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Covid-19 Vaccine and International Relations

New frontiers of vaccine diplomacy

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Abstract

The initial policy of the countries that developed vaccines has been to lock the vaccine by patent. This has been due to the fact that domestic demand for vaccine was mounting. Since only a few countries could invest in it, manufacturing and export remained at the behest of those few resulting in deep inequity in the global rollout. Pandemics are global health crises. Hence, calls for the patent waiver for the COVID-19 vaccine are growing to access the vaccine. The vaccine and its production, marketing and distribution have been politicized driven by the hegemonic aspiration. Both manufacturing and import-dependent countries are racing to win the diplomatic battle: the former has to win to gain hegemony and the latter to get the vaccine. Hence, the vaccine distribution has been marked with deep discrimination, and as a result, the migrant community is less likely to get their vaccine on time. This article engages in the decades-long debate over intellectual property rights and patenting life-saving vaccines. We argue that exemption of COVID-19 vaccines from intellectual property rights would improve global access and equity.

Keywords: COVID-19; Vaccine; Diplomacy; International relations; Hegemony.

Introduction

The number of COVID-19 infections and deaths is being slowly replaced with global vaccination counts (Ledford, 2021). Vaccine is seen as a beacon of hope for billions of us. However, the unpleasant reality is that the availability of vaccine and vaccine nationalism are becoming the fundamental challenges for an equitable and legitimate distribution of it because currently, just a handful of COVID-19 vaccines have been developed, mostly by a few medically advanced countries (Krasnyak, 2021). Hence, production, distribution, and delivery are falling way behind the global demand.

The demand-supply imbalance has led to a rise in “vaccine nationalism” (De, 2020:1), whereby “even before the end of final stage human trials or regulatory

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approval, several wealthier countries like Britain, France, Germany and the US have entered into pre-purchase agreements with Covid-19 vaccine manufacturers. This implies that countries are averse to share their stocks of vaccines with other countries until vaccination against the virus is complete in their own country (James & Lagman, 2021). Of course, vaccine nationalism poses a predicament in solving this global problem. Though prioritizing themselves seems to increase their protection and vulnerability to the virus (Wong, 2021) but the reality is if everybody is not safe, nobody is safe. The rich countries purchase and hoard supplies of the vaccine for their utilization (Ghebreyesus, 2021). Therefore, the vaccine manufacturing countries are planning to lock it by patent. Though voices are getting stronger for deglobalization and withdrawing within borders, this pandemic has given the lesson that it is impossible to be secure in a country unless there is security in all of them (Peterson, 2002; Vilasanjuan, 2021).

Even the United States has not committed to sharing vaccines with any country before vaccination of the American people is complete. Many other countries that were supposed to export vaccine to their allies blocked the export. The countries that cannot develop a vaccine and dismantle the pandemic are in an extremely tough position. The question here is this: how can states navigate the international system to eradicate the virus in the world ultimately, and how can they do it without compromising their national interests? Vaccine diplomacy might be the answer.

Diplomacy at the moment sounds like a critical force in solving vaccine distribution and delivery (Krasnyak, 2021). This means the state leaders, policymakers, and diplomats should handle the vaccine issues. However, the effectiveness of diplomatic task often depends on several factors, such as how strong is the relationship between the incumbent and the export countries; how good (proactive, fast, objective, determined in advancing state's national interests and ready to finance etc.) are the diplomats of the incumbent countries in negotiating issues. For example, the Russian vaccine Sputnik V has been registered in 39 countries, mainly those once in the Soviet sphere of influence in sub-Saharan Africa and Latin America. Still, it has also been registered to two European Union member states. Thus, vaccine diplomacy appears to be an effective tool for many countries at the moment of the Covid-19 crisis.

Significance, objectives and argument

The significance of this discussion of the Covid-19 vaccine and how it influences international relations has been succinctly captured by Jennings (2021), who wrote: The prospect of global health becoming a new arena for global power competition and rivalry should worry us all. Whatever benefits may have emerged from such rivalries in the past, they did so through cooperative rivalry. The global response to COVID-19 has thus far tended to be uncooperative and divisive,

casting blame or seeking to spread distrust. The complexities of global health, and the needs of the billions excluded from the benefits of vaccine science and innovation, demand a truly global response." In the following sections, we outline the role vaccines in global security, the history of "vaccine diplomacy," and the current polemic in relation to Covid-19. We aim to provide a complete picture of those complexities that Jennings (2021) referred to. We argue that the apparent rise of vaccine nationalism must be halted, replaced by a united global fight against the pandemic.

Vaccine and global security

After more than a year since the virus shattered our lives, we see the light at the end of the tunnel, i.e. the vaccine. COVID-19 has altered the roll call of global threats and has caught us off guard (Khan et al., 2020). It has today become clear to us that the collective ability of both states and the organizations to address this kind of challenge was insufficient, and the states have been unable to devise a resounding response.

Since the beginning of the pandemic, the collective voice that we have heard was the necessity for vaccine inventions. The vaccine should not be administered only in a pocket of countries. Instead, it should be made available and reached out to all countries and all the people. Hoarding and locking vaccine by patent and nationalism have been the fundamental barrier to reaching out to billions who need the vaccine most. Hence, the world is witnessing the least developed countries' governments fighting to win the vaccine battle. Who wins and who loses in the battle depends on who is powerful financially and has good relationships historically?

Hotez (2020) contends that the historical and modern-day accounts of the vaccine and vaccine diplomacy are remarkably great. However, these have not taken an overarching framework for its expanded role in foreign policy. Vaccine diplomacy as the branch of global health diplomacy relies on the use or delivery of vaccines" (Hotez, 2020). In the diplomatic battle to get the vaccine, it is important to remindessentiale of Edward Jenner, who discovered the smallpox vaccine in 1798 (Bazin, 2000), on how to administer the smallpox vaccine. Vaccine diplomacy should be premised on the spirit of Louis Pasteur's remarks that "science knows no country, because knowledge belongs to humanity (Hotez, 2013; 2021; David, 2005; Sabin, 2014). Hotel (2014; 2006) and Franklin (2020) reminded that Dr Albert Sabin (developer of the oral polio vaccine) travelled from the US to the Soviet Union during the Cold War to collaborate with Soviet virologists on prototype development for the oral polio vaccine (Kaufmann & Feldbaum, 2009). The success was possible because they placed humanity over ideology for joint scientific cooperation.

Vaccine diplomacy grew in popularity in the later half of the twentieth century. Vaccines were used to negotiate so-called ‘days of tranquillity’— UNICEF, often in partnership with WHO, uses this method to ensure that children have access to health care during times of conflict— in over a dozen nations in the 1980s and 1990s, including Afghanistan, Angola, Chechnya, the Democratic Republic of the Congo, El Salvador, Guinea Bissau, Iraq, Lebanon, the Philippines, Sierra Leone, Sri Lanka, and Sudan (Arya, 2019). Under the auspices of WHO, in 2007, Romania, Vietnam, Serbia, Brazil, Iran, Thailand, Republic of Korea, Mexico, Egypt, Indonesia and India collectively received US\$25 million that aimed to build their influenza vaccine production capacity through technology transfer. The 2010 survey reported 12 million influenza vaccine doses were produced by the eleven manufacturing countries, with three of them successfully implemented vaccine production and distribution countrywide (Friede et al., 2011). It is also worth noting a relatively low-profiled China humanitarian response, alongside others, the United States, France, Sweden, Norway, and Switzerland, against the Ebola outbreak in West Africa in 2014-2015 (Huang, 2017).

These are remarkable examples of how vaccine administration should go about. Historical instances of global health led to an unprecedented collaboration which has some impact on today’s diplomacy. For example, vaccines became integrated as critical tools in helping developing nations and international efforts to ensure universal access for low- and middle-income countries” are also fostering greater collaboration. The Global Vaccine Action Plan (GVAP) is also critical. Endorsed in May 2012 by World Health Assembly, it is working to provide more equitable access to existing vaccines to all populations by 2020 — based on the premise that health is a fundamental human right.

Kickbusch et al. (2007) described global health diplomacy as the process by which governments and civic groups “position health in foreign policy negotiations” and develop new forms of “global health governance (cited in Labonte & Gagnon, 2010). In 2007, foreign ministers from seven countries—Brazil, France, Indonesia, Norway, Senegal, South Africa, and Thailand—issued the landmark “Oslo Ministerial Declaration” that formally linked global health to foreign policy (Kvåle, 2007; Fee, 2002; Fidler, 2010; Tognotti, 2013).

Kreutzer talks about ten principles for conducting operational level diplomacy to help practitioners frame the development and implementation of successful foreign policies. We attempt to see the traditional diplomacy framework through Kreutzer’s (2014) approach. Diplomacy — the use of negotiations to advance international interests — continues to play an important role in adjusting state interests and societies to contemporary challenges (Kreutzer, 2014). In preparing guidelines for operational diplomacy, the principles themselves need to reflect realistic parameters in their design and substance.

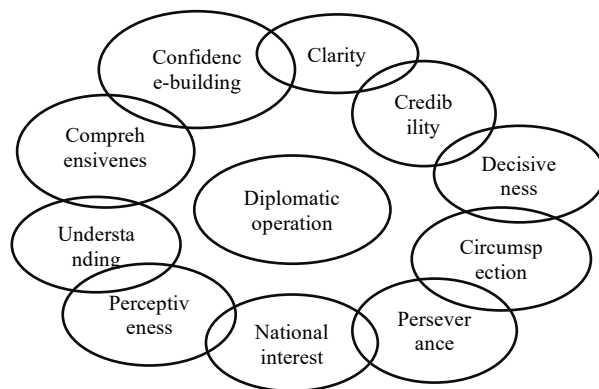


Figure 1. Principles for diplomatic operations.
Source: Kreutzer, 2014

Of course, traditional diplomacy and vaccine diplomacy are distinct in principle because traditional diplomacy is primarily based on the premise that diplomacy is meant to uphold national interest as determined by its legitimate policymakers, representative institutions, and enshrined commitments

and values. Vaccine diplomacy should be, however, premised upon the principle of humanity. Principles such as credibility, clarity, understanding, comprehensiveness, confidence-building, decisiveness, and perseverance conflict with vaccine diplomacy.

About two decades ago, a second modern framework for vaccines built around the concept of “vaccine diplomacy” (Hotez, 2001), recognizing how vaccines are not only economic drivers but also powerful and historically relevant instruments of foreign policy. Kickbusch (2013) argues that in modern global health diplomacy, “no longer do diplomats just talk to other diplomats,” but instead a variety of experts in different areas are involved in solving timely global health issues. Katz et al. (2011) have included a number of elements in international health diplomacy: “(1) Basic diplomacy, which refers to “classical Westphalian negotiations” between nations that result in bilateral and multilateral treaties like the WHO ((2020; 2021)Framework Convention on Tobacco Control and International Health Regulations (IHR) 2005; (2) multistakeholder diplomacy, which includes peer-to-peer scientific partnerships, private funders such as the Bill & Melinda Gates Foundation, and even some government employees from USAID or the US military working more or less independently in the field; and (3) informal diplomacy, which includes peer-to-peer scientific partnerships, private funders such as the Bill & Melinda Gates Foundation, and even some government employees from USAID or the US military working more or less independently in the field” (Cited in Hotez, 2014:2). Vaccine diplomacy incorporates the crucial work of the GAVI Alliance, as well as aspects of the WHO, the Gates Foundation, and other critical international organizations, and refers to nearly any facet of global health diplomacy that relies on the use or delivery of vaccinations (Hotez, 2001; 2001a).

COVID-19 Vaccine and diplomacy

As we entered the COVID-19 period, we realized how a pandemic could wreak havoc on global normalcy (Ullah et al., 2021). The World Bank (2020) estimates that due to the pandemic, from 88 to 115 million people will fall into extreme poverty in 2020, with the total rising to as many as 150 million by 2021. The economic cost of COVID-19 (which is expected to reach between US\$5.8 and US\$8.8 trillion globally— almost 6.4–9.7% of global GDP) (Chowdhury and Chakraborty, 2021). More than 500 million full-time jobs are estimated to be lost from the job market (Ullah et al., 2021). These stark changes will affect the global economy, population mobility and foreign policy.

A race for the invention of a magic bullet that would halt the epidemic began soon after the outbreak came to be known to us. Now the race is to obtain the magic bullet, i.e. vaccine. Governments have spent at least €93 billion on COVID-19 vaccines and therapeutics globally since the beginning of the pandemic (Hoecklin, 2021). Hence the unprecedented investment to secure an effective vaccine as quickly as possible. Never before in human history had there been so much haste to obtain a vaccine. Never before had a vaccine been developed in so short a time. It took 18 years to develop the first flu virus in the previous century; for other more recent diseases such as AIDS (Ullah and Huque, 2014; Ullah and Kumpoh, 2018), the search is continuing more than three decades later.

On the geopolitical front, there is vaccine diplomacy and vaccine nationalism. The former is demonstrated by swift action to build COVAX Facility after the declaration of COVID-19 as a pandemic. COVAX convenes Gavi, the Vaccine Alliance, WHO, and a Coalition for Epidemic Preparedness Innovations (CEPI) to support the development, manufacture, or distribution of new COVID-19 vaccines. It emphasizes equity access for low- and middle-income countries (LMICs) (Excler, Saville & Berkley, et al. 2021; Gavi, 2020). India currently hosts some of the largest vaccine producers, which now work with WHO for prequalification and COVAX for financing and distribution.

At the same time, vaccine nationalism has steadily gained geopolitical significance as high-income nations led the global race to secure vaccine access for their populations, leaving behind the vulnerable ones in the geopolitical competition. The politics of aid and mask diplomacy that dominated the international relations in the first year of the COVID-19 pandemics have been replaced by vaccine nationalism and distribution, which “all, of course, act as an extension of existing geopolitical competition” (Grgic, 2021:1). The US Government refused to participate in COVAX, withdrawing from WHO and the ‘America First’ executive order in December 2020 to secure a “priority access” for COVID-19 vaccines (WHO, 2020; 2020a). The Brexit row worsened due to an EU’s blockade against the vaccines produced by EU manufacturers to Northern Ireland (Eaton, 2021). Compared to 49 wealthy countries that administered 39 million vaccine doses, only 25 million doses were delivered to one developing country (Farge, 2021). In addition, vaccine producers in Russia and China test or

approve vaccines of uncertain quality, so far avoiding stringent regulatory authorities yet negotiating bilateral agreements with Latin American, Asian, and African nations to sell vaccines or propose joint production.

Vaccines for who?

Understandably, the competition has been fierce to buy doses, and as a result, the initial production was exhausting for consumption in Russia, China and the Western nations (Vilasanjuan, 2021). In these circumstances, India and South Africa requested the World Trade Organisation (WTO) not to lock the vaccine, diagnostic tools and treatments by the intellectual property rights during the pandemic. If the patent was locked, only the rich countries would benefit from the new technologies as they come on the market, whereas the less-developed countries will be wrecked by the pandemic (Vilasanjuan, 2021).

The below statistics demonstrate how unfairly the vaccine has been distributed and delivered.

About 20.8% of the world population has received at least one dose of a COVID-19 vaccine, and 2.4 billion doses have been administered globally, and 32.6 million are now administered each day. Only 0.8% of people in low-income countries have received at least one dose (Oxford Martin School, 2021).

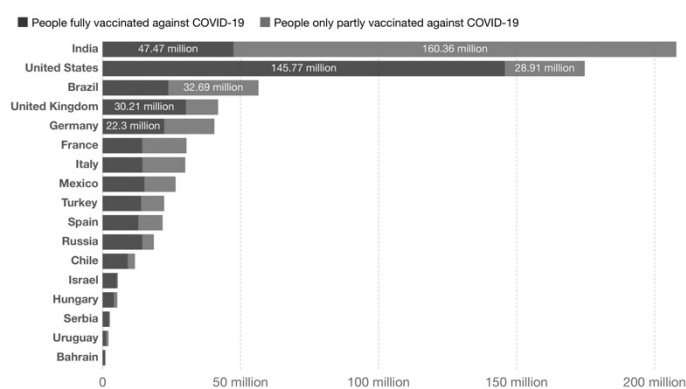


Figure 2. Number of people vaccinated as of 19 June 2021

Source: Oxford Martin School, 2021

The Covid-19 pandemic has affected nearly every country globally, changing the lives of billions of people. About 178 million infected, and about 3.9 million died of Covid-19 (Ullah et al., 2021; 2020). Therefore, vaccine development has come as a beacon

of hope for billions (Balasubramanian, 2021).

With regards to vaccine access, some countries are fortunate to be able to order sufficient doses and invest in producing vaccines, while some are struggling to order for purchase for their citizens. Countries like the United States, Israel, United Arab Emirates, United Kingdom, and India, among others, developed and/or acquired vaccines and rolled out their distribution plans to some extent (Figure 2). Many others in Latin America, Africa, and South Asia could not

develop their vaccine or acquire purchasing rights to existing vaccines. Although Russia developed Sputnik V vaccines and China did the Sinovac vaccine, with limited authorizations and undermining by others, there were limited use and export. China and Russia being bullied and labelled by the West as a myth in the free trade and secrecy seized on a chance to project their influence by providing medical aid to countries in need (Grgic, 2021), even though this did not go without contention and controversy within the ambit of international relations.

Vaccine donations gave some producing countries such as China, India and Russia geopolitical leverage to step into a gap left by Western governments (Hosp and Wenger, 2021). In early June 2021, the G-7 summit ended with some notable decisions. We quote below from UNICEF. “In a landmark agreement at G7 summit, held in Cornwall, UK, global leaders have pledged to share COVID-19 vaccine doses internationally, in support of global equitable access and to help end the acute phase of the pandemic. Building on the momentum of the G20 Global Health Summit hosted by Prime Minister Draghi and President von der Leyen and the Gavi COVAX AMC Summit hosted by Prime Minister Yoshihide Suga of Japan, G7 countries committed to sharing at least 870 million doses of COVID-19 vaccines directly, to deliver at least half by the end of 2021, and reaffirmed their support for COVAX as “the primary route for providing vaccines to the poorest countries (UNICEF, 2021:1).”

The painful reminder, however, from the summit has been the overtly repetitive words from G-7 leaders that “the poorest” countries would be given the vaccine. This phrase, while well-intentioned, suggests the G7's being out-of-touch or even disrespectful because the World Bank and United Nations have already replaced this term with “least developed”.

We touch upon a bit about some vaccine diplomatic successes. The US plans to donate 500 million Pfizer coronavirus vaccine doses to nearly 100 countries over the next two years (Reuters, 2021). China has donated 18.5 million vaccine doses worldwide, with 5.85 million going to Africa, less than half of what has been donated to the Asia Pacific region (Edward-Ekpu, 2021). China has sold about 683 million doses worldwide. Africa has purchased 33 million, the majority by Egypt and Morocco, and Latin America has purchased 279 million doses, Asia Pacific 260 million, and Europe 111 million (Edward-Ekpu, 2021). Additionally, China has donated 500,000 doses of its Sinopharm vaccine to Nepal (Sharma, 2021).

Of course, vaccine diplomacy is delicate. Governments have to attempt to strike a balance between global and domestic pressures. Domestic demands mount as citizens of respective countries suffer and die. Therefore, quelling infection rates and citizens' discontent are priorities over sending shipments abroad. In addition, vaccine diplomacy provides massive opportunities for the governments to

increase their influence through diplomatic relationships and developing common goods.

Diplomacy today has become a race. It is about losing and winning over others. Wheaton and Deutsch (2021) appropriately pointed out that European capitals are getting ready to give away their coronavirus vaccines with conditions that they get back as good as they give. Soon after they realized that the supply of vaccines in the EU is set to exceed demand, they reversed their decision from the halting vaccinations to start diverting doses to less fortunate countries. Interestingly, the EU feels humiliated because Russia, China and India seemed to have taken all the credit for supplying vaccines (Wheaton and Deutsch, 2021).

Discussions and conclusions

According to Bloomberg (2021), as of 21 June 2021, more than 2.62 billion vaccine doses have been administered. If we look at the global vaccine demographics, a stark disparity appears; for example, in DR Congo, only 0.1% of the population has been vaccinated when it is about 50% in the USA. This disparity has been exacerbated by the disparity in foreign relations with certain countries. For example, socialist countries cannot expect to get vaccine doses from the USA. Though there are debates that the world goes through humanitarian crises, ideological war should be placed aside. As mentioned earlier, during the Cold War period, the two superpowers of the United States and the Soviet Union put aside tensions for the common good. They cooled bilateral relations in the process by practising vaccine diplomacy.

These two countries successfully helped many underdeveloped nations eradicate smallpox and polio. They were also successful in gaining their foreign policy goals, such as the expansion of influence in the world and confirming their global roles. This means that they did it through vaccine diplomacy. Of course, there are opportunities for vaccines to promote cooperation between Asian nations. For example, China, India, Indonesia, Japan, and Vietnam can develop and produce new vaccines (Almedia et al., 2009). Coordination and cooperation about vaccine development between and among them could ease existing conflicts, notably between China and India.

Given the exemplary legacy of international scientists, vaccine developers, global health practitioners and government officials joining together for the goal of improved universal health, the current leaderships double down the use of vaccine diplomacy in foreign policy.

A patent waiver could also be the way to achieve equitable vaccine access globally without being dependent upon vaccine diplomacy. The suspension of the IP protections on Covid-19 vaccines allows producers to export raw materials, industrial parts and components and allow technical knowledge transfer from

vaccine makers in the global north to new manufacturers in the global south (Gonsalves & Yamey, 2021). There are needs to be aware of immediate implications and limitations once the waiver is enforced, including raw material and supply bottleneck, infrastructural and manufacturing limitations and funding unavailability (Chakraverty, 2021). However, in the long run, waiving the patent could end “the vaccine apartheid” (Byanyima, 2021).

Weaker nations are falling behind in global vaccine competitions. But the migrant communities who are already in vulnerable conditions bear the brunt of this competition disproportionately. Migration is becoming an increasingly essential aspect of bilateral and international diplomatic relations, just as it is in war and peace, trade, economics, culture, the environment, and human rights. Despite a growing body of research on the many dimensions of modern diplomacy, migration has yet to be included in such studies, despite its prominence in practitioners' plans. This is not to suggest that research into the relationship between foreign policy and population movement has not been done. Indeed, there is a substantial body of knowledge in this domain, with the majority of it focusing on immigration across OECD countries (e.g., Tempo 2008; Hollifield, 2004).

While taking on the rewarding role of global vaccine leader may appear to have a short-term benefit, it is in the national interests of the world's wealthiest countries. Nonetheless, it is unlikely to see the pandemic ending anytime soon unless they take on this responsibility. Therefore, policymakers and leaders in all affluent countries, particularly the most powerful states, should reject vaccine nationalism, and promote vaccine diplomacy as a top priority.

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Homestay Accommodation in Brunei Darussalam

An exploratory study

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Abstract

Homestay is an alternative product to mass tourism where tourists are accommodated with local family allowing the tourist to learn local culture and lifestyle. The changing tourists' preferences influence the phenomenon of this accommodation trend for unique experiences, increasing competition in the market, and the rapid development in communication technology. This paper aims to observe the current state of the homestay situation in Brunei. This research utilized qualitative in-depth semi-structured interviews with a total sample of 23 respondents consisting of homestay operators, local community and tourism officers. The findings are that homestay in Brunei experienced issues with licensing and standards due to unending bureaucracy and unclear instructions, an elusive search of successors for long-term sustainability, and issues on participatory management within the community. This paper contributes valuable insights to developing strategies for the sustainability of homestay tourism, particularly for the stakeholders involved, such as homestay operators, policymakers and tourism practitioners.

Keywords: Homestay, Community-based Tourism, Community Development, Sustainability, Brunei

Introduction

Accommodation is an essential component of the tourism product, and it is observed that the phenomenon of tourist accommodation has changed over the past years. Alternative accommodations such as commercial homes, bed & breakfast establishments and guesthouses provide a substitute to tourists who prefer accommodation aside from conventional hotels. The growing popularity of homestay and community-based tourism is due to the intensified competition of creating

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distinctive tourism products, changing tourists' preferences reflecting demand for more unique experiences, and advancing communication technology. With the aid of communication and digital technology, the visibility of alternative accommodation, which is usually remote and isolated, is now accessible to more tourists creating better experiences and similarly better exposure for homestay owners (Lopes et al., 2019; Novelli 2005; Scarinci & Harold, 2008). They are idiosyncratic from the conventional hotels in personalized and customized services with an authentic, 'local' touch (Gunasekaran & Anandkumar, 2012).

Homestay accommodations have increased drastically, especially in developing economies and contributed significantly and directly to small-scale entrepreneurs (Yahaya & Rasid, 2010). This is highly emphasized to ensure tourists' spending goes now to the local communities within the host destinations, leading to a better standard of living and quality of life of residents (Chin, 2017; Chin & Hampton, 2020; Chin et al., 2017). The surge in homestay accommodation is also contributed by low entry barriers and the convenient use of the available resources. The concept of commercializing homes has been originally practiced in Europe, with opening up their privately-owned homes commonly situated in well-known American vacation areas to accommodate tourists (Nuntsu et al., 2004). Homestay venues are 'private homes in which unused rooms are rented for the purposes of supplementing income and meeting people' (Lanier & Berman, 1993, p. 15). In addition, homestay is defined as a form of "alternative tourism where tourists stay with the host's family in the same house and experience the everyday way of life of the family and the local community" (ASEAN Homestay Standard, 2016, p. 3). Homestays at the rural locality are typically popular among foreign tourists who are from affluent backgrounds and international students for their significant cultural experiences. The homestay development in the rural areas has been well-known for over a considerable period and establishes a crucial form and responsibility of the local community involvement in tourism. It is known to be a component of Community-Based Tourism (CBT), where it is small-scaled and practice a bottom-up approach. True CBT initiatives emphasize the direct involvement of the host community in tourism activities and, in turn, empower the local communities socially, economically or politically (Kunjuraman & Hussin, 2013). Hence, the homestay programme is seen as one of the best ways to engage the local people to be more involved with tourism projects.

In the context of Brunei, one of the aims of the Tourism Development Department is to strengthen and ensure the sustainability of existing tourism products as well as developing more quality tourism such as cultural and heritage tourism (Ahmad, 2013), Ecotourism (Hamdan & Low, 2014), Film tourism (Chin & Liu, 2018; Liu et al., 2020) and homestay (Janaji & Ibrahim, 2020). One of the recent strategies was the recognition of homestay tourism which could highlight the appeal factor of Brunei

through local lifestyle, culture, music, traditional food, and the experience and uniqueness of homestay. However, it is notable that there are limited data, information and study on homestays in Brunei. Hence, this paper explores the overview and current state of the homestay businesses across the four districts within the country. If Brunei were to move forward in developing homestay products, it is vital to identify the existing problems and issues in homestay businesses' current state of affairs. This study, therefore, provides valuable insights in understanding such issues and espoused positive strategies for the sustainability of homestay tourism, particularly for the stakeholders involved, such as homestay operators, policymakers and tourism practitioners.

Homestay conceptualized

The concept of homestay is well studied among academics worldwide, hence having a variety of different definitions and views. Homestay is described as “a type of accommodation where tourists or guests pay to stay in private homes where interaction with a host and/or family, who usually live on the premises and with whom the public space is, to a degree, shared” (Lynch, 2003, p. 528). Kayat (2011) asserts that it is a home setting equipped with exclusively owned facilities and managed in delivering comfortable and friendly services for guests in which friendship and bond with the hosts are expected to develop. This definition agrees with Yahaya and Rasid (2010) that tourists also value quiet scenes of natural beauty, indicated expanded enthusiasm to connect with the way of life of host inhabitants they are staying with and make social collaborations. Such tourists are known to be experiential as they discover genuine back-of-house knowledge that has not been treated for consumers. In addition, Frederick (2003) also points out that homestay is a prominent choice to cater to international students that will be hosted by a local family, which provides them with authentic learning experiences and culture outside of the classroom setting.

Homestay activities are common worldwide with varying degrees depending on the city or the country. According to Hamzah (2009), the economy, culture and political situation of a country fundamentally affect the concept of homestay development. Subjecting upon the place, homestays vary in terms of their location, whether within the heart of a village, close to the beaches and even within a plantation area. The admiration towards homestay is rising solely to its assimilation of all aspects of the rural environment that offer a mix of natural, cultural and human interaction experiences (Amir et al., 2015). The opportunity to gaze and engage in village residents' daily lives enables the visitors to get involved with the local community in ways that differ from typical tourism interactions and settings. This is what rural homestays have to offer (Dolezal, 2011). As a matter of fact, Kayat and Nor (2006) highlight that homestays are characterized beyond an accommodation, as it stresses

on the idea of lifestyle and experience of the local culture and economic activities. Therefore, homestay is an interrelated term with specific cultural aspects. It is believed that the concept of homestay compliments community-based tourism (CBT) as a new addition to the tourism industry. This is supported by the findings of Korir et al. (2013), where the effects from engaging in homestay tourism not only merely benefit the socio-cultural and economic benefits on the host inhabitants but also protect the cultural identity of the host communities.

Propensity and Constraints of Homestay Tourism

Homestays are typically classified as a programme initiated and encouraged by the government as it is perceived as a distinctive product that supports the country's tourism sector and encourage the protection of the authentic local heritage (Agyeiwaah et al., 2014; Galbreath, 2017). This is in agreement with Pusiran and Xiao (2013), who suggest that running homestays in rural communities can be a means of achieving sustainable development by enhancing the destination representation and lowering the poverty rate. In a community-based approach to tourism, the inclination towards homestays can be motivated in regards to stimulating socio-cultural interactions or exchanges (Nor & Kayat, 2010; Sweeney, 2008), providing extra income and employment (Liu, 2006; Sweeney, 2008), preserving local culture (Wang, 2007), providing an authentic learning environment for hosts' children (Richardson, 2004) and empowering women in rural communities (Acharya & Halpenny, 2013). In other words, Dahles (2000) simplifies that homestay accommodation services have contributed an indirect source of extra income to perform other commitments while maintaining their religious and social standing.

However, literature has also exhibited numerous challenges encountered by homestay operators, particularly in the course of service delivery which comprises of the mismanagement with the establishment, administration, monitoring and the sustainability of homestay tourism (Kayat & Nor, 2006; Nor & Kayat, 2010; Shukor et al., 2014). Cultural shock, seasonality of homestay business, insecurity and delayed payment by intermediaries have appeared as constraints for operating a homestay business (Agyeiwaah et al., 2014). This shows similarity with the discovery from a study by Nor and Kayat (2010), where the challenges can be derived from both within (internal) and outside (external) the community. Internal challenges refer to the aspects that can be controlled by the homestay participants or associations themselves, such as unbalance demography, passive community, leadership problems, informal organizational structure, over-commercialization and conflicts in the community. Meanwhile, external challenges are defined as factors arising beyond the control of these stakeholders, which include misconceptions of homestay programme and methods of payment. A recent study by Nor and Awang (2017) found that the two

major challenges in running a homestay are the conflict of attitude and the insufficiency of homestay regulations as there is inadequacy observed in terms of general awareness concerning the concept of homestay. With the emergence of conflicts, Nor and Kayat (2010) state that the sustainability of homestay will be at risk due to the pessimistic behaviour and disintegration of unity. Malaysia's Ministry of Tourism claimed that the improper use of the 'homestay' title by unregistered operators has led to the uncertainty of what homestay supposedly constitutes and negatively influenced the registered operators' income (Nor & Kayat, 2010). The emphasis is that the lack of monitoring by government and state agencies may have brought about the mushrooming of unregistered homestay operators. Nor and Awang (2017) addressed that it has resulted in demotivation as the homestay income distribution has to be shared between the registered and unregistered homestay operators. Moreover, financial issue is a major concern among homestay operators as this type of tourism is unable to bolster consistent income on a monthly basis and that homestays are primarily utilized on a seasonal basis such as during school holiday (local and international) and public holiday (Ariff et al., 2015).

Furthermore, Pusiran and Xiao (2013) add that the problems such as an unbalance demography and lack of youth participation or successors may have considerable effects on homestay programme. Malaysia's homestay programme was susceptible to the risk of inaccessibility of successors in taking charge of the functioning of homestay from the parents or former operators (Mohamed & Aminudin, 2016). In addition, Shakur and Holland (2000) prove the importance of the availability of successors to secure from disruption in the homestay programme. There are several ways to foster such matter by generating consciousness (Silparcha & Hannam, 2011), inspire and shape them to be passionate (Ateljevic, 2009; Ibrahim & Razzaq, 2010), encourage empowerment and possess heritage skills (Sung et al., 2012). The role of the family in encouraging is one of the essential motivational factors that impact the participation of successors in the homestay programme. Such a factor is further explained where the acceptance of their parents' advice may depend on the children's perceptions as the potential successors by considering the outlook of how homestay programme was managed by their parents (Mohamed & Aminudin, 2016).

The availability of additional income, the contentment of the parents' and the sense of belonging within the community, are some of the aspects taken into account before accepting the role of a successor. In addition, Razzaq et al. (2010) extend that the reason behind the need to recruit young people is their ability to continue the homestay programme by producing and developing alluring packages and activities. This is certainly substantiated with the vitality, social skills and home-grown experience provided by young people in order to create, organize and lead nature- and culture-based activities (Muslim et al., 2017). Moreover, the advantage gained from the active

participation of the youths in handling the activities enhances the value of homestays, either emotionally, educationally or experientially (Jamal et al., 2011).

Homestay in Brunei Darussalam

The introduction of 'One Village One Product' started in 1993 with aims to encourage the culture of self-employment efforts, to increase the community spirit and interest in local products and to strengthen the local community to specialize in a sustainable community-oriented economy. This initiative is to focus on the brand values of local village products and to promote a community-based rural development mechanism that utilizes local resources for the development of products or services to each village. The homestay programme is a product listed in one of the four main categories, with the first project implemented in Temburong District in 2008.

In order to streamline the concept and features of what homestays should constitute, the Tourist Accommodation Standards - Homestay was established by National Standards Council Brunei Darussalam in 2016. It serves as a guideline for homestay accommodation in Brunei by introducing specific criteria to ensure that the service quality and facilities conform to the standards. According to Brunei's Homestay Standards, it is regarded as a form of hosted accommodation at a residence where guests stay with the host's family and experience the everyday way of life of the family and community. Most of the criteria from Brunei were adapted from the ASEAN Homestay standard[†] with minor adjustments to the local environment. For instance, supplementary criteria and requirements were listed in the Brunei Homestay standards to ensure the best fit in the Brunei locality. The additional criteria include 'host' from the homestay can be independent house owners; the need for homestay to obtain approval from Authority of Building and Construction Industry (ABCI) or relevant authorities; homestays situated on water such as in Kampong Ayer should have proper sewage disposal. The criterion listed in both the ASEAN and Brunei Homestay Standard includes categories such as the host, accommodation, activities, authenticities, management, location, safety and security, marketing and sustainability principles. The establishment of ASEAN Homestay standard is necessary, providing an opportunity to standardize a base level understanding of what a homestay is and to establish a minimum standard across all ASEAN member states. The standard also facilitates a coordinated approach, encouraging partnership with the relevant stakeholders, creating a positive environment while revitalizing the rural economy as well as poverty reduction (ASEAN, 2016).

[†] <http://www.tourism.gov.bn/SiteCollectionDocuments/ASEAN-Homestay-Standard.pdf>

Methodology

This research applied a qualitative approach as the techniques and methods allow greater spontaneity and adaptation of the interaction between the researchers and the respondents. The sample ($n=23$) in this research was chosen using a non-probability method, specifically purposive sampling, based on the suitability for the aim of the study. The relevant respondents comprised of local communities, tour operators, homestay owners as well as government officials. The main purpose of choosing purposive sampling is to focus on those who are involved in homestay operations to obtain more reliable and detailed data. In addition, it is the most cost-effective and time-effective sampling method given the budget constraint. This paper recognizes the limitations that not all homestay has been covered within the scope of this study. However, the authors have paid particular attention to cover those active homestay operations throughout the four districts. In addition, authors have also reached 'data saturation where no new information was discovered from further interviewing the respondents.

For collecting data for this research, we utilized an in-depth, semi-structured interview. This combines a set of open-ended questions with the opportunity for the researchers to explore particular themes or responses further. This offers the informants a freedom to express their views on their own terms (Cohen & Crabtree, 2006). The interviews were conducted with an average duration of approximately 1 hour 15 minutes with consent from participants required to audio record the conversation to ensure that the researchers were focused. During fieldwork and interviews, direct observations and other notes were detailed down, and interview data were scrutinized in the light of emerging themes which enabled self-reflection in qualitative fieldwork. Related secondary data were used as supportive data to enhance the findings by conducting correlation and comparisons. The data were coded and analyzed using Nvivo software to draw out specific themes based on the components from both studies. Applying such an approach is the most appropriate strategy to gain an in-depth understanding of the situation in homestay businesses in Brunei.

Results and discussions

Issues with intermediaries

The notable point that most respondents mentioned is the confusion from the bureaucratic procedure of licensing and standards. Initially, the respective District Office, Ministry of Home Affairs (MOHA) handled homestay registrations in Brunei and is now under the jurisdiction of the Tourism Development Department, Ministry of Primary Resources and Tourism (MPRT). The reason behind this is to promote the interest of local products within the country under the government's initiative 'One

Village One Product (OVOP)'. However, it has evolved to include homestay accommodations as part of the local tourism product, hence the inclusion of the Tourism Development Department. These changes were not clearly communicated to relevant stakeholders such as potential or existing homestay owners creating confusion and misperception of the administrative process to apply for licensing. Furthermore, with the introduction of ASEAN Homestay Standards in 2016 as part of the ASEAN Tourism Strategic Plan and the introduction of Brunei Homestay Standards, homestay owners must comply with both standards to be recognized at the local and ASEAN level.

Respondents have also pointed out the dissatisfaction of bureaucratic experiences to obtain a license. The different set of standards caused confusion and difficulty to homestay operators and inter-governmental procedures. Homestay operators need to start their registration process at Licensing and Enforcement Unit, where they receive the registration form. It then passes to the Standards Unit to perform an inspection on whether businesses or houses comply with the Brunei Homestay Standards. Once assessed, the form is returned back to the Licensing and Enforcement Unit to issue the licensing certificate. The standards have been adopted in the Tourism Premises Registration process at the Tourism Development Department for all accommodation premises owners in line with the regulations in Tourism Order 2016. The entire procedure above took at least four to six months or longer, as mentioned by respondents. "If your premise did not fulfill the requirements during inspection, you need to wait even longer to get a letter to know what has not been fulfilled. I cannot wait that long without doing any business" (Homestay owner respondent). With the updated registration process coupled with the established homestay standards and the time needed for inspection, most respondents are apprehensive about going through the bureaucratic process. This might be one of the reasons for the rise of unregistered homestays, as observed in Brunei.

Elusive search for successors

The lack of youth participation in homestay businesses is found to be frequently mentioned in the interviews conducted. Out of 23 respondents, only five homestays suggested that they have younger generations involved in operating the homestay, and they are likely to become the successor in the future. However, considering the demographics of the homestay operators (in their late 40s and 50s), they are mainly motivated due to hobbies or interest in meeting new people. Meanwhile, the younger generations involved in homestay ventures mostly have their full-time job and commitments. Hence, the main bulk of the operation is supported by their retired parents or their temporary unemployed siblings who stay in the house full time during weekdays. The younger generation participates full-time only during the weekends as tour guides, cultural performers, or transportation services. Most younger respondents

also mentioned that they have “no interest to continue the homestay businesses and they are only there to help their parents out temporarily.” Hence the risk of the continuity of homestay operation is seeking a successor is worrying.

A successful and sustainable homestay and community-based tourism need young and active successors to continue to give impacts within their community and beyond. One very common thing that most younger generations use is an information technology (IT), such as building websites, advertising in social media and online booking sites which aided in the exposure of the homestays. The findings concur with Gunasekaran and Anandkumar (2012) that the role of communication technology is pivotal. We argue that the current demographics of homestay operators may not be able to utilize IT better as compared to the younger generations. With the use of IT, even remote homestays can be promoted widely.

Participatory management of the community

Managing and empowering community participation can be a challenging task. The involvement of women is actively visible in conducting demonstrations of handicrafts, local delicacies, and traditional cakes as Acharya and Halpenny (2013) believed that the importance of inclusiveness within the community portrays positive impacts and empowers women in communities.

In Brunei, homestays are mostly grown organically by volunteer participants with a bit of initial push from the government. However, this has created a community that becomes over-reliant on a government agency. According to Yahaya and Rasid (2010), one of the criteria to ensure successful homestay operations is that participants are willing to take part in investing time, money and effort. According to the respondents, the attitude of most communities in Brunei is ‘wait and see’. Problems such as lack of leadership skills, the lack of proper management system such as a homestay organization, working committees are all constraints faced by homestay operators. Additionally, the lack of willingness and the inability to see the benefit of working together makes the difference in opinions. Additional barriers were evidenced within the interviews. “I know two other people who are running a homestay too within the village, but we have an entirely different opinion. I can advertise my own homestay without working with tour operators. Why give a cut of commission to them? I can simply use social media” (Respondent 5). Respondents 7 and 9, who stayed in the same village, however, thinks that “engaging in tour operators will bring bigger market, for example, China, where social media platforms are different from ours. We have to think long term and reach out wisely.” Due to the difference in viewpoints, working committees were not set up, and individual homestay owners usually focus on their own businesses. However, some villages in Tutong district have participatory initiatives for activities such as handicrafts,

woodwork and cooking showcasing different ways of life and unique traditions. A 'head' is formally nominated as a spokesperson to liaise with outsiders (tour operators and visitors) and agreed on a specific date of visit. The head then organizes community dance from active youth participants or community activities like fishing, carving, cooking etc., involving men and women within the village. Most of them are usually volunteers participating, usually only during their free time.

A number of respondents mentioned that the government had offered useful courses such as languages, tour guide and standard homestay management. Of course, cooperation and understanding are important between communities to create a synergy in amplifying the involvement of the community. This is to ensure that the community is being empowered to be more proactive and participative in accelerating the progress of homestay tourism in Brunei.

Conclusions

In response to greater demands and changing tourists' preferences, alternative forms of tourism, particularly homestay, exhibit great potential in the tourism industry. This is mainly due to its distinctive features incorporating cultural values where conventional tourist accommodations do not exist. The emphasis is on its important contribution to smaller-scale enterprises and the standard of living of the local communities in developing economies. Hence, the community-based approach has drawn homestay to be a niche segment in the tourism industry.

The findings show that the regulatory process for homestay was unclear as it was originally administered as One Village One Product under the Ministry of Home Affairs. With the establishment of homestay standards in ASEAN and Brunei context, the Tourism Development Department has taken part in assessing the true homestays based on the criteria set. However, the multiple standards to adhere to has brought confusion to the registered and potential homestay operators. Such effort was however made to ensure that homestay establishments are registered because unlicensed homestay establishment was growing. The creation of public awareness and clear communication of streamlining the licensing process is therefore crucial. Moreover, the homestay operators encountered difficulty in looking for successors, either among their families or the community. This has created a sustainability challenge for homestay businesses. The majority of the younger generation has a full-time job and has little interest in running a homestay business usually owned by their family members. Therefore, initiatives, awareness and strategies need to be established to appeal to the younger generation in homestay businesses. Lastly, management and empowerment among the local community are deemed to be below the optimum capacity. The lack of leadership skills and the lack of a proper management system

appeared as challenges in this study. Brunei is already a tight-knit community, but a sense of belonging needs to be strengthened so that community could work hand in hand to ensure an overall greater tourist experience. The engagement of the community at various ages and statuses should be encouraged and supported by the government.

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Women Leadership in Brunei Darussalam

Challenges and enabling factors

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Abstract

This article examines the experiences of women leaders and their challenges in Brunei Darussalam. Globally, women are underrepresented in leadership positions. Though the Brunei government does not discriminate against any gender in delivering free education, medical facilities and healthcare, women in leadership positions are as well underrepresented. We try to understand the factors that challenge as well as motivate women to become leaders in Brunei. For this research, we conducted qualitative interviews with some respondents selected purposively. The study results show that women leaders in Brunei face challenges in obtaining financial support and accessing resources. Despite the challenges, there are some women who have been assuming and excelling in their leadership roles. The study identified that personal strengths have also been critical in contributing to their successful leadership.

Keywords: Women leadership; Brunei; financial support; mentors; family/spousal support

Introduction

Buzzanell and colleagues (1997) define leadership as the process by which an individual mobilizes people and resources to achieve a goal. Leaders motivate others to aspire to achieve them to do so. Leadership mediates others to achieve a certain goal for a team, organization or of a nation (Goleman, 2003). It comprises a set of traits that allows a person to persuade others in order to achieve a given aim (Monjur, 2010). The concept of leadership has a religious dimension too. For example, in Islam, leadership is a symbol of trust[†] that a person acquires to guide the community into the way of Allah SWT (Monjur, 2010). The fundamental sources of Islamic leadership and guidance for the Muslim leaders are Al-Qur'an and Hadith.

Nevertheless, different communities may have different perspectives on women's leadership. We people have an image in our minds about what a male

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[†] *Amanah* (Monjur, 2010)

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in mind? Of course, great leaders possess similar leadership traits. There is currently a lack of powerful women leaders; it is difficult to know how female leadership qualities can be used to their best advantage (UN Women, 2021; Ullah, 2013; 2013a). In general, women often take up low to middle positions compared to men, and they face stereotypes that limit their power which prohibits them from holding higher positions (Major and O'Brien, 2005). Although some women can reach top leadership positions, they still face the leadership labyrinth (Eagly, 2007).

In Brunei Darussalam, although women are treated equally as men, the number of women leaders in the country is relatively low as compared to men (Yunos, 2011). This is the reality despite the fact that women in Brunei Darussalam surpass more than men in education (Figure 1) (UNESCO, 2018).

Additionally, in Brunei, women holding seats in parliament are only 9.1% compared to men's 90.9% (Inter-Parliamentary Union, 2018). As of 2010 until the present, there have only been three women deputy ministers appointed in Brunei: Datin Paduka Hajah Adina Othman as deputy ministers of Ministry of Culture, Youth and Sports, Datin Hj Elinda Hj CA Mohamed as the Deputy Minister at Prime Minister's Office and Datin Paduka Seri Dr Hj Romaizah Hj Mohd Salleh as the Deputy Minister of Ministry of Education (Masli, 2010). Unfortunately, as of today, out of all three female deputy ministers, only one still upholds their position.

There is a deficiency of data on women leaders in the private sector. While there

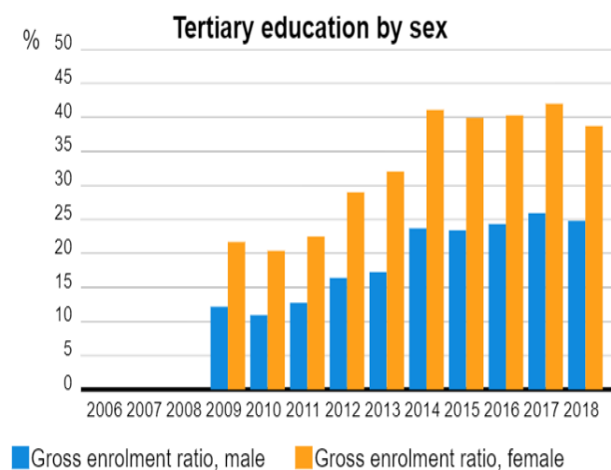


Figure 1. Shows the gross enrolment ratio by sex in Tertiary education in Brunei Darussalam. Source: UNESCO, 2018.

fully exploited (Low and Zohrah 2013).

is an estimate that women working in the private sector is 58%, the number of women holding leadership positions is inaccurate (Department of Economic Planning and Development - Labour Force, 2018). This may be because women holding higher positions in Brunei Darussalam are still negligible, and likely that women are sidelined unintentionally, and their full potential is not

According to Brunei Darussalam's National Vision plan (Wawasan, 2035), the country aims at achieving a sustainable economy in which equal opportunities for women in the workforce and nation-building are encouraged (Department of Economic Planning and Development, 2012). This research contributes new knowledge about women's leadership to the literature. This, in the long run, inspires more women to take up leadership roles in the country. It was until 26 March 2021 that leadership opportunities for women are brought up during the Legislative council in which YB Khairunnisa have agreed that women have the capability to prove themselves (Othman, 2021). Countries such as Thailand, Vietnam and China recognize women's ability to engage in their company's best interest to guide others without the help of men (Bullough, 2013). The growing number of women leaders may also motivate other women to advance in their careers. Schipani et al. (2009) note that networking is essential for women to build up social capital, which is crucial in obtaining a leadership position. Both mentors and their mentee share their experiences and assist each other in times of need. With an increasing number of women taking up leadership roles, they have more influence, power and recognition, giving inspiration for others to do the same.

Objectives and methodology

Given the relative lack of research on women's leadership in the country, this research aims to discover women leaders' challenges and experiences in Brunei Darussalam. Women are often viewed as unsuitable for leadership in Bruneian society. This research aims to investigate the motivation and problems women experience in becoming leaders and examine the societal pressures encountered by these women leaders in the country.

This research is based on a qualitative approach. To collect data, I conducted a semi-structured interview. The respondents were asked about the motivations they had and difficulties they faced as women leaders, and what factors contributed to their success. Tedrow & Rhoads (1999) conducted similar research in a community college in the United States. This research inspired me to do this research in Brunei. Women to be interviewed consist of CEOs and Co-founders of their organizations, including government officials. Unfortunately, out of ten intended participants, the researcher could only interview seven women leaders because some of the interviewees rejected the request due to time difficulties. During the interview, notes were taken, and conversations were recorded via mobile phone. The interviewees have given consent to be recorded and used their names for this study. The interview lasted 15 minutes to 1 hour, and most of the interviewees conversed in English, but some also spoke bilingually (a mixture of Malay and English) for better communication. The data collected from the respondents were analyzed using thematic analysis. Women chosen in the study must be women living in Brunei Darussalam and a citizen of

the country, and they must also be portrayed as leaders in social media and news report. Finally, they must have at least three to five years of leadership experience which may include managing one department or have experience handling big projects and initiatives that have had an impact in Brunei.

Table 1. Background of women leaders interviewed

Participants	Position	Other Organization/s
Nornaqibah Hamid	Chairperson of Lamin Warisan	Committee of Minda Youth Movement
Dewi HK	Chairperson of Sutera Memento	Teacher in one of sixth form in Brunei Darussalam; part-time news reader
Fatin Arifin	President of Young Entrepreneurs Association of Brunei (YEAB)	Founder and convener in Brunei Chevening Youth Forum
Noor Hafizah Hj Rashid	Founder of Big-BWN Project	Founder of womennovation; Co-founder of womenpreneur network
Ain Bandial	Co-founder of The Scoop	Journalist in The Scoop
Pg. Noor Affizan	Founder of YoucanLead.bn	Eye surgeon; deputy head of ophthalmology in RIPAS hospital
Dr Siti Mazidah Haji Mohamad	Lecturer in FASS UBD	Mentor for Young Professional Network (YPN)

Source: Author, 2019

Factors affecting women leadership

Mentorship

Mentoring is a professional activity, a trusted relationship, a meaningful commitment (Eric, 1992). Women leaders need mentors for personal growth through learning experiences (Van Velsor and Hughes, 1990). Mentoring may benefit the mentees with experiences, understanding, challenges and support to pursue their own objectives (Johnson 2002). Lo & Ramayah (2011) note that mentoring has a positive relationship with job satisfaction, such as faster promotion, teamwork and helpful supervisors. Hetty van Emmerik (2008) shows that with the help of their mentors, employees enhanced their careers.

Work and family life balance

Women being able to lead must also strike a balance between work and family life (Jyothi Sree and Jyothi 2012). Women leaders must be able to see themselves multitasking to maintain familial relationships while advancing the cause of the organizations they work for (Cheung and Halpern, 2010). Research by Hewlett & Luce (2006) revealed that women leaders that achieve success in their careers are seen to have a balanced family life as well. In order for them to bring a balance between work and family, they got to prioritize their family while taking up the work responsibly. Almaki et al. (2016) have also supported this that one of the ways to assume a leadership position is by recognizing the role and responsibilities at work and following precise regulations for home.

Challenges women leaders face

Gender Stereotype

Historically, the idea that men make better leaders than women has gained prominence (Kiamba, 2008). This gender stereotype[‡] has a severe impact in the long run on leadership development. In characterizing leadership, scholars believe that men are more ambitious and risk-takers than women (Apesteguia, Azmat, and Iriberry, 2012). Women are seen to be more compassionate, caring and emotional (Weikart et al., 2007). This is, in fact, undermining the capability of women. The roles of gender stereotypes may affect how women lead and result in double binds, in which women are unlikely to receive recognition and undergo specific standards to keep up with men (Chin, 2011). Omar & Davidson (2001) note that in Japan and Singapore, women leaders must display leadership qualities like a man in their organizations. This, in fact forces the potential leaders to adjust to what the organization wants them to be (Heilman, 2001).

Social culture

Society's perceptions on the role of women are often shaped by their cultural practices, social belief and religion (Chigwata, 2016), which may affect the potential of women who want to climb up to leadership (Lahti 2013). The traditional gender norms still remain strong, as seen by McLellan & Uys (2009), where women must maintain their roles as mothers at home. Although the number of women holding higher positions is increasing, they still have the responsibilities as caretakers of their families (Hughes and Ginnett, 2009). An imbalance between work and family may lead to conflict that can affect the mental health of the incumbent (Fourie, Schurink, and Franks, 2006). Hence, many women leaders may choose not to have children in order to focus on their careers (Welch and Welch, 2006). Achour et al. (2014) found that in Malaysia, female Muslim lecturers are often bombarded with the conflict between work and family life. They are required to work extended hours, and as a result, they cannot take care of their children properly. Family satisfaction and organizational commitment become critical points for their life (Abdullah, Noor, and Wok, 2008).

[‡]how society sees both men and women should be (Burgess and Borgida, 1999)

Current research

In Brunei's perspective, K. C. P. Low (2008) explained that Brunei Darussalam indeed undergoes a "Father Leadership" style which is referred to as both paternal and maternal leadership. Although now that the social etiquette and gender roles are more open and flexible (Chin, 2011), this kind of leadership may affect society. This includes gender institutions influenced by patriarchal norms and values in which women were denied to achieve the position of power due to male dominance in the patriarchal society (Pengiran, 2017). Although women working in Brunei Darussalam are large in numbers, they still face significant barriers in reaching senior leadership positions (Othman, 2010). In Brunei, the Sultan's leadership is based on the national ideology of *Melayu Islam Beraja*[§] that serves as a beacon for the country's culture (K. C. P. Low 2008). Even though rights were given to women in Brunei in terms of education, healthcare and employment and citizenship (Othman, 2010), they still struggle for a balanced life (Aewon 2014). In many Asian countries, it is obligatory for women to be committed to family responsibilities as prescribed by their gender roles (Abdullah, Noor, and Wok, 2008).

Results

This study has identified several themes. The first one is the motivation to become leaders in Brunei Darussalam (Table 2). Of the seven respondents, two have the same motivation, which is to help the youth and community. The first respondent (A) aims to achieve the 'Wawasan 2035' target of creating a local brand called 'BigBWN' to create more entrepreneurship for local youth. While Respondent B is a lecturer in UBD and a youth Geographer herself, she comes to realize that youth in Brunei needs a certain push to help with their vision. She aims to shape the way youth perceives information by encouraging them to become more mobile and critical thinkers.

Table 2. Shows women leader's motivations to become leaders.

Themes	Motivation/s
Personal Development	Family, Passion, Youth and Community
Professional Development	Finding opportunities
Local Sectors	Developing media sectors

Source: Author, 2019

[§] Malay Muslim Monarchy

Respondent C is a final year student in UBD. This respondent has been given the responsibility of '*Lamin Warisan*' by her elderly. Although she is faced with doubts, she made the decision to overcome her challenges and prove herself suitable to handle the initiative. Respondent D, while taking the course Drama and Theatre, she was motivated, and she becomes passionate about performing arts and decided to create her own theatre production called '*Sutera Memento*.'

For another respondent (E), motivation comes when her expectation is low. While working as a doctor in Singapore, her life was very strict and regimental. Once she decided to take the time to shape her personal development, she started to see life differently, and she changed her life in a better direction. She started to share what she learned with others and soon realizes her voice can make an impact.

Respondent F is one of the co-founders of her company, 'the scoop'. While working in Brunei, she realizes that news media in the country did not do an excellent job in delivering Bruneians' stories and what interests them. Therefore, she and three of her colleagues took the risk of creating a platform that would reflect thoughtfully on stories in Brunei. Finally, another respondent (G) believes that her motivation came after joining an organization called YEAB⁴ in which changed her from being a shy person to the person she is now, more confident and risk-taker. When she was allowed to lead the initiative abroad, she felt it was life-changing to be entrusted with a big decision. From there, it motivates her to keep on going until now.

Table 3. Barriers faced by women leaders in Brunei Darussalam

Barriers experienced	
Financial support	Business sustainability, own financial
Access to resources	Teams, venue

As stated in the table above, the barriers experienced by women leaders are divided into two themes, which are: Access to resources and financial support.

All three respondents faced the same struggle in finding the right team. One respondent's team was mainly her students (as she is also a teacher in a sixth form centre in Brunei Darussalam) who often need parental consent to participate in theatre. Persuading parents is often difficult. This respondent has two permanent members (herself and her boyfriend). The other two respondents faced conflict in delegating tasks within their teams. For example, one is having difficulty for her team to understand her goal, and another finds it challenging to find support from friends, especially when handling events.

In terms of financial support, respondent F struggles to maintain her media business. She and her co-founders started the company with only BND 2,000, and with all from an editorial background and no business background, she faces difficulty in sustaining her business, knowing that media business is decreasing in revenue due to Facebook and Google taking the line of advertising. Respondent D also has issues funding her initiative. To her, people were still skeptical of 'Sutera Memento'. Therefore, the theatre is built from her own financial source. She often faces hardships in creating astounding events but also wanting to save cost, especially in terms of venue. She said, '*Venue I suppose is another challenge. There is a lot of venue in Brunei, but if you want a theatrical venue, there are only a few.*'

Table 4. Factors that allowed women leaders to achieve their goals

Scope	Enabling factor/s
Family/ Spousal support	Compromising activities, supportive, time management
Mentors	Experiences, reshape abilities and skills, mentality

Source: Author, 2019

Two factors that enabled women leaders to succeed. These are Family and spousal support and mentors. All respondents agreed that they found it easy to become leaders due to their family and spousal support, but each has different experiences. Most of the respondents said their family supports them in everything they do. As for another respondent (D), she was a single mother, and her family supports her in balancing their time taking care of her daughter while she is busy training. As for another respondent (B), she felt lucky she has her support system to help with her goals. For example, when she travels overseas, her family supports her in taking care of her daughter. She and her husband also agreed to adjust their free time for their daughter.

Ford (F), also agreed her family supports '*The Scoop*'; unfortunately, she also admits she sometimes has no time for her families and friends. She said, '*To be honest, I'm not good at balancing things. I work a lot, and I often don't have a lot of time to spend at home, but I have realized that in the past year, that is not a healthy thing to do just because everybody needs time to switch off and everybody needs time to connect with their family and with their friends. So, I think finding that balance is very typical because you always feel torn, especially you know you start your own business because it's like your baby right. You feel like the sense of obligation to it, and I think a lot of women think that way*

Lastly, (C) agreed that she is very privileged '*Lamin Warisan*' is a family initiative, and any events are considered okay. But whenever she needs it, she never hesitates to choose her family first unless given permission otherwise.

As for mentors, most respondents agreed that mentoring is essential; even so, how they seek mentors for their organizations is extraordinary. Most of the respondents had a specific mentor that they look up to in their leadership. One respondent (C) sees her mentor as someone she can count on, especially when organizing events and past experiences shared by her mentor in which she can learn and grow. Another respondent (G) is inspired by how her mentor can stay optimistic even faced with challenges in their life. Lastly, respondent F agreed that her mentor has helped shape her writing skills and ability that have led to her success until now. Although three respondents endorsed mentoring, they also claimed that they did not seek only one mentor.

Another respondent agreed that mentors helped shape her thoughts, but her mentor functions mainly online through podcasts, videos and YouTube. She explained that *"There is no harm in having these online virtual mentors. Most of the stuff made me who I am today, and it is convenient because I can listen to it while driving"* fortunately, another respondent claimed that she does not have any mentor and uses her personal experience to brush up her skills and get better. She often learned from other peers' mistakes and made sure she does not do the same and made improvements. She agreed that *'I feel that we are a work in progress and everything should be taken as a learning step.'*

Personal strength of successful women leaders

During the interview, time management and determination were recognized in relation to each respondent's personal strengths. Two respondents have claimed that they could manage their time well. One respondent has set her long and short terms priorities. Since she is still a student, she manages her task accordingly, such as assignments first and then manages activities for her initiative. Another manages her time according to her daughter's. She added that her training is always done at night; therefore, it does not disturb her time with her daughter.

As for respondent A, her strong desire towards achieving local and community growth have made her very focus on achieving her task and deliverables. Respondent E also has that same focus. Although she is working as an eye surgeon, she still manages to give talks in schools and universities because she has a purpose of sharing her personal development and inspiring everyone around her.

Lastly, for B, she has both time management and determination as her strengths. She explained that she always manages her time well for her daughter, especially after school and during weekends. She added that she never loses her focus

because she aims to become a professor by the age of 50. Even though she is faced with challenges, her determination is what keeps her going until now.

Discussions and Conclusions

So far, literature that deals with the motivation and challenges experienced by women leaders in Brunei are scanty. According to Goleman (2003), motivation is one trait that all influential leaders must attain. This study found that women leaders in Brunei have different motivations in becoming a leader. Two respondents said that their motivation is to help the youths and community to create critical thinkers. As for others, initially, they were only handling initiatives based on their own interest, such as self-passion for arts, family requests, and personal development, finding other opportunities and developing the media industries. Fortunately, they become motivated when they see a gap to make a change and decided to go with it. They decided that they have a passion for the work itself, seek out new obstacles and opportunities, learn new things, and eventually take great pride in the job they do. Indeed, the persistent energy they show proves that they have the intention to do things better and grow further beyond what they imagined they would be doing.

Despite facing various challenges in reaching leadership positions and carrying out leadership duties, the respondents in the study do not seem to relate to the realities of gender stereotypes. Two reasons may be attributed; one, there is no gender expectation and women leaders are treated the same as men and have the same opportunity. Secondly, and more likely, these women do not realize that it is a fact of their gender that creates these challenges for them in the first place. In Brunei, the challenges identified are only in terms of access to resources and financial support. The majority of the respondent found it challenging to find the right resources they need for their organization, especially the support of teams and venue. Many until now have no permanent members because they are still under the supervision of their parents. Some may have a team but find it challenging to obtain mutual understandings of a specific goal. This can be because there is no proper monitoring of performance in the team. However, the team is not entirely to blame, as the leader can also be questioned. Past research has found that some individuals are more egocentric in preferring to work independently rather than to work in a team (Day, Gronn, and Salas, 2004).

In terms of financial support, as stated by Education Delphi (2019), finance is necessary to acquire physical resources, which are very important to carry business functionalism. In the study, many of the women leaders opened up their organizations using their financial sources. Unfortunately, this limits the expansion of their organization, hence business stability. However, the exciting factor that made them successful is by finding other ways to promote their organization. Due to an increase in technology, many use social media to

promote their productions and content, thus attract people to invest in their business.

The study found that the presence of mentors may lead to successful women leaders in Brunei. The majority of the respondents agreed that their mentors helped reshape and strengthen their skills and ability. In handling certain events, they added that their mentors often shared personal experiences with them. But they also include that they did not have only one mentor but more than one depending on the initiatives they joined. One respondent claimed that she did not have mentors but uses her personal experience to brush up on her skills and get better. She added that everything she did was taking the risk and making sure not to repeat the same mistake.

Studies showed that work-life balance is seen as a way to help female leaders can balance their work and home commitments (Rahman, 2013). Hewlett & Luce (2006) conducted a study that demonstrates that women leaders have successfully employed strategies to make more time for their work and their family. This study found that all women leaders can achieve a work-life balance because of the support from their family and partner. The majority agreed that their family has support for them in taking care of their children while they are busy with their professional work. Their parents never question them on what they are doing, and they would never debate on what initiative they are doing. Some may also add that their partners support them in compromising time in terms of familial relationships, such as sending their daughter to school and helping with the logistic side when creating events. This finding also substantiates the study by Cheung & Halpern (2010) in which most women leaders agreed that the support they receive from their husbands and family makes their life easier. They added they could not achieve their goals without them.

Lastly, the study has identified the fact that that leader obtained certain personality traits or particular skills that make them a leader. In this case, the women leaders have the expertise to manage their time and their determination. Although they are busy at work, with some having children, they would always make it a habit to spend time with their children. Evidently, with compromising time of their family and spouse, these women find it easier to make time for their children. As for their determination, three respondents stayed focused on their aims. Although they are faced with challenges, they always found ways to overcome them.

This paper examines the experiences of Bruneian women becoming leaders in their respective organizations. It studies the motivations they had and barriers they experienced, and how they managed their responsibility at home and work. This study showed that women leaders in Brunei Darussalam are often faced with challenges in terms of business stability, especially when funds were

mainly from their own and in finding the right team for their initiatives. Fortunately, the motivation these women experienced is what keeps them going. The study found that each women leader had different motivations, but when they see the opportunity to make a change, they are willing to do it. Lastly, these women became leaders because of the personality traits they own.

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Coastal Erosion in The Unprotected and Protected Sections At Berakas

A comparative study in Brunei Darussalam

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Abstract

The coast at Berakas in the Brunei-Muara district of Brunei Darussalam suffers from erosion caused by a combination of fluvial and marine processes. This paper investigates the rate and pattern of erosion along a 1.8-km stretch of coast to compare the difference between the unprotected and protected sections. We used (i) image and spatial analysis and (ii) field geomorphology. The Digital Shoreline Analysis System (DSAS) in ArcGIS was used to compare the study area using two Google Earth images. The study found that the unprotected section had receded by 4.6 m between 2009 and 2019, while the protected section had advanced by 8.0 m over the same period; intense gullying and slumping of cliff continued at both sections. The detached headland breakwaters in the protected section were effective in stabilizing the coast. A concrete drain installed parallel to the cliff edge appears to be capable of intercepting storm runoff, but its effectiveness was undermined by lack of maintenance. We conclude that terrestrial-fluvial processes continue to erode coastal land and cause slumping of the cliff face at Berakas. However, coastal protection structures that curb the marine process could stabilize the coastline, even where sediment transport is active.

Keywords: Berakas; coastal protection; DSAS; gullying; marine processes; coastline stability.

Introduction

Coastal erosion, which results in recession of parts of the coastline, occurs in nearly all coastline at different spatial-temporal scales. It may occur in response to short-term events, such as storms, or regular wave, tidal or winds regimes, or long-term events, such as glaciation or orogeny, resulting in land subsidence or rise in sea level (Bird, 1993; Pethick, 1995; Prasetya, 2006). Human activities and modifications of the coastal environment have become significant contributors to erosion over the past century, mainly by altering sediment cells and removing natural barriers at the coast (Nordstrom, 2009). Brunei Darussalam (Brunei

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henceforth) is a coastal state with an open coastline of about 130 km facing the South China Sea. At the eastern end is the large Brunei Bay. The present-day coastline is shaped by a combination of sea-level rise during the Holocene, minor tectonic uplifts in the eastern half and subsidence to the west. The majority of the population resides in the coastal zone, where economic activities and development are concentrated (Chua et al., 1987). Large sections of the coastline have been modified (see Yong, 1997; Shulter and Gnanachandran, 2005).

The eastern half of the open coast covering the districts of Brunei-Muara and Tutong suffers from erosion caused by a combination of fluvial and marine processes (Yong, 2010). The situation in the vicinity of the study area was exacerbated by illegal sand-mining at Tungku beach 4-5 km to the west in the early 1990s. This resulted in severe erosion along the coast further west, exposing the rock base at Jerudong. Sand mining was halted in the mid-1990s, and 12-km section was reconstructed as part of a development project, which was completed in 1997 (Shulter and Gnanachandran, 2005). A variety of coastal protection structures have also been installed along a 9.5 km section extending east of the Tungku-Jerudong coastal development site. The 9.5 km of coast protected starts from the Tungku development and between it and the Berakas Forest park, there is a 1-km section that is unprotected

This provides an opportunity to examine the efficacy of the coastal protection measures on this eroding coast. This paper, therefore, aims to determine the efficacy of the coastal protection measures in this section of the Berakas coast by comparing the rate and nature of erosion in the unprotected and protected sections. It employed a combination of field geomorphology and digital shoreline analysis using ArcGIS.

The paper concludes by highlighting key controlling factors for coastline stability in this section of the Berakas coast.

Methodology

Shoreline movement is the common indicator used to detect coastal recession, as it marks the boundary between land and water (Di et al., 2004; Hanslow, 2007). However, it is highly dynamic, changing with the tides each day, month and season over the year. It is also affected by storm events and may recede or advance with the rise and fall of the sea relative to the land over a longer timeframe.

Therefore, frequent monitoring is important to understand the dynamics of the shoreline and the processes that drive it (Prasad and Kumar, 2014). The coastal dynamics at Berakas are understood from over two decades of observation and ad hoc studies by Yong (2010). It is often used in field classes on coastal

geomorphology, management and environmental processes. Due to the dynamic nature of shorelines, a specific shoreline indicator that represents shoreline position, such as vegetation line and high-water line, is often used in coastal erosion research (Boak and Turner, 2005). This study employed the vegetation line as a reference for coastal recession, as it is visible in satellite imagery provided by Google Earth. This paper compares coastline changes between 2009 and 2019.

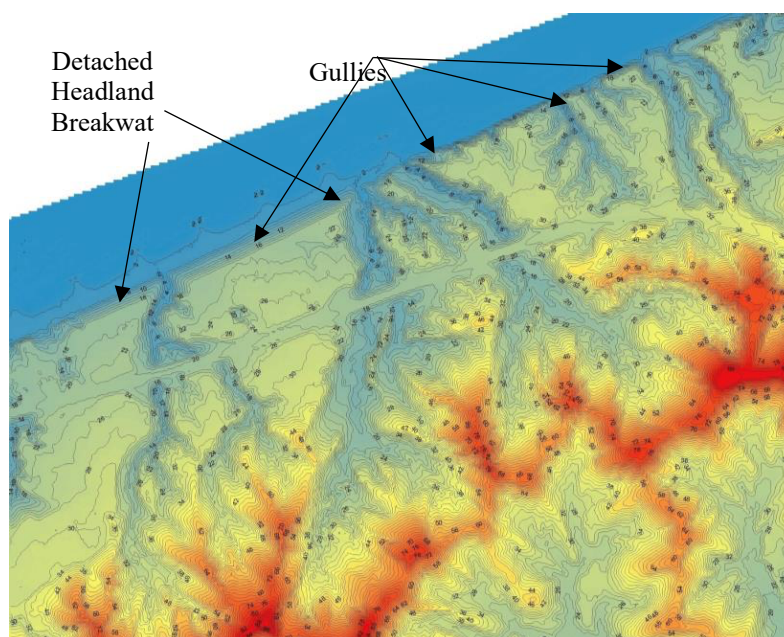


Figure 1. LiDAR Image Revealing Details of Gullies in the Study Area

Traditionally, the coastal recession is examined by comparing profiles measured using standard surveying techniques. However, it is not possible to obtain accurate readings due to the soft and friable nature of the cliff face and pile of slumped material at the base. The ground readily breaks apart, and the surface is highly irregular. Aerial imagery, captured using aircraft or satellite, is preferred because they provide a synoptic view of the study area, allowing for areal analysis. This approach has been used effectively in numerous coastal studies (see, e.g., Prasad and Kumar, 2014). A LiDAR image, captured in 2009, was used because it was available. It provides high-resolution 3-dimensional information that reveals details of gullies and ravines in the study area. Liu (2009) and Collin (2014) provided useful guidance on LiDAR remote sensing in coastal research. Figure 1 shows gully networks derived from the 2009 LiDAR image.

The data derived from the images were analyzed using ArcGIS, a geographic information system (GIS) software. GIS allows for precise measurements and has

been used together with remote sensing in several coastline change studies (see, e.g., Leatherman, 2014; Collin, 2014; and Ajay and Sheeja, 2016). This paper employed the Digital Shoreline Analysis System (DSAS) in ArcGIS to determine the degree and rate of shoreline change between 2009 and 2019. Oyedotun (2014) provides a detailed guide on the use of DSAS. Figure 2 outlines the methodology using DSAS in the present paper. The LiDAR data was used to generate contour lines and gully/stream networks using ArcGIS. The topography map was generated using the LAS Dataset tool to convert LiDAR data into ground surface contours, while the gully network was produced using the Flow Accumulation tool (Figure 8).

The particular research methodology was chosen because of available resources. It combined (a) image and spatial analysis and (b) field geomorphology. The main data sources are available data, which include (i) Google Earth satellite images (2009 and 2019), (ii) 2009 LiDAR image commissioned by Brunei Survey Department, and (iii) a 1972 topographic map produced by Brunei Survey Department. Field data are derived from surveys as well as long-term knowledge of the area. Key references are Wilford (1961), James (1984), Yong (1996), Sandal (1996) and Yong (2010). Figure 2 shows the research design that we adopted.

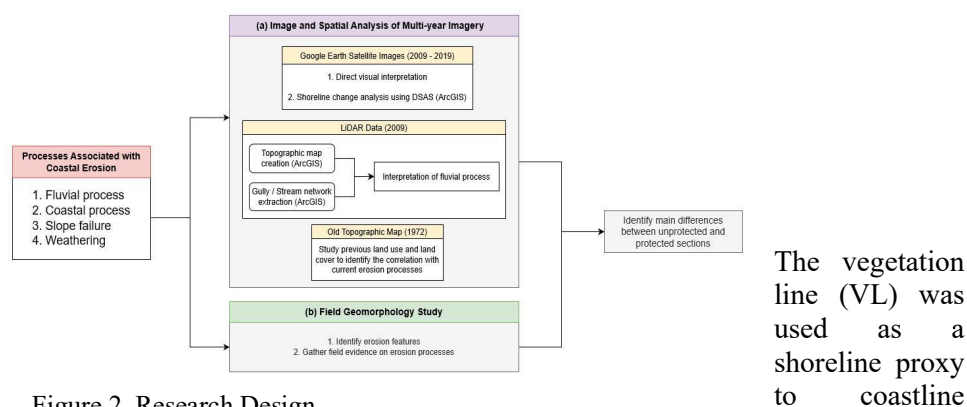


Figure 2. Research Design

recession/erosion. It is a continuous line that represents the boundary between stable land and eroding slope or beach. It is a good indicator for a long-term change due to its longer-term stability compared to other shoreline proxies such as the high-water line and low-water line that vary daily due to tides and storms (Ron et al., 2001). The VL in the 2009 and 2019 images were manually digitized and saved as line objects in Google Earth. However, the two images must first be adjusted due to a slight misalignment between them in Google Earth. This was done by overlaying the 2009 image over the 2019 image and shifting the image manually to align permanent structures, such as buildings, roads, and wave-breakers, like control points to match both images. The tip of the building roofs was key as they do not vary with the angle and altitude of the satellite

(Warnasuriya et al., 2018). Field surveys were conducted to verify key features identified in the images to enhance accuracy. The VL in kmz format were then imported into ArcGIS and converted to ESRI shapefiles for processing using DSAS.

The shoreline analysis was executed in three steps. Firstly, a baseline parallel to the VL is generated using the buffer tool. The distance of 35 m was used because it provided sufficient details without exaggerating the curvature of the baseline, which would occur at a greater distance. Secondly, transects perpendicular to the baseline were cast at 5-m intervals to intersect the VL and baseline. Finally, changes between the two years were computed using the Net Shoreline Movement (NSM) and End Point Rate (EPR) functions within DSAS. The NSM generates the distance between older (2009) and younger (2019) shoreline positions, whereas the EPR is derived by dividing the distance of shoreline movement by the time elapsed between the older and younger shoreline positions (Thieler et al., 2009; Oyedotun, 2014).

Study Area

The study area is a 1.8-km section of coast in the sub-district (or *mukim*) of Berakas, Brunei-Muara District. The location of the mid-point is 4°59'20.39"N and 114°54'34.66"E. The eastern half, which begins just west of the Berakas Forest Park, is unprotected. In contrast, the western half is protected (a) by five detached headland breakwaters and (b) a concrete drain installed parallel to and close to the edge of the cliff to intercept storm runoff (see figure 3). A narrow prism of sandy beach exists as a natural buffer between the South China Sea and the low cliffs (or more accurately, bluffs), which are intensely cut by gullies and most of its base covered by an apron of material derived from slumping at the upper part of the cliff face.

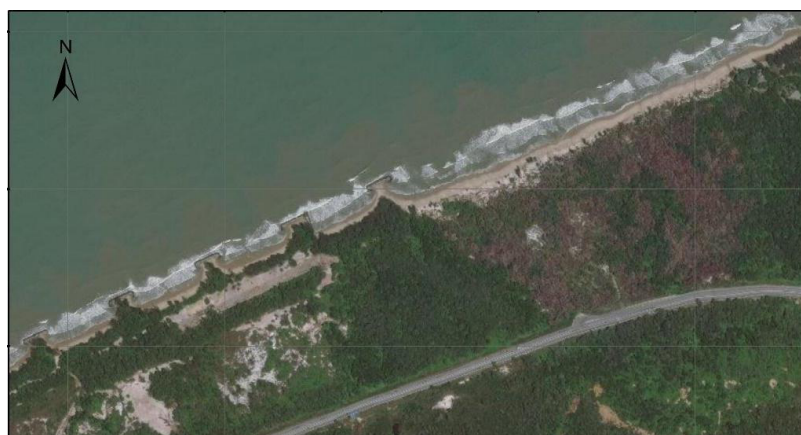


Figure 3. Google Earth image showing protected and an unprotected section of the study area at Berakas. Image date 9 June 2019

The geology of the cliffs is composed of young Pliocene-age sedimentary rocks belonging to the Liang formation, overlain by a thin layer of podzolized sand deposit. The lithology is characterized by poorly consolidated sandstone and clay with occasional lenses of thin layers of lignite and pebbles (Wilford, 1961; James, 1984; Sandal, 1996). Channel lenses and floodplain mud are discernible on the cliff face as the young sedimentary layers have not undergone much compaction. The natural vegetation is predominantly grass, shrubs and invasive trees, notably *Acacia*, which has replaced the 'dry' dipterocarp forest (*Kerangas*), which is conserved in the Berakas Forest Park at the eastern end of the study area. There has been an increasing occurrence of bush fires in recent years.

The coastal land and cliffs are eroding from active gullying due to storm runoff on unconsolidated sandy substrate. The process is exacerbated by land clearance and development works, including the construction of the coastal highway. At the coast, the slumping of weakened materials between deep gullies is widespread. Displaced patches of vegetation are often preserved intact on the slumped materials, and they continue to grow on the different 'steps' on the cliff face for weeks or months. The slumped material would slide episodically with significant storm events and eventually merge with the beach. The absence of wave-cut notches at the cliff base indicates that they are not directly affected by marine processes. Instead, the prevalence of talus cones means that terrestrial processes are the main cause of cliff recession here. However, marine processes also contribute to the erosion process indirectly by transporting beach sediments away from the area.

Longshore drift is generated by wave activity. The Brunei coast is affected by two-wave regimes. The Northeast Monsoon (November to February) is characterized by the frequent occurrence of high-energy waves that approach the coast from the north to the northeast. It is a generally destructive regime that erodes and removes sediments from the beach, transporting much of it offshore and along the coast in a westerly direction. The Southwest Monsoon (May to September) is characterized by low-energy waves that arrive at a highly oblique angle from the west. It is generally a constructive regime with prominent longshore movement towards the east. Wave regime becomes destructive occasionally when typhoons track across the South China Sea. Longshore drift is, therefore, in opposing directions between the two monsoons. Net drift in the study area is towards the east. During destructive episodes, a large amount of beach sediments extending close to the cliff base is eroded.

Sand mining is a major contributor to coastal erosion. It has caused severe erosion in the Belait area in the 1930s (Yong, 1996) and in the Jerudong-Tungku-Berakas area in the early 1990s. Reconstruction of the Jerudong-Tungku coast, which included beach nourishment, was completed in 1997. Gravel mining at a site 200-400 m east of the Berakas Forest Park, in contrast, contributed sediments and

gravel to the beach between the mid-1950s and late 1990s. However, much of the sediments were transported eastward, away from the study area.

Mitigating Coastal Recession

Coastal erosion results in an incremental loss of land to the sea, a recession of the coastline. It is, therefore, a concern of the government. However, effective mitigating measures are dependent on a good understanding of the erosion process, which differs from the context. At a regional-tectonic scale, the land could be rising relative to the sea or vice-versa. At Berakas, the land appears to have been uplifted in recent times. Wilford (1961) identified three periods of uplift during recent geological times. A low terrace found along much of the country's coastline suggests that uplift occurred episodically in small increments (Yong, 2010). The process would have disrupted energy equilibrium at the coastline, resulting in the observed erosion; cliffs indicate coastal erosion (see, e.g., Bird, 1993; Pethick, 1995). At a longer time scale, the sea level had risen by 100m during the first half of the Holocene Period. It is unclear if the sea level has continued to rise since then. The South China Sea basin is subsiding to the west due to sediment loading via the Baram Delta. Cliff erosion is part of the process of attaining equilibrium by lowering the slope to a stable grade and building up sufficient sediment buffer (beach) to absorb energy from the sea (see, e.g., Komar, 1983; Pethick, 1995).

However, if the materials deposited at the base of the cliffs are constantly being removed, erosion will continue, and the coastline will continue to recede. There is, therefore, a need to arrest sediment loss at the base of the cliffs. The main controlling factors would be (a) waves and (b) tides, which could extend the reach of wave action further landward. Waves are propagating energy, the amount of which is reflected in their height. The relationships between waves and coastal erosion are well established (e.g. Komar, 1983; Pethick, 1995). Early attempts at 'sea defence', which sought to keep out the sea using increasingly stronger and higher walls, have all failed eventually. Latter designs try to work with – rather than against – natural dynamics to alleviate the impacts of high-energy waves. For example, Wright (1985) identified a relationship between beach form and wave regime, where the former response to wave energy by adjusting its form to dissipate energy in order to attain equilibrium. Sea defence structures, therefore, tend to incorporate some or all of these features: low-angle slope, large surface area, porous surface, mobile wall material, or structures that dissipate wave energy further from the coastline.

The detached headland breakwater (DHB), such as those installed at Berakas, mimics the natural headlands and promontories (Chasten et al., 1993). Waves would refract around the tip of such features and break along the length of these structures, resulting in much-reduced energy of the waves that arrive at the

adjacent shore. In nature, this process breaks down protruding structures overtime to produce a smoother coastline. Engineered DHB comprises only of the head without the extension from the land. It is typically constructed as an arrangement of rock blocks (a rip-rap), designed to absorb and therefore dissipate a large amount of wave energy compared with a solid wall. Often, DHB are installed as a set spaced apart at distances depending on the wave characteristics of the area. At Berakas, the gap between each DHB is about 160 m. Each DHB (70-75 m in length) is installed approximately 70 m off the coastline (vegetation line). The advantage of a set arrangement is that a bay beach will form at the shoreline in between two DHB, providing a safe space for recreational use, at least, in theory. A depositional feature develops directly behind each DHB, connecting it to the land, creating a headland with a large rocky head and a body of beach deposits. A set of DHB will eventually develop a headland-bay coastline not dissimilar to the geomorphology of many beach holiday destinations.

DHB allows beaches to build up along the coastline. Beaches are natural barriers to coastal erosion. Unconsolidated sediments absorb and dissipate wave energy, thereby reducing the capacity of nearshore currents to transport sediment out of the beach section. The amount of sediment transported out of a section of beach versus the amount transported in, i.e., the "sediment budget," determines whether the coast recedes or accrete. However, high-energy storm waves can reach further inland to erode the backshore or even the cliff due to higher sea levels associated with storm events, which are accompanied by lower atmospheric pressures. Large portions of the beach are generally eroded and deposited offshore as a consequence of storm waves. Oblique waves have large longshore current components, which transport sediments along the coast. Although a set of DHB is effective in arresting longshore sediment movement, it will affect sediment budget and, therefore often cause erosion downdrift.

In the study area, the severe erosion to the coastline due to sand-mining in the early 1990s was remediated through a coastal reconstruction project in the Jerudong-Tungku section. Coastal reconstruction (see, e.g. Nordstrom, 2009) differs from the installation of coastal protection structures, which are design primarily to protect the land from erosion. Instead, artificial coasts, which involved reclamation, are more ambitious and optimistic in taming the sea. At Jerudong-Tungku, sand was mined from deposits on the seabed off the coast, beneath the reach of the present-day wave regime (James, 1984). The reconstructed coast and associated protection structures in adjacent areas, including the study site, have not experienced the 1-in-20-year or 1-in-25-year storm events described by Tate (1970) and Yong (1996).

In the Berakas area, it is evident from a field study that fluvial processes associated with storm runoff are the primary cause of cliff recession. The weakly consolidated podsolised sand is readily eroded, producing extensive gullies and ravines on the land atop the cliff and on the cliff face. Weakens areas collapse as

slumps now and then, transferring patches of vegetation from the top of the cliff to various 'steps' on the cliff face before finally resting on the beach, where trees will die and dry out. A 245-m long, small concrete drain was installed about 60 m from the edge of the vegetation line parallel to the cliff face. Its purpose is to intercept storm runoff and lessen their erosive power at the cliff face between the second and fourth DHB from the unprotected section. Two ravines have formed on either side of the drain (see Figure 1).

In summary, coastal recession in the study area is largely dominated by fluvial processes (gullyng) and slumping. The unconsolidated sand cover and young sedimentary rocks are readily eroded by a combination of surface and groundwater flows—fluvial action and slumping transfer materials to the beach. During high tides or storms, wave-generated currents remove large amounts of materials away from the beach. Under normal conditions, sediments are slowly transported to the lower level of the beach face, where they are then transported out of the beach section via longshore drift. DHBs and a concrete drain have been installed to protect half of the coastal section being examined in this paper. Figure 4 is a systems diagram that depicts the situation at Berakas.

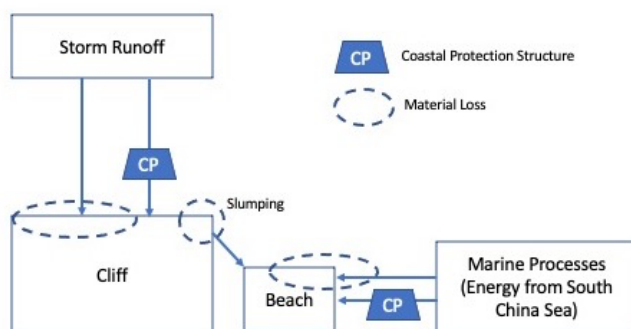


Figure 4 Coastal Erosion Model for Study Area

Digital Shoreline Analysis: Findings

Shoreline changes between 2009 and 2019 were computed for (a) the unprotected and (b) protected sections of the coast in the study area using DSAS in ArcGIS. The results are presented below.

Unprotected Section

The image below (Figure 5) shows the NSM (transact lines perpendicular to the VL) in the unprotected section. The data reveals that the coastline has retreated for the most part (evident from red-coloured lines indicating recession). The NSM and EPR values calculated for each transect is summarised in the table below the image. It can be seen that the coastline has receded by 4.6 m on average between 2009 and 2019, at a rate of 0.46 m/year. Over 10 years, the average distance for receding transactions was 4.87 m, with a maximum distance 17.6 m. About 7% of the coast has advanced seaward at an average length of 0.54 m; the full movement

is measured at 1.7 m. These are points where vegetation has established on materials deposited at the base of the cliff.

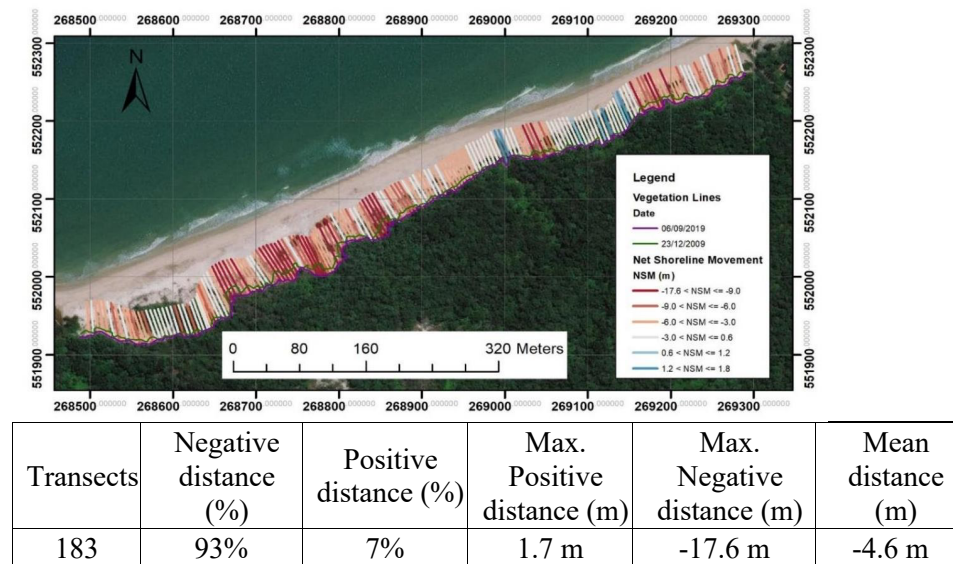


Figure 5. NSM Result, Unprotected section.

Based on image interpretation and field observation, recession in the unprotected coast is mainly due to slope failure, particularly slumping. The slump scars are identifiable in the satellite and verified through field surveys. Slumping is a catastrophic slope failure event, i.e., it occurs at intervals rather than in a continuous manner when the weight of saturated soil has exceeded the strength of the weakened weathered edge of the cliff. It leaves behind a distinctive arcuate-shapes scar at the top of the cliff face after the slumped material has slid downslope. At Berakas, this often occurs in several stages over weeks or months before the materials finally settle on the beach. In the meantime, fluvial processes continue to cut rills and gullies on the surface of the slumped material accumulated at various parts of the cliff face, which extended to the beach as talus cones.

The 1972 topography map revealed that the large gullies or ravines (many of which were mapped as coastal streams) had existed before the area suffered from severe coastal recession and coastal protection structures were installed (see Figure 6). Storm runoff generally flows in a northerly direction due to the relief of the land. The ground, which is composed predominantly of sand, is readily eroded. The process was accentuated by development works, which included the

removal of the natural forest vegetation. The present vegetation cover is comprised mainly of grass, shrub and invasive *Acacia* trees. The fluvial process also gave rise to isolated spots of coastal accretion. The materials are brought down through the gullies and ravines built up at the mouth, which becomes vegetated and merged with the continuous stable vegetation line. One of the channels at the eastern end of the area has been diverted north-eastwards towards the Berakas Forest Park to form part of a large drain (outfall) at the park.

A concentration of high recession can be seen at the western part of this unprotected section, midway between two coastal streams. Active gullies have developed at the cliff edge where a notch in the cliff has deepened and extended landwards, as is typical of the growth process of gullies.

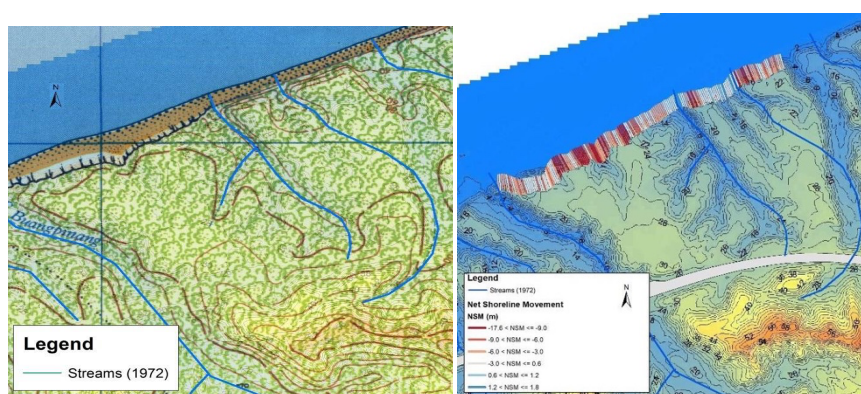
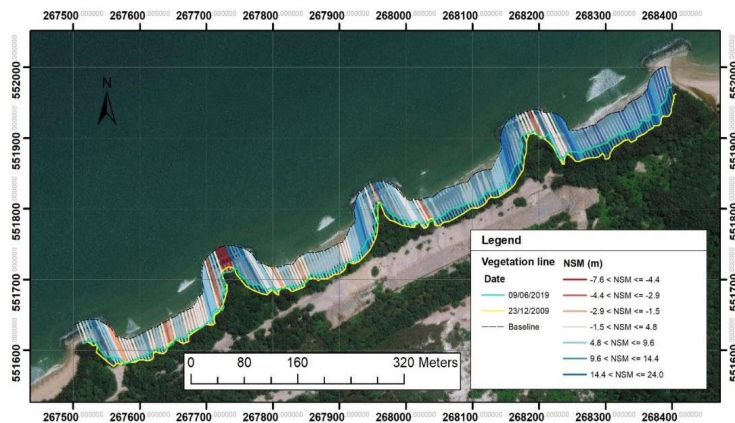


Figure 6. Streams, Gullies & Relief Pattern in 1972 topographic map (left) and 2009 LiDAR image with NSM transacts and contour lines in the unprotected section

Protected Section

The result for the protected section shows the opposite pattern, where for most parts (89%), the VL has advanced 8 m over 10 years, or 0.80 m/year. Figure 7 shows the NSM transacts and EPR values generated. This is almost double the distance of recession in the unprotected section. A small portion of the VL (11% of the dataset) receded by an average of 2.3 m over the period, with the maximum at 7.5 m. In contrast, the maximum advancement was 23.9 m with a mean of 9.8 m over 10 years. It, therefore, appears that the DHBs have been effective in mitigating against coastal recession, allowing the deposits that have accumulated at the base of the cliff to become stable enough to support vegetation that has merged with the continuous vegetation line. The gully pattern (yellow lines in Figure 8) further shows that the concrete drain and other hard structures do affect the flow pattern of storm runoff. It shows flow along the edge of the concrete drain and other man-made structures (drains and pathways). However, it also revealed intense gullying along the cliff face just north of the concrete drain installed to intercept storm runoff. The concentration of gullies was produced by water flowing over the drain. In the field, it was found that the drain is almost filled with

sediments and grass. Therefore, although storm runoffs would flow along the edge of the concrete drain, part of it would have flowed directly over the drain and down the face of the cliff, producing rills and gullies. This was verified in the field.



Transects	Negative distance (%)	Positive distance (%)	Max. Positive distance (m)	Max. Negative distance (m)	Mean distance (m)
222	11%	89%	23.9 m	-7.5 m	8m

Figure 7. NSM Result, Protected Section

Field survey also found toppled casuarina trees on the beach. This is indicative of marine erosion, most likely associated with storm surges, when both sea-level and wave energy are considerably higher. Occasional storm events, together with slumping from fluvial processes, are the most likely cause of cliff recession at isolated spots in this section.

Discussions

The output from the DSAS shows that the VL in the unprotective section had receded by 4.6 m between 2009 and 2019, while in the protected section, it had advanced by 8 m. The main difference between the two sections is the presence or absence of coastal protection structures, namely the DHB and concrete drain, because both sections share similar environmental processes in the land area behind the coast. They vary only locally due to surface characteristics and topography. In general, fluvial activity and hence, gullying pattern is affected by the nature of vegetation cover, slopes and presence of hard (built) structures. This can be seen in the pattern generated from the LiDAR image in Figure 8. The yellow lines indicate the axis of gullies/valleys in the downslope direction generated using the Flow Accumulation tool in ArcGIS. The output was uploaded to Google Earth. Although a few of these drainage channels were identified as

Sungai (“river”) in the 1972 topographic map, they are more accurately described as ravines as they only channel water during storms.



Comparing
the
protected
and

Figure 8. Gully Networks Derived from LiDAR Image Superimposed on Google Image.

unprotected sections, the gully network in Figure 8 revealed more complex patterns in the more confined western part behind the protected section. Here, fluvial patterns appeared to flow from arcuate features north of the highway. The contour pattern shows the presence of concave features, which have expanded from a smaller version that can be found in the 1972 topographic map. The more complex and intense pattern, as well as the lines that aligned with drains and pathways, are due to the fact that this part has been subjected to modification, probably as part of the project to install the coastal protection structures. This has resulted in the loss of natural vegetation cover, which further accentuated gullying activity. Yet, despite having a more complex gullying pattern, which suggests more intense fluvial erosion, the VL along the protected section has accreted by twice the distance of cliff recession in the unprotected section.

The main difference, therefore, appears to be due to the efficacy of the DHBs in curbing the loss of sediments at the beach. Longshore drift is prominent along the Brunei coast and occurs in opposing directions between the seasons. Net drift in this part of the coast is towards the east. In the unprotected section, the materials deposited by slumping would be transported out of the beach, causing the cliff to remain unstable and prone to further slumping. Strong easterly sediment drift occurs during the southwest monsoon when waves approach the coast from the west. However, during the northeast monsoon, when longshore drift is towards the west, there is a large shore-normal component in the nearshore current generated by storm waves, which scours and transports beach sediments offshore. In the protected section, the DBH would have reduced the energy of storm waves, thereby mitigating against the loss of sediments by nearshore currents. However, the higher sea level that accompanies storms, as well as the occurrence of storm

surges, could still manage to reach and erode isolated parts of the coast, which accounts for 11% of the section based on the NSM result. Additionally, the set of parallel arrangements would be effective in curbing longshore sediment transport; the arrangement is commonly employed in sea defence involving groynes.

It must be noted, however, that the VL is not necessarily the edge of the cliff. In the protected section, it marks the part of the beach that has become stable, where vegetation has established and developed to a more mature stage. The findings, therefore, show that the DHBs are effective in stabilizing the coastline, preventing coastline recession, and contributed to sediment accretion and advancement of coastal vegetation. However, the land behind the cliff continues to erode, as is evident from the gully and ravine networks and the slump features and deposits at the cliff. This is due in part to the nature of the substrate, which is highly erodible podsolised sand, with sparse vegetation cover, and the presence of hard-built structures in the area. The latter would concentrate, thereby strengthening the erosive capacity of storm runoff. If a lesson could be learned from the concrete drain installed to intercept storm runoff, it should be that such a structure is effective, as it diverted some of the storm runoff along with it to the channels at either end. However, it must be maintained regularly to keep the drain deep enough to intercept and channel water away from the cliff face. Similar structures, perhaps with better design to work with natural dynamics, could be used at various parts of the land behind the cliff, perhaps as part of the landscaping, particularly south of the highway.

Finally, although the land area behind both sections is now covered by grass and other colonizing shrubs and trees, vegetation cover is still relatively thin, offering little protection against fluvial and gulying processes. A number of large ravines cut across the area from south to north, passing under the coastal highway. They continue to grow in size and contribute sediments to the beach during storms. They also pose a risk to highway users, as the substrate beneath sections of the highway widens and deepens over time.

Conclusions

This research investigated the pattern of coastal erosion between an unprotected and a protected section of an eroding cliff coast in the Berakas sub-district of Brunei. Digital shoreline analysis of remote sensing imagery using ArcGIS and field geomorphic surveys found a clear difference between the two sections.

(a) The protected section had accreted by 8 m on average between 2009 and 2019. Advancing sections accounted for 89% of the dataset and averaged a distance of 9.8 m, while receding parts averaged 2.3 m. The mean accretion rate was 0.80 m/year.

(b) The unprotected section receded by an average of 4.6 m over the 10 years. Receding sections, which accounted for 93% of the dataset, lost on average 4.87 m of coastal land. Meanwhile, isolated advancement averaged 0.54 m. Overall coastal recession rate was -0.46 m/year.

The coast in the study area has receded by less than half a metre per year in the unprotected section between 2009 and 2019, but accreted by almost a metre in the protected section. This occurred despite the higher level of human disturbance behind the protected section. The findings show the significance of marine processes, particularly because, visually, terrestrial fluvial processes appear to be the primary cause of erosion. The study was, however, based on the stable vegetation line along the coast, which shifted from the top of the cliff to stable ground on the beach behind the DHB. It can therefore be concluded that while fluvial processes continue to erode the land and promote slumping at the cliff, curbing the reach and capacity of the sea to remove beach sediments is adequate in preventing coastal recession. In this section of the Berakas coast, terrestrial-fluvial activity will continue to erode the land and cliff in a process towards attaining equilibrium and stabilization of the coastline. Although the process could be alleviated with appropriate landscaping and management to intercept and reduce the effect of storm runoff, structures that curb the reach and capacity of the marine process would be most effective in stabilizing the coastline.

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Safe Drinking Water Crisis, Technological Alternatives and Constraints in Bangladesh

Lessons from Singapore

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Abstract

Groundwater resources are the primary source of meeting the water demand in Bangladesh. In rural areas, hand-pumped tube wells have been the primary source of drinking water. Though studies claim that Bangladesh has the potential to achieve universal safe drinking water supply coverage, the presence of excessive arsenic in the shallow groundwater sources, and the encroachment of salinity in the coastal aquifers in coastal regions (Satkhira, Khulna, Bagerhat, Patuakhali, Jhalakathi, Pirojpur, Barisal, Barguna etc.) hind the path. The concerned authorities of government and other non-government organizations assist the coastal people with alternative technologies like Desalination Plant, Arsenic-Iron Removal Plant, Pond Sand Filtration (PSF), Managed Aquifer Recharge, Rainwater Harvesting System, Installation of Shallow, and Deep Tube Wells. But based on case studies and surveys, this article shows how these existing technologies fail to ensure water safety within the coastal areas. The Singaporean water management policy is an example, this article advocates for necessary government intervention to ensure safe drinking water in coastal areas.

Keywords: Safe drinking water; sustainability; Singapore; technological constraint; Bangladesh; salinity.

Introduction

The other name for water is life. This fact has been recognized from the very beginning of human history. Safe drinking water is an essential condition for human existence. Generally, water is used for three major purposes: drinking,

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agricultural production, and industrial production. Scientifically, the quality of water varies depending on the geological positions of different countries. Countries with extensive coastlines and high coast-to-land ratios seem vulnerable to excessive salinity intrusion (Ramasamy et al., 2015). In Asia, countries like Bangladesh, India, Sri Lanka, Indonesia, Timor-Leste, Maldives, and Myanmar have extensive coastlines. In Southeast Asia, Brunei, Malaysia, Cambodia, Papua New Guinea, Singapore, Vietnam, and the Philippines are considered coastal countries (Ramasamy et al., 2015). Evidences suggest that saline or arsenic-contaminated water poses threats to food production as well as to human existence, particularly in the regions affected by salinity.

Being a low-lying deltaic land, the coastal areas of Bangladesh[†] Are vulnerable to salinity intrusion. During the monsoon season, the southwestern districts (Khulna, Jessore, Satkhira, Bagerhat, and Gopalganj) were found to be the highest salt-encroached (Shammi et al., 2019). River salinity in the southern part, including Patuakhali, Barguna, Pirojpur, Khulna, Bagerhat, and Satkhira, has increased by 45% since 1948 (Alam et al. 2017). We witnessed how the hit of cyclone AILA in 2009 dissipated into low lying districts (such as Patuakhali, Khulna, Jhalakathi, Barisal, Satkhira, Barguna, Laxmipur, Bagerhat, Pirojpur, Bhola, and Jessore) along the coastal region of Bangladesh with a sustained wind speed of 120 kmh (Khatun et al., 2018), had contributed immensely to the salinity intrusion within these areas.

The United Nations General Assembly (UNGA)[‡] has explicitly declared that access to clean and safe drinking water and sanitation are human rights. The resolution also stressed the capacity building and technology transfer, especially for developing states, to ensure accessible and affordable drinking water for all (UNGA, 2010). Long before that, General Comment No. 15 on the water right was adopted by the UN Committee on Economic, Social and Cultural Rights in November 2002, stating the indispensability of water for human beings (UNCESCR, 2002). Despite having these many legal frameworks and conventional recognitions, unfortunately, in developing

[†] This paper studies the scarcity of drinking water in coastal areas of Bangladesh with a coastline of 710 Kilometers (440 ml) on the northern littoral of the Bay of Bengal. It is formed by a deltaic plain of the river Padma (Ganges), Jamuna (Brahmaputra) and Meghna river, following the northeastern part of the Indian Subcontinent (Etzold, 2015).

[‡] Resolution 64/292, on 28 July 2010.

country contexts—2.1 billion people still lack access to safely managed water and 844 million lack even basic water (WHO, 2017).

In Bangladesh, the scarcity of safe groundwater resources and salinity gives birth to problems like miscarriage among pregnant women, hypertension, skin diseases, hygiene problems during menstrual cycles, respiratory tract infections and many waterborne diseases like Typhoid, Cholera, Dysentery, and so on. The problems have been exacerbated by the presence of excessive arsenic and iron in surface-ground water. With governmental and NGO support, the people in the affected areas adopted technologies like Pond Sand Filtration (PSF), Desalination Plant (DP), Arsenic Iron Removal Plant (AIRP), Deep Tube-Well, Shallow Tube-Well, and Managed Aquifer Recharge (MAR) as an effort to purify the water.

There is an abundance of literature on water scarcity, water salinity, impacts of salinity intrusion on health, agriculture, and livelihood, and technological solutions etc. However, very few have discussed the constraints of the technologies impeding uninterrupted access to safe drinking water. By analyzing the hindrances of technological alternatives in supplying safe drinking water, the paper contributes to the existing literature.

Objectives and research methodology

The study has two major objectives. One, to disclose the constraints of existing technologies in ensuring safe drinking water and second, to show the road map what lessons the government of Bangladesh (GoB) can learn from Singapore to ensure the coastal people's right to safe drinking water in Bangladesh.

For this study, we applied both the quantitative and qualitative research approaches. We collected data from both primary and secondary sources. Primary data were collected from selected stakeholders and key informants by using open-ended questionnaires. For primary data, we conducted surveys, field visits and have used Key Informant Interviews (KII) and Focus Group Discussion (FGDs).

Consent of the respondents was obtained to record their interviews. Respondents spoke in their native language—Bengali. We have translated the substantial parts into English while transcribing. For secondary

data sources, we have solely relied on published reports of national and international organizations, journal articles, newspapers, and relevant books.

Research Area: The selected study area includes Koyra, Dacope, Kaliganj, and Shyamnagar Upazilas of Khulna and Satkhira districts in Bangladesh, covering from 22°25'N to 22°54'N latitude to 89°15'E to 89°45'E.

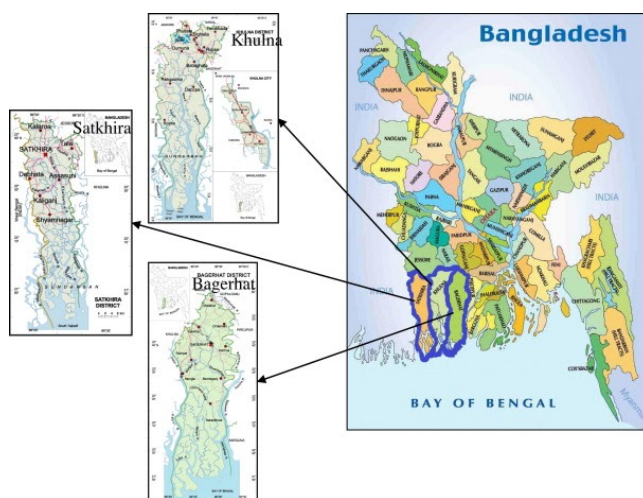


Figure 1. Geographical Location of Satkhira, Khulna, & Bagerhat.
Source: Hassan, et al. 2013

Water Supply Technologies & Constraints

Pond Sand Filtration (PSF)

To purify pond water, Slow Sand Filters (SSFs), commonly known as Pond sand Filter (PSFs) are being installed in saline affected areas by the United Nations

Children's

Emergency Fund

(UNICEF) and Department of Public Health Engineering (DPHE) since 1983 (DPHE & UNICEF, 1989). This is a low-cost alternative to ensure a safe water supply. Yokota et al. (2001) argued that PSF is low-budget and it is a coliform and bacteria reduction efficient technology. Despite PSFs inability to purify 100% of pathogens from heavily saline water, it has become the most popular technology for coastal communities (Harun & Kabir, 2012).

We found two types of PSFs (a) traditional PSF, where water is pumped from the pond using the No. 6 hand pump; (b) PSF with solar-powered pump, where water is automatically pumped to the PSF. The study found that each traditional PSFs in different unions of Shyamnagar Upazila is being used by 30 to 50 families, whereas 120 to 170 households can use the solar-powered pumps. The instalment costs vary from BDT 80,000 to BDT 1,70,000 (US\$944 to \$2006) and it costs around BDT 6,50,000 (US\$7671) to install a solar-powered pump. We found that many PSFs were not fully functional. Again,

the water quality supplied by the PSFs, after purifying, solely depends on the quality of water collected from corresponding ponds (Harun & Kabir, 2012). Because of excessive salinity intrusion, as well as the existence of Potassium and Chloride, PSFs are not able to meet the standard (0/100ml water) in terms of bacterial contamination. Furthermore, labour-intensive water pumping from pond to filter is a barrier to proper utilization of PSF technology. We also found the PSF equipment requires periodical cleaning and pumping, which is quite difficult as it gets stuck due to high level of salinity. As a result, the durability of PSF appears as a big concern to address.

Desalination Plant

Desalination treatment plants are popularly used to segregate dissolved salts and other minerals from saline water. The plant is effective in getting fresh and safe drinking water in areas where water resources contain a low rate of Total Dissolved Solids (Saleh, 2015). With the assistance of GoB, DPHE, and NGOs, desalination plants have been installed within the coastal belts of Bangladesh. During the River Osmosis (RO) desalination process, a pressure higher than the osmotic pressure is used to ensure the flow of fresh drinking water. The rate of freshwater flow through the membranes increases with the rate of pressure applied. The study found that the desalination plants in our respective research areas are using shallow groundwater with mild salinity concentration (EC 5000-6000 $\mu\text{S}/\text{cm}$). We found that the approximate installation charge of a desalination plant is BDT 16,00,000 (US\$18884) to 25,00,000 (US\$29506), along with high operation and maintenance charges. As we delved into the constraints, we found that users can collect only 40% of drinking water by desalination plants, whereas the rest 60% of raw water is discharged as brackish water.

Arsenic Iron Removal Plant (AIRP)

An arsenic and iron removal plant (AIRP) is an effective technology to ensure safe drinking water by removing the existing contaminant ingredients from water, like Arsenic (AS) and Iron (Fe). With the assistance of the Secondary Education Quality and Access Enhancement Project (SEQAEO), the DPHE has installed some AIRPs within our studied areas (Rahman et al., 2021). The approximate production cost of installing an AIRP is USD 3000 (Singh, 2017). Rahman and colleagues (2021) found that in a developing country like Bangladesh, the instalment of AIRPs is effective to reduce exposure to Arsenic and Iron, and that the AIRPs to be 67% to 98% effective in AS removal during

the pre-monsoon, but it slightly decreases during the post-monsoon (Rahman et al. 2021).

Managed Aquifer Recharge (MAR)

The Managed Aquifer Recharge (MAR) system reduces the contaminated chemicals mixed in the aquifer (e.g., As, Cl) due to the dilution process. The purifying procedure involves recharging the aquifer with pond water after slow sand filters (Rahman et al., 2019). The approach promotes the oxidation and retention of oxygenated pond water to ensure the reduction of As (Arsenic), Fe (Iron), and Mn (Manganese). The MAR system requires the creation of an artificial pond to bring new sands in contact with the aquifer and to enhance the recharge of the aquifer (Zahid, 2019).

Deep Tube-Well

Deep Tube-Well (DTW) is a well-known technological alternative to ensure safe drinking water which works in suction mode. Wherever a potentiometric surface of the groundwater table exists 7.5 m below the ground surface, DTW withdraws groundwater from the deep aquifer. In general, these deep aquifers have a depth of 150m in the basin part. DTW is separated by impervious clay layers, which are geologically and hydro-stratigraphically defined as deeper aquifers (Ground Water Task Force, 2002). We found that the depths of DTWs vary according to the geology of different areas. But aquifers with a depth of more than 100m can be found as arsenic contamination-free. Saha et al. (2018) found that proportionally only 12% of the existing deep aquifers can serve with safe-contamination-free drinking water. The study directly warned the upcoming threats of water scarcity within these areas suggesting the installation of aquifers with specific depths of 150-384 m to ensure safe drinking water within the coastal belts of Bangladesh. We found that the installation of DTWs is generally beyond the affordability of people living in these areas as these instalments are expensive, whereas pumping is not possible with suction mode if the water level is ≥ 30 ft.

Shallow Tube-Well (STW)

Shallow Tube-Well (STW) is widely known as low budget, convenient alternative to access drinking water in rural areas of Bangladesh. According to researchers, shallow shrouded tube wells have a depth ranging from 15 to 20m (Ahmed, 1996). We found that the shallow tube wells are the most common technology for the abstraction of groundwater due to their cost-effectiveness.

Our survey found shallow aquifers all around the Upazilas and unions with a maximum depth of 100 m. Our study found that the approximate cost of installing a shallow, deep tube well is around BDT 15,000 to 25,000 (US\$177 to \$295). It is worth mentioning that we have found how ineffective these instalments of STWs are, as these aquifers cannot ensure the removal of iron or salinity from contaminated water sources. Unfortunately, the water collected from STW is vulnerable to surface pollution due to the poor disposal of human and industrial waste on the ground.

Rainwater Harvesting System

The average rainfall is approximately 3000mm in the coastal areas of Bangladesh. Almost 75 percent of this rainfall occurs during the monsoon season, from mid of May to September (Ahmed, 1996). The process of storing rainwater during the wet season to use the water in the dry season is popularly known as rainwater harvesting (Masum et al., 2018). The process involves the concentration, storing and collection of rainwater which serves the purposes of domestic chores, industrial uses, agricultural production and many (Sutherland et al. 2000). For collecting rainwater in the coastal zone, the most popular system is the rooftop catchment system though there are other two ways of collecting it; the in-situ catchment system and the run-off catchment system (Islam, 2017). We found that different types of RWH systems had been installed by other organizations where people are suffering from both arsenic and salinity contamination of water from surface and groundwater sources. The Community Rainwater Harvesting System (CRWH) is also popular. The average cost for installing an RWH system varied from BDT 10,000 to 1,50,000, (US\$118 to \$1170) depending on the size of the storage tank and other facilities. The rainwater is not sufficient for round the year as it solely depends on rainfall, its intensity, and frequency.

Policy lessons from Singapore

Singapore has no water sources like aquifers or lakes. The People's Action Party (PAP) established a unitary state to construct Singapore as an ideal state (Ullah, Ho and Kathy, 2021). Approximately 5.69 million people in Singapore (UN, 2021) use an average of 430 million gallons of water per day. With no particular water resources, how Singapore managed to develop such a strong water management system is a miracle to the world. Singapore became independent in 1965 from Malaysia under the strategic leadership of its first

Prime Minister, Lee Kuan Yew (Oei, 1998). Singapore's economic miracle has been one of the most cited issues in the public and private discourse, and the foundation of which was laid by Prime Minister Lee (Irvine et al., 2014; Ullah, Ho and Kathy, 2021). He introduced the Singaporeans to the holistic development of urban environmental management, and under his close supervision, the Public Utility Board (PUB) was established to supervise electricity, water, and piped gas (Irvine et al., 2014). PUB runs the National Taps of Singapore Program for meeting the countrywide demand for water. Water from local catchment areas, imported water (from Malaysia); reused water (known as NEWater); and desalinated water are the four national taps of Singapore. According to the government data, imported water from Johor satisfies about 50 percent of the national demand for water, Desalination up to 25, NEWater can meet up to 40 percent, and the local catchments help to make up the rest (The Straits Times, 2018). We believe that Bangladesh has many lessons to learn from Singapore on some particular aspects to solve the safe drinking water scarcity in the coastal belts.

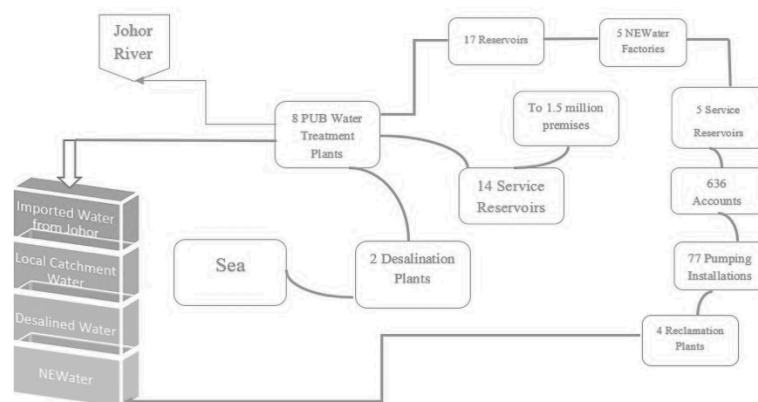


Figure 2. Singapore's Water Supply

Source: Adapted from PUB. Singapore's National Water Agency, 2021

<https://www.pub.gov.sg/watersupply/singaporewaterstory>

Formation of an authority like the PUB of Singapore:
In Bangladesh, under the National Water Management Plan we found nearly ten different

institutions[§] To work on water management. We have found that there is a

[§] WARPO as a secretariat of the National Water Management Council to monitor national planning and implementation, DPHE, the Bangladesh Water Development Board (BWDB) to develop the main and regional rivers, the Local Government Engineering Department to support floodproofing and cyclone protection measures, the department of disaster management for the preparedness and continuation of relief operations, the Bangladesh Haor and Wetland Development Board to ensure integrated

lack of coordination among institutions. In Singapore, however, we learned that the Ministry of Sustainability and the Environment (MSE) has a statutory board named PUB, which manages all Singapore's water management issues in an integrated fashion. This means there is no coordination issue in handling whole-of-government initiatives to ensure water security. We are sure that the formation of such a board or body increases efficiency and helps the government to remain focused on water issues.

Installed Technologies Need to be Cost-Effective: A study found that in the coastal areas of Bangladesh, only 30% of the total households have PSFs within 400m of their residences, and about 46% of the households do not have PSF within 2 km of their houses. The study also calculated the required time for water collection and found that PSFs are more than 2 hours for 55% of the households (Islam et al., 2013). We found a resident of Sutarkhali Union under Dacope, a 25-year-old woman Aleya Begum saying

I wake up before dawn almost every day and walk five kilometres away to collect drinkable water from a water plant installed by a Non-Government Organization. I have a family of six members, and I fetch drinking water for all of them. I have ponds nearby, but due to salinity, the water is used neither for drinking nor for cooking. Our suffering does not end within walking; I need to queue up near the water plant for hours to get my turn to fill my water pot. It even becomes midday when I return home with drinking water. There is no one to hear us!

Table 1.

PSF	RWHS
<p><u>Cost for 60 Households</u></p> <ul style="list-style-type: none"> Total construction cost Tk. 66,000 (Maintenance Cost Tk. 3,000/year (including cleaning by chlorine and repairing for any damage is detected) <p><u>Cost per Household</u></p> <ul style="list-style-type: none"> Total construction cost is Tk 1100 Maintenance Cost TK 50/year <p>Economic Life = 15 years Total cost = $\{1100 + (50 \times 14)\} = \text{TK } 1800$ Annual Payment = $(1800/15) = \text{TK } 120$ Cost/L = $[1800 / (25L \times 365d \times 15 \text{ years})]$ = TK 0.013/L</p> <p>Cost/L = 0.013 (Cheapest)</p>	<p><u>Cost per Household</u></p> <ul style="list-style-type: none"> Cost of construction Tk 29,000 Maintenance cost Tk 200/year <p>Economic Life = 15 years Total cost = $\{29000 + (200 \times 14)\} = \text{TK } 31800$ Annual Payment = $(31800/15) = \text{TK } 2120$ Cost/L = $[31800 / (25L \times 365d \times 15 \text{ years})]$ = TK 0.032/L</p> <p>Cost/L = 0.032</p>

Source: Islam et al., 2013.

Calculated Cost of PSF & RWHS by DPHE

Undoubtedly, the households living in the coastal areas are paying much for RWHS, CRWHs, and PSFs in terms of both; time and money [i.e., a big portion of their income] to get access to safe drinking water. What does Singapore do exceptionally? Singapore takes the water quality, production and management costs into account so that people can access to safe drinking water without financial burdens. Moreover, the success story of Singapore on water resources management reminds us to come up with out-of-the-box ideas and innovations and to allocate a substantial budget on water research and sustainable planning.

Conclusions

Despite the fact that access to safe drinking water is a universally acknowledged human right, coastal residents are denied it is owing to their physical position. To protect coastal residents from many lethal diseases, issues such as salt intrusion, arsenic poisoning, and other technological impediments to accessing affordable and safe water must be addressed. Singapore serves as an example for us, demonstrating how to spend on long-term water project management in the face of scarcity, which we may emulate to ensure human survival.

Natural disasters are growing, and the adverse effects of climate change are responsible for the low durability of water technologies in coastal areas. Therefore, the budget allocation from Annual Development Plans should give priority to the issue. The Union and ward level Water and Sanitation Committee (WATSAN) and capacity building of caretakers of water sources should function under the direct supervision of the DPHE. NGOs and private actors should take one step ahead to deal with the existing water technological constraints. Business agencies operating in coastal areas should allocate a budget for establishing advanced water technologies as part of their Corporate Social Responsibilities (CSR). A separate policy and comprehensive work plan can be formulated. Existing legal frameworks and practices concerning leasing water bodies for surface water should be amended according to priorities. The surface water in ponds and canals should be preserved as the sources of drinking water, agricultural irrigation and household chores.

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Book Review

State and Finance in the Philippines, 1898-1941: The Mismanagement of an American Colony Yoshiko Nagano (Singapore: NUS Press, 2015)*

This book offers an alternative interpretation of the financial crisis in the Philippines in 1919-1922 which was widely understood to have been caused by corruption among Filipino bank officials of the Philippine National Bank. The author argues that such a view emanated from a “colonial discourse” that served the interests of the Americans by obscuring the true reasons for the crisis. Through a meticulous archival work, the author demonstrates that while the mismanagement by Filipino bank officials played a significant role the crisis was also largely caused by a policy mistake on the part of the Washington-based Bureau of Insular Affairs (BIA). Had the truth come out then, so the author argues, the Philippine legislature could have “seriously undermine(d) the US administration” and “would have gravely damaged the foundation of the U.S. colonial system” (p. 188). In addition to reiterating the critique of the orientalist features of knowledge production during the colonial decades, the book’s greater contribution lies in the wealth of archival data it patiently synthesizes and analyzes. It also offers some refreshing, if at times debatable, insights on the political and economic dynamics in the early decades of the American rule in the Philippines.

Divided in three major parts, the book is introduced by a chapter that provides a strategically concise survey of relevant work on the economic and political history of the Philippines and a few other countries. The first part consists of two chapters that elucidate the development of modern currency and banking systems in colonial Philippines. Chapter 1 focuses on the shift from the gold standard to dollar standard whereas Chapter 2 describes the promulgation of banking laws as well the establishment of a number of banks that played important roles in laying the modern banking system in the country. A more in-depth treatment of the key players in the emerging banking system is offered in the subsequent two chapters. The Agricultural Bank of the Philippine

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Government (ABPG), the first bank established by the American colonial government in the country, is analyzed in Chapter 3 whereas Chapter 4 focuses on the Philippine National Bank (PNB) that superseded the ABPG. The details provided in these first four chapters are essential to the understanding of the general politico-economic contexts, as well as the specific policies and decisions made by government official that led to the crisis.

The last three chapters focus on the crisis itself, its consequences, and the reforms that were pursued in its wake. Chapter 5 sums up and analyzes the various reports on the crisis with a particular emphasis on one produced by the Wood-Forbes Mission. Chapter 6 details the questionable practices of lending credits without adequate collateral and other corrupt practices committed by officials of the Philippine National Bank. The last chapter, Chapter 7, examines the changes in the policies that sought to reform the banking and currency systems. It also analyzes the struggle between Governor General Lenard Wood and the Filipino political elites led by Quezon and Osmena.

The book concludes by teasing out the implications of its key arguments. Interestingly, the author offers an alternative periodization of the American period in Philippine history, with the financial crisis of 1919-1922 as the turning point. The author argues, rightly I think, that conventional periodization based on political development--particularly on the stint of governor generals--did not accurately capture the major shifts in US-Philippines colonial relations. However, the author's claim that the American colonial government was fragile before 1918 and the financial crisis was a key indicator of this, seems to require further substantiation. The same may be said about the author's assertion that scandal could have seriously undermined American rule had its truthful nature been made known then. The other half of the twin-assertion on new periodization, that the post-crisis reforms on banking and currency systems strengthened colonial government, seems convincing.

Questions may be raised as to the extent to which key leaders like Quezon and Osmena lacked a true understanding of the nature or causes of the crisis. Astute and seasoned politicians as they were, the possibility cannot be ruled out that they did understand it. Osmena in particular was very close to Concepcion, the bank president who was at the center of the scandal. It was not unlikely that they discussed and comprehended what was happening then. Now, supposed they actually did not, would have they, Quezon in particular, reacted

differently? One can infer from the known patterns of Quezon's attitude and behavior, as well as from the author's own account on pp. 139-140, that Quezon might have acted just the same and not undermine the American colonial rule, as the author opined. The possible reason for this lay in Quezon's ambitions as politicians, which hinged both on opposing and affirming American colonial rule, as he saw fit. Also, he saw the scandal as an opportunity to get ahead of Osmena in their rivalry for leadership of the Nacionalista Party. Even if Quezon knew that American officials in Washington had a share of blame, he would have ignored it, and emphasized instead the corruption committed by Concepcion. Doing so, he pinned down Osmena through whose favor and intercession Concepcion was appointed as the PNB president.

Extending this line of reasoning, a shadow of doubt may be cast on the book's idea of "colonial discourse." If colonial discourse presupposed the dichotomy between the superior colonizer and the inferior colonized, and that it was meant to serve the interest of the earlier at the disadvantage of the latter, then what do we make of the possibility that such a discourse was nurtured by, and it did reinforce, the Republican critiques of the accelerated Filipinization, or the policy of appointing Filipinos in various offices, which was a pet project by the preceding governor general, a Democrat? At the same time, it appears to have served, and fueled by, intra-elite rivalry among Filipino politicians, particularly Quezon's political interests at the expense of Osmena's? In other words, while the scandal or crisis was likely to have been driven or occasioned by politically interested discourses, such discourses may not be simply categorized as "colonial". It seemed to be more complicated than that.

These issues notwithstanding, the book is no doubt a welcome addition to the crowded field of Philippine-US relations. It is valuable particularly for advancing the understanding of economic history of the Philippines, which remains inadequately mapped out. It must also be commended for the effort to situate Philippine economic history within the broader economic history of the region. Students and scholars of Philippine and Southeast Asian history will find it a profitable read.

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