai Bypass. We chose to group the two locations together due to their close proximity to each other. Causeway Bay is a very accessible location because of its central location along the harbour front of Hong Kong Island and its proximity to the Causeway Bay and Tin Hau MTR station. As a typhoon shelter, Causeway Bay already has a large population of boats and is protected from destructive wave action. Wan Chai currently has no boats and a large water area for a possible wet berthing marine facility. Our estimation is that the Causeway Bay–Wan Chai area could hold at least 531 boats by fore and aft mooring.

There are a few major barriers with the Causeway Bay location. One of these is that there is no undeveloped coastal area to accommodate any land-based facilities. Another complication is the current construction of the Wan Chai bypass, which will interfere with the boat storage capacity of the typhoon shelter until construction is complete.

Since the Victoria Harbour and Junk Bay region is located in the centre of the major urban area of Hong Kong, we believe a public-access boat club in Victoria Harbour could potentially further promote boating among Hong Kong residents. The Causeway Bay Typhoon Shelter is also particularly promising because the Royal Hong Kong Yacht Club's Kellett Island facility moorings are within the shelter, and they have expressed interest in being involved in a new public-access boat club in Causeway Bay or the former Wan Chai cargo-handling basin.

Another site that is worth mentioning is the *Kwun Tong typhoon shelter* (see Figure 4-16). This typhoon shelter was recently cleared of boats during the construction of a LCSD promenade along the northeast side. Additionally, a cruise terminal is

planned to be located on the west side of the old Kai Tak runway, therefore only the east side can be considered. However, we found that Kwun Tong has a large amount of unused land space that can be used to support land-based facilities such as dry racks. This makes Kwun Tong unique from other areas in Hong Kong. Since the Kwun Tong area is a typhoon shelter, there is already a pre-existing breakwater and there is adequate water depth for vessels. The water space is also very large, being approximately double that of the Causeway Bay–Wan Chai area.

4.3.3 TOLO HARBOUR



Figure 4-17: Map of Tolo Harbour with Sam Mun Tsai and Science Park Indicated

The final two promising locations are Science Park and Sam Mun Tsai (see in Figure 4-17), both located within Tolo Harbour. As a limitation, we have learned through our boat facility manager interviews that the entirety of the Tolo Harbour region lacks sufficient boat repair facilities. It is in the opinion of Roger Eastham of the Royal Hong Kong Yacht Club that, in order for the Tolo Harbour/Tai Po area to accommodate a new boating facility, a new repair facility must be constructed; otherwise boats may need to make a “a potentially rough and dangerous trip around the end of the Sai Kung peninsula” to receive repairs.

Science Park is a short bus ride from University MTR station and is part of large development of offices and residential buildings. The location we analysed was near the construction site of the Providence Bay residential development. There are currently no boats moored in Science Park, but there is enough area for over 700 boats to be fore and aft moored if a breakwater is constructed. The water around Science Park is adequate for mooring very large boats. In addition, there is significant water depth, meaning dredging would not be necessary and will therefore not harm the marine environment. The water accessibility is low due to public promenade that walls off the water with no access points, but another

Designing Hong Kong study (2010) indicated that there is developer interest and creating a marine facility in this area.

Sam Mun Tsai is a promising location because it is currently located within a typhoon shelter. The typhoon shelter gives an advantage to this region because it makes the waters safe for boats to be moored all year round. The village of Sam Mun Tsai is actively trying to promote tourism; therefore Sam Mun Tsai would likely be receptive to the creation of new boating facility. There are approximately 120 boats currently moored in this public mooring area, but the entire area has enough room for about three times as many boats (~366 boats). The typhoon shelter allows for fore and aft mooring to be used at this location without additional construction. In addition, there are Marine Department private moorings nearby that currently have 87 empty swing moorings.

Our findings are limited by the fact that we considered only ten potential locations. We have not considered how increased car traffic to a new facility may affect the traffic along the access roads to location during the peak seasons. Another limitation is that we were only able to gauge local opinion at location where we found current boat owners to interview.

4.4 THE FEASIBILITY OF A PUBLICLY-ACCESSIBLE BOAT CLUB

In the following section, we present the integration of our findings in order to assess the feasibility of public-access boat clubs in Hong Kong. The two main determinants of feasibility are the presence of an organization willing to operate a facility and the financial feasibility of a facility.

4.4.1 PRESENCE OF AN ORGANIZATION WILLING TO OPERATING

In our interviews with boat club representatives, we were not able to identify an organization willing to operate public-access boat clubs. At this point, there is no evidence of a private organization willing to operate a public-access boat club. Further research will need to be done to identify an organization willing to operate this type of facility.

4.4.2 FINANCIAL FEASIBILITY SCENARIO

To assess the financial feasibility of a public-access boat club, we modelled basic financial parameters for a public-access boat club by integrating the knowledge from the marine professionals we interviewed. In generating the scenario, we make the following assumptions:

- **Number of Berths:** 200 berth facility
- **Location:** Kwun Tong Typhoon Shelter
- **Berthing Type:** 2 story dry racking facility
- **Additional Infrastructure:** Forklift

- **Boat Size:** 15 feet to 26 feet
- **Total Land Area:** 0.67 hectares
- **Acquisition of Land and Sea Rights:** Granted by Government
- **Number of Employees:** 3
- **Fees for use:** Monthly berthing fee, no membership fees

This public-access boat club, located in Kwun Tong, would have a 200-berth dry stack facility constructed under the Kwun Tong Bypass, next to the LCSD's Kwun Tong Promenade facility. This facility would be two levels high at approximately 8 metres in height so as to fit under the Bypass.

Aside from services assisting dry stack facility operation (e.g. vessel launching), the public-access boat club would not offer amenities like food & beverage. This would limit expenses to those essential to water access: boat storage. Revenues would come solely from monthly berthing fees; there are no membership fees. Given this type of facility, we estimate the start-up costs, annual operating cost, and monthly berthing fees below.

- ⇒ **Start-Up Cost:** *HK\$18.3 million*. This cost is composed of the following:
 - **Dry-Berth Racks:** *HK\$16.8 million*. This reflects the cost of the 200-berth dry rack facility. Assuming the cost is half the cost of a 400 berth dry stack, refer to Table 4-2.
 - **Forklift:** *HK\$500,000*. This is an estimated cost for a used forklift based on online sale listings (**International Boat Lift Exchange, 2012**).
 - **Land Lease:** We assume that the government would provide the land for this facility.
 - **Small Management Facility:** *HK\$1 million*. This is an assumed cost for a small management facility housing employees to handle bookkeeping and other organizational tasks.
- ⇒ **Annual Operating Cost:** *HK\$ 2.2 million*. This is composed of the expenses from the following areas:
 - **Payroll:** *HK\$1.2 million*. This estimation is based off an estimate given by a representative from one of our interviewed boat clubs. The estimation was scaled down to 3 employees for the purposes of this model. (Appendix A)
 - **Repair & Maintenance:** *HK\$1 million*. Repair & Maintenance covers the repair, replacement, and maintenance of the facility's operational hardware. This is an assumed figure based on the idea that dry-racks require minimal maintenance.
- ⇒ **Berthing Fee (per month):** *HK\$920*. This fee represents the annual operating cost distributed among each berth over each month of the year. This fee is needed to cover the operating costs during the year in order to keep the facility running assuming no outside assistance in the form of financial subsidization.

Given these numbers, the financial feasibility of such a boat club would be dependent on: an organization's willingness to pay the start-up cost and a market willingness to pay for the berthing fee. Roger Eastham of the RHKYC told us that organizations like the Hong Kong Jockey Club have been known to finance the start-up cost for public facilities. In the case of the Jockey Club, this has been done for the Sha Tin Rowing Centre.

Given a monthly berthing fee of HK\$920 per month, the *Unaffiliated Recreational Boat Owner* group is the likely market. Our analysis of this market segment showed that it includes a large potential market, specifically for vessels in the range of 16ft to 26ft. The large potential market translates to a high demand so we conclude that it is moderately possible that a public-access boat club scenario like this would succeed. The HK\$920 per month price tag may likely still leave this type of new boat storage out of reach to many Hong Kongers. Thus, further research is necessary to make a facility like this affordable to the general public.

5. CONCLUSIONS AND RECOMMENDATIONS

Our findings on the feasibility of public-access boat clubs led us to the following conclusions and recommendations for Designing Hong Kong, the Harbour Business Forum, and any other interested party. The following sections cover our recommendations for suitable locations, promising mooring strategies, government initiatives, and areas for further study.

5.1 CONCLUSIONS FROM FINDINGS

A large demand for pleasure vessels of 16ft -25ft length exists in regions with equal access to the water.

The trends in pleasure boating in Florida and Turkey show similar distributions of high numbers of 16-25ft vessels compared larger (26-39ft) vessels. The ratio of 16-25ft boats to 26-39ft boats in these distributions is about 6:1 whereas in our estimated Hong Kong distribution it is 1:4. This suggests that the possible market for 16-25ft pleasure vessels is 2400% larger than it currently is. This market is unable to be developed due to the lack of berthing spaces in Hong Kong.

Currently, there are expensive private facilities catering to Hong Kong's residents able to afford high entrance and monthly membership fees. There are also free public mooring areas catering to the people who have been part of the local community for many years. Normally the Marine Department private moorings would fill the gap between the two options, but the private moorings are operating at 95% capacity and the Marine department has no plans to expand them. Therefore, there is currently a gap in the boat storage options offered in Hong Kong.

Start-up costs will be high and will require the cooperation of government and charitable organizations.

We found that the start-up cost for a boat storage facility is exorbitant without any financial backing, because the cost to construct the necessary infrastructure is very high. Using a favourable scenario we identified, we estimated a cost of HK\$18.3 million for a basic 200-berth dry rack. Facilities involving water-based infrastructure could cost considerably more to build.

Operating expenses can be offset by revenue from mooring fees.

For a 200-berth dry rack facility, we estimated the operating expenses to be HK\$2.2 million per year. The operating expenses include employee payroll as well as the repair, replacement, and maintenance of facility hardware. Using a scenario we identified, we believe the facility would require a monthly mooring fee of HK\$920 to offset this expense, assuming it operates at full capacity. The operating costs and mooring fees for a club with water-based infrastructure could be considerably higher.

5.2 SUITABLE LOCATIONS FOR A PUBLIC-ACCESS BOAT CLUB

After completing our analysis, we identified four sites with promising features for a public-access boat club. Though each location may be promising, we believe there are steps that can be taken to make them more feasible. Using this information we are able to make the following recommendations to Designing Hong Kong, the Harbour Business Forum, and any other interested party.

Table 4 - Summary of Promising Features and Challenges for Locations

Location	Promising Features	Challenges
Tai Tam	Large Water Area	Nearby Environmental Protection Areas
Causeway Bay-Wan Chai	Easily Accessible Moderate Water Area	Construction of Wan Chai pass Existing Boat Facility
Kwun Tong	Large Water Area Available Land Existing Breakwater	Promenade Planned
Sam Mun Tsai	Moderate unused water area Existing Breakwater Promotion of tourism	Region lacks repair facilities
Science Park	Large unused water area Lacks environmental concerns Developer interest	Region lacks repair facilities Needs a breakwater

We recommend creating boat maintenance facilities if a new boating facility is implemented in Tolo Harbour.

Tolo Harbour has many positive aspects, but on the downside there are no boat maintenance facilities located in this area. One marine operations manager reported that if a boat club were to exist in Tolo Harbour, the boats would need to travel to Sai Kung to be repaired. In his opinion, the feasibility of a public-access boat storage facility located within Tolo Harbour would be improved if a new boat maintenance facility were constructed.

We recommend further research into the Causeway Bay-Wan Chai area before the Wan Chai Bypass construction is complete due to demand for the land.

Our analysis of the Causeway Bay Typhoon Shelter reveals that it would be a suitable location for a public-access boat club for many reasons including: high accessibility from public transport, sufficient water depth, large recreational boating population, and a pre-existing breakwater. Unfortunately, this location is crowded and nearly full, meaning there is no room to expand the number of boats in this location. Fortunately, the former Wan Chai cargo-handling basin, located on the opposite side of Kellet Island from Causeway Bay Typhoon Shelter, currently has available land and water area. Although we could not access this area due to on-going construction of the Wan Chai Bypass, we were able to evaluate the area through archival research. We believe that Wan Chai offers the same positive aspects as the Causeway Bay Typhoon shelter. Our interviews also revealed that there is already interest in developing a marine facility in the Wan Chai area. Therefore, there is high demand for the development in the area; so we recommend

further research into the area before the current construction of the Wan Chai Bypass is complete.

We recommend a new boating facility in Tai Tam Harbour be designed in a way that avoids harming the local community and environment.

Construction of a public-access boat club should not affect the existing recreational population and those who currently live adjacent to the site in squatter huts. As with any site, the approval and support of the local community will be important. Therefore if a facility were implemented in this area, it needs to be designed with the input of the local community.

In a previous Designing Hong Kong study, the north and east sides of Tai Tam Harbour were noted to have natural areas zoned as country parks or coastal protection areas. Development of a boating facility in Tai Tam Harbour should avoid these areas so as to reduce the impact on Tai Tam's local ecology.

5.3 PROMISING MOORING STRATEGIES

This section presents recommendations for moorings strategies for public-access boat facilities.

We recommend dry racks as the primary source of mooring for a public-access boat facility.

Typical boat lengths of boat owners not moored at private clubs, who will be the target users of a public-access boat facility, is 20-25ft; dry racks can store boats up to 35ft. Therefore, these boat owners' vessels can be stored primarily using dry racks. Dry racking is an effective strategy because it is the most space efficient, using only 0.67 hectares for a 400-berth system. This strategy also helps to prolong the life of boats by protecting the vessel from seawater corrosion. By providing dry racks, a public-access boat club will be able to fill the existing service gap.

When land scarcity precludes dry moorings, we recommend that fore and aft mooring be used as a wet mooring strategy or be used to organize current swing moorings.

While fore and aft mooring is approximately double the cost of swing mooring, it uses 40% less water area than swing mooring. Due to its space efficiency, organizing current swing moorings into fore and aft moorings will increase an anchorage's boat density. Additionally, if not wet mooring strategy exists, fore and aft mooring should still be implemented because of its space efficiency.

5.4 GOVERNMENT INITIATIVES

Below we summarize the first step that could be taken by the government in order to improve the boat storage in Hong Kong.

We recommend that Designing Hong Kong and the Harbour Business Forum pursue discussions to encourage the Hong Kong government to formalize the current unauthorized boat anchorages located throughout Hong Kong.

If the government of Hong Kong recognizes these unauthorized anchorages as public mooring areas, then the following improvements can be made:

- **Accessibility:** Owners of boats moored publicly or informally often need to climb over fences or use self-made wood ladders to access the water. To make the water access safer, the government could provide basic hardware like metal ladders or concrete stairs. They could also ensure that fences surrounding anchorages areas have access points like a gate to improve water access.
- **Boat Securing Hardware:** One major problem with the current boat situation in Hong Kong is that boats are often informally moored when tied to trees and bridges. We recommend that the government provide hardware like bollards or cleats for boat owners to moor their boats firmly and safely.
- **Safety and Security:** If the government were to formalize these unauthorized anchorages, then a set of regulations regarding the use of anchorages could be put in place in order to increase the safety of moored vessels at the boat owners' current locations.

Formalizing an informal mooring by implementing basic hardware like concrete stairs and bollards would cost the government a minimal amount of money and time. This option would provide a quick solution to some current issues by providing more mooring areas that are safe for boat owners to access and store their boats.

5.5 AREAS OF FURTHER STUDY

As a result of our interviews and analysis, we identified a number of areas for further study related to the feasibility and implementation of new public access boat facilities in Hong Kong. The following recommendations represent the practical concerns of implementing a public access boat club that require additional research.

We recommend supplementary research on the willingness of organizations to finance and operate a new public access boat facility.

In order to mitigate the high start-up costs associated with the creation of boat clubs, Designing Hong Kong, the Harbour Business Forum, and any other interested party will need to seek financial support. Several options for support revealed during the course of our research are listed below.

- **The Hong Kong Jockey Club**
Hong Kong Jockey Club has been known to fund the set-up costs for public access facilities in the past, such as the Sha Tin or Shek Mun Rowing Centres. Their support could help overcome the large set-up costs associated with creating a boat storage facility.
- **The Hong Kong S.A.R. Government**

Constructing a marine facility in Hong Kong requires approval and permits from many different sectors within the Marine Department and the Lands Department. Direct involvement of the Hong Kong government may ease the coordination of these approvals.

➤ **Other Options:**

We believe other charitable organizations will have similar interests as the Hong Kong Jockey Club in supporting a public access boat facility. We recommend further study into other organizations willingness to support a public-access boat facility. We also recommend future initiatives investigate the willingness of other existing private boat facilities because the government is pressuring private clubs to offer more services to the public

We recommend further research into the inadequate amount of skilled marina workers in Hong Kong.

A prominent feasibility concern identified during our boat facility staff interviews was the perceived lack of skilled marina workers currently available in Hong Kong. The current marina employees who maintain the vessels and perform the basic marina services are an aging population; multiple interviewees stated that the “young” range of workers currently in the market to be in their late 30’s to early 40’s. The shortage of skilled workers could present a challenge to any new boat storage facility in Hong Kong moving into the future.

5.6 PROJECT CONCLUSION

While there are private facilities catering to the elite of Hong Kong and public mooring areas catering to the communities that have been there for many years, mooring options do not exist to meet the demand of the residents falling between these two categories. This project serves as a study to help fill the gap that currently exists in the Hong Kong boating industry. It also lays out stepping-stones in Designing Hong Kong and the Harbour Business Forum’s quest to make the vibrant waterways of Hong Kong accessible to a larger percentage of the population.

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