

Section Four: Society, Economy, Energy and Environment

Oceans, seas and coastal areas constitute a combined and essential component of the earth's ecosystem and are of the utmost importance for the continued use of essential resources. In recent years, the need for oversight of the continued exploitation of ocean and sea resources has become more acute, even if it seems that by using these resources we may be able to eliminate poverty, to see to continued economic growth, to attain food supply security and to create jobs. Alongside the oversight of the use of these resources, we must prepare to protect the entire spectrum of the maritime environment including getting ready for the climate changes we have been witnessed in recent years.

2020 gives every indication of being the year in which the issue of climate change moves from the political periphery to the political mainstream. In 2020, the increased focus on this subject led to clashes between activists, governments and businesses. Whereas climate change still represents the largest physical and existential threat menacing humanity, immediate handling of it will, most likely, be postponed because of the pandemic and its heavy economic and social impact. On the one hand, this is the good news for the fight against climate change, which reached its climax in 2020, while on the other hand, this is still bad news for the actions that must be taken to deal with the results of climate change in the near future.¹

To date, global climate change has been studied as a topic on its own. A recent scientific study conducted by Germond and Wa Ha, found that even though climate change and maritime security have top priority today on states' national and international agendas as well as for international organizations, the mutual influences between the two areas has yet to be investigated, by academic researchers or by applied research conducted by practitioners in the area. The study's authors note that their research is the first one to indicate the possibility that a link exists between climate change and other social phenomena such as increased maritime criminality. Likewise, they point out that links were also found between climate change and migration, and migration and maritime security, which may indicate an indirect association between climate change and maritime security. Their paper summarizes the implications of these hypotheses, both for academic research and for practical research, which can contribute to understanding the link between the effects of climate change on natural and human systems and aspects of maritime security better.²

1 Ian Bremmer, Top Geopolitical Risks in 2020: Coronavirus Update, *Time.com*, March 21, 2020. <https://time.com/5807597/top-geopolitical-risks-in-2020-coronavirus-update>

2 Basil Germond & Fong Wa Ha, Climate change and maritime security narrative: the case of the international maritime organization, *Journal of Environmental Studies and Sciences* volume 9, pages1–12 (2019). <https://doi.org/10.1007/s13412-018-0509-2>

The rise in sea levels: In the chapter in this report dealing with new sea lanes, the possibility of opening new routes through the Arctic Ocean as a result of the thawing of ice bergs was noted. The greenhouse gas effect, thus, also directly affects the rise in sea levels, which phenomenon carries within it more than a few dangers. In 2019, the global sea level was 87.61 mm above the average, recorded in 1993. This is an increase of 6.1 mm compared to 2018 (see Figure 1). The accelerated rate of increase has led to flooding of many places along the US coast and coastal flooding today occurs at a much higher frequency than 50 years ago. Even if the world lowers the rate at which greenhouse gases are released into the atmosphere, it is reasonable to assume that the global sea level will rise at least 0.3 meters above the levels of 2000 to 2100.

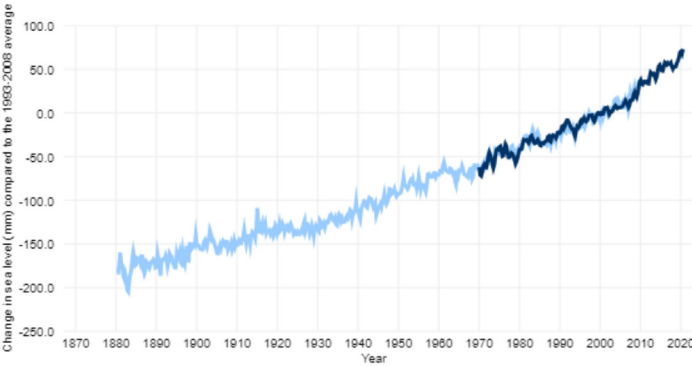


Figure 1: The change in the sea level since 1880³

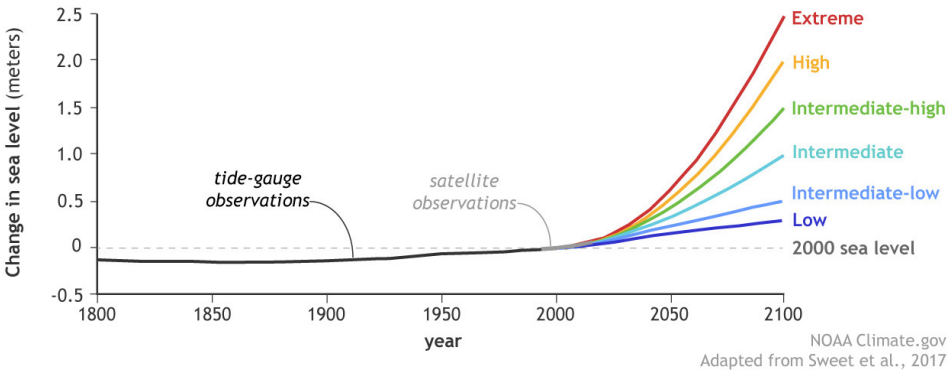


Figure 2: Changes in sea levels under different scenarios of greenhouse gas release levels

3 Rebecca Lindsey, Climate Change: Global Sea Level, NOAA, August 14, 2020, <https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level>

The shipping sector, which has developed in the past few decades as a result of globalization, contributes directly to some of the damage and harm being inflicted on Earth, starting from the impact of the emissions from the fuels the industry uses on their ships, their cargo and in a certain way, because of accidents, spills, etc., which pollute the ocean, through to underwater noise that the ships create that affects marine life. As a result, the International Maritime Organization (IMO) has tried to establish new standards, to tighten oversight and compliance, and to reduce these effects. Exactly as laid out in the Safety of Life at Sea (SOLAS) Convention that obligated the shipping sector to meet standards for safeguarding life at sea, so too the Marine Pollution (MARPOL) Convention is intended to protect the marine environment from diverse types of pollution caused by ships.

The MARPOL Convention has six appendices or annexes that include standards for preventing pollution by oil (1983), by noxious liquid substances in bulk (1987), by harmful substances carried in packaged form (1992), by sewage from ships (2003), by garbage from ships (1988), and by air pollution by ships (2005). Beginning in 2020, shipping companies will be required to use clean fuel containing less than 0.5% sulfur (also called LSFO – low sulfur fuel oil) – fuel that is more expensive than that in use today; otherwise, they must install scrubbers on their ships. The cost of installing scrubbers on the ships to remove sulfur from emissions is estimated at between 5 to 10 million dollars per ship.

The Regional Seas Conventions and the three-year Action Plans are intended to serve these objectives by deepening the involvement of signatory states, through appropriate national legislation and adoption of appropriate control and compliance mechanisms. The 2017–2020 action plan was formulated and approved by 143 member states in 13 different areas around the world. Israel is a signatory of the Barcelona Convention for Protection of the Marine Environment and the Coastal Region of the Mediterranean, including the six main Regional Activity Centers (RACs).⁴

The convention covers the following areas: Prevention of pollution of the Mediterranean Sea by oil and chemicals and their control; sustainable management of marine and land resources in combination with socioeconomic subjects; prevention of coastal and marine pollution from land sources and from activities exploiting the seabed's natural resources; monitoring the maritime environment; monitoring and

4 UN Environment (2016) Regional Seas Strategic Directions (2017-2020), Regional Seas Studies Series No.201. <https://wedocs.unep.org/bitstream/handle/20.500.11822/31229/RSSD2017-2020.pdf?sequence=1&isAllowed=y>

protecting the range of species; integrative management according to the principles of advanced environmental management of coastal zones; protecting the heritage, the animal life and the landscape of the maritime environment; and promoting the quality of life of residents in the Mediterranean Sea basin.⁵

At this stage, it appears that the main focus is on establishing an action plan for tracking and monitoring in order to close the existing information gaps. Regarding the eastern Mediterranean Sea region, the lack of data from the states of North Africa, of which Libya is a failed state, or Lebanon and Syria that are in a similar governmental situation, makes it difficult to conduct tracking, monitoring and handling of the existing problems.

5 See the website of the Ministry of the Environment, the Barcelona Convention Protocols. https://www.gov.il/he/departments/guides/barcelona_convevtion_mediterranean_marine_and_coast?chapterIndex=3 [Accessed October 1, 2020]

Oceans and Pandemics: Lessons to learn to address Climate Change

Nitin Agarwala*, *Semion Polinov*

Introduction

Oceans that provide global mobility to trade and humans have been responsible for the spread of pandemics since ships have moved on the seas. Be it the infamous plague (1347–1352), cholera (1817), yellow fever (1845–1846), typhus (1892), tuberculosis or influenza (1918), they all have spread through ships moving on the oceans. Unlike the earlier episodes, the recent pandemic,¹ COVID-19, has not spread through ships. However, there have been some incidents wherein ships were quarantined or disallowed entry to ports due to COVID-19 cases onboard. As the number of affected nations increased, international borders were closed and lockdowns enforced to prevent a spread that brought businesses to a grinding halt. This notwithstanding, lockdowns provided a unique window of opportunity to scientists and environmentalist alike to study the environmental changes using automated monitoring techniques such as information technology and remote sensing technology. Of these, only a few of studies have focused on the environmental changes in the maritime domain. It is with this understanding that the paper aims to discuss the maritime domains impacted by COVID-19 (GHG and oil pollution, marine litter, fisheries, marine tourism, underwater noise and waste water discharge) to highlight the lessons to learn from the public-health-emergency, COVID-19, to address climate change, a public-health-emergency-in-waiting.

Background

There have been numerous events of climate change on Earth since the Precambrian times². These are all considered *normal* system behavior. However, anthropogenic activities such as burning of fossil fuels (from transportation, energy production),

* Corresponding author, Email: nitindu@yahoo.com National Maritime Foundation, New Delhi, India. <https://orcid.org/0000-0003-0916-3044>

- 1 An *epidemic* that has spread over a large area and is prevalent throughout an entire country, continent, or the whole world. Epidemic is the temporary prevalence of a disease affecting many persons at the same time, and spreading from person to person in a locality where the disease is not permanently prevalent and occurs at the level of a region or community.
- 2 The Earth naturally undergoes cyclical climate change which is a significant variation of average weather conditions—say, conditions becoming warmer, wetter, or drier—over several decades or more.

cement manufacture, land use (through agriculture, livestock farming, forestry), and aerosols (such as chlorofluorocarbons [CFCs]) generate greenhouse gas (GHG) emissions that create a deviation from this normal system behavior. To appreciate the anthropogenic contribution to climate change, several scientific studies such as the study of ice-cores and geological samples (Ethedgge et al., 1996; Lüthi et al., 2008; Friedlingstein et al., 2019) and the cumulative impact of different types of anthropogenic stresses³ on various global marine ecosystems types⁴ have been performed (Halpern et al., 2008, 2015, 2015a). Though these studies confirm anthropogenic contribution to climate change, this fact continues to be hotly debated in political circles.

On a similar note, bacteria and virus, considered the basic building blocks of life have been around since life begun on Earth. It is only when humans began to live with plants and animals, bacteria and viruses began to cross over and humanity saw epidemics. As globalization and population growth increase the average global mean surface temperature (GMST) due to anthropogenic activities (Huppert & Sparks, 2006; IPCC, 2018), the habitat of various common disease vectors⁵ is increasing (Reinhold et al., 2018; Ryan et al., 2019) and spreading from the Tropics to colder regions (which are warmer now) to create fresh strains of epidemics (Githeko et al., 2000). These epidemics cause death (at times nearly 80% of a country's population and billions in global figures), alter the lifestyle of people (to contain the spread) and bring shrinkage to the economy (due to slowing/stopping of commercial activities). When recovery happens, individual lives change and the economy recovers (Conis, 2020) but all at the cost of the environment (Delivorias & Scholz, 2020).

This said, if the epidemic is treated as a health-emergency it brings about improvement in living standards as seen with the *Plague*, *Cholera*, and *Typhoid* of the nineteenth century that gave us tapped water in houses, sewage systems, piped gas, electricity, and health and safety standards. However, if the epidemic

- 3 Artisanal fishing, Demersal destructive fishing, Demersal non-destructive high by catch fishing, Demersal non-destructive low by catch fishing, Direct human impact, Inorganic pollution, Invasive species, Light pollution, Nutrient Pollution, Oil rigs, Ocean acidification, Ocean-based pollution, Organic pollution, Palegic-high by catch fishing, Palegic-low by catch fishing, Sea level rise, Sea surface temperature, Shipping and UV.
- 4 Coral reefs, Seagrass, Rocky reefs, Palegic Surface water, Palegic Deep water, Mangroves, Seamounts, Hard Shallow, Soft Shallow, Hard shelf, Hard slope, Hard Deep, Soft Shelf, Soft Slope, Soft Deep, Deep Water, Surface Water, Nearshore ecosystem, Deep ecosystem, Shallow ecosystem.
- 5 Such as the *Aedes aegypti* mosquito, which can spread dengue, chikungunya, Zika, and Yellow fever.

is considered an economic/ financial crisis, it increases global CO₂ emissions and hence deterioration of the environment as seen in Figure 1, due to unsustainable rebounding methods (Agarwala & Polinov, 2020).

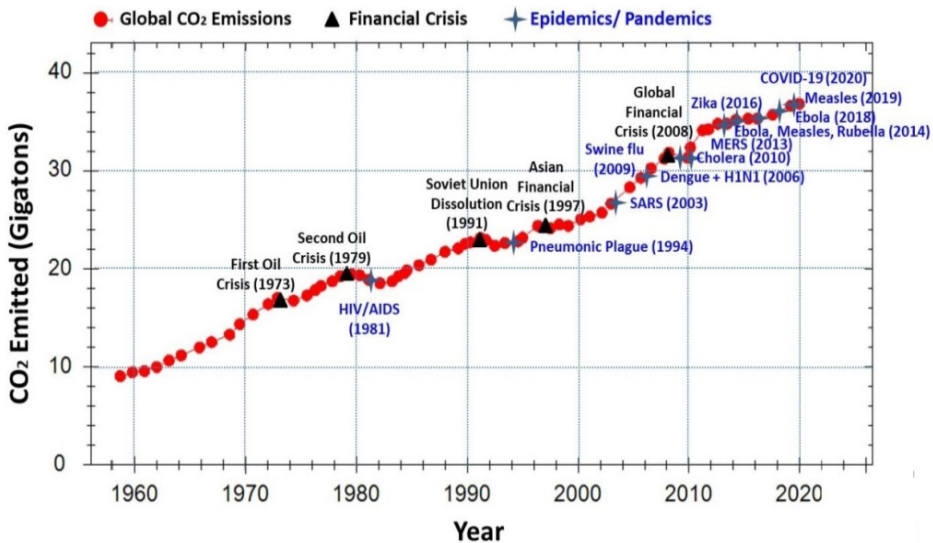


Figure 1: Global fossil CO₂ emissions (in Gigatons of CO₂), with the most important world financial crises and epidemics/ pandemics. (Source: Agarwala & Polinov, 2020)

Another area that is fast becoming a growing cause of concern for the spread of epidemic is 'climate change'. As climate change impact increases, the number of climate refugees⁶ are increasing thereby causing unplanned urbanization, poor sanitation, poor access to clean water, increased transmission of contagious diseases (Bloom et al., 2018) and multiple types of conflicts (Marshall, Hsiang & Edward, 2012). In addition, variations in precipitation⁷ due to climate change (Trenberth, 2011) creates undue stress on the existing sources of clean water causing water-borne epidemics and growth of water-borne vectors (Hunter, 2003). It has also been shown that as ocean currents increase, the number of cholera cases increase (Colwell, 1996; Lipp et al., 2002). If these were not enough, air pollution kills an estimated seven million people globally each year (Seaton et al., 1995; Isaifan, 2020). This effectively means that climate change needs to be categorized as a 'public-health-emergency' as it has the potential to spread several epidemics.

6 *Climate refugees* are people who are forced to leave their home region due to sudden or long-term changes to their local environment. These are changes which compromise their well-being or secure livelihood.

7 High precipitation causes floods and low precipitation causes droughts.

To add to all this, the universal ‘sink’ – the oceans – are shouldering the outcome of events that happen on land. Since both the land and the ocean are interconnected, events such as a landfill, a land based pollution, or deforestation of land all eventually result in a negative impact on the oceans as does the economic slowdown or changed lifestyle as a result of epidemics.

Effect of Lockdown on Oceans

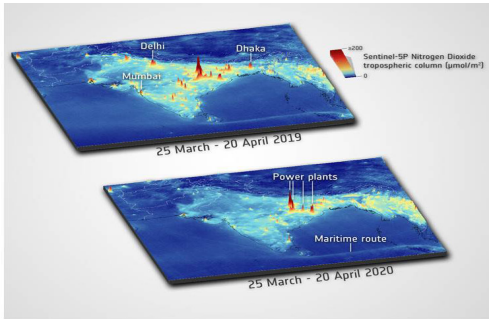
COVID-19 has shown that the Earth has a limited capacity and if these capacities are stretched, nature will reset itself causing mass-extinction as seen many times since the Precambrian times. Accordingly, we will discuss the impact of lockdown on the maritime domain and some lessons to learn to address climate change.

Pollution levels

Of the first few studies related to the marine environment, using space-based imagery, the European Space Agency’s Copernicus Sentinel-5P mission (ESA, 2020) has shown that the shipping lanes have recorded reduced noise and pollution levels (see Figure 2). Similarly, due to reduced tourism and boat traffic in Venice, the waters are clearer and marine life has been sighted (see Figure 2).



Venice – reduced boat traffic leading to clearer waters (seen as lighter colour in the top image of 13 April 20)



Indian Ocean – reduced pollution levels on maritime routes

Figure 2: Water pollution levels – before and after – outbreak of COVID-19 (Source: ESA, 2020)

Ocean noise

The oceans are called as the ‘silent world’ as little is known about the sounds that exist there. The oceans are actually a noisy place with humans greatly adding to this noise by using sonars, seismic surveys, oil drilling, dredging, and the ships’ engines. Such noises cause physical damage, alter behaviour, communication and feeding of marine life resulting in increased whale stranding, killing of zooplankton (McCauley

et al., 2017) and change relationship with other species due to an altered singing frequency. While no map for the ocean noise exists to date, it is known that growing ship traffic has increased sound contribution by nearly 3 dB per decade (or doubled the noise intensity every 10 years on a log scale) between 1950 to 2000 (Jones, 2019). These increased sound levels have led to a highly stressed marine life (Rolland et. al., 2012) that has shown reduced reproduction, reduced caring for offspring and greater chance of being hunted.

Studies (Thomas & Barclay, 2020) made at the NEPTUNE nodes (see Figure 3) show an average reduction of 1.5 dB in year-over-year mean weekly noise power spectral density at 100 Hz, while near the shipping channels off the Port of Vancouver it was 4 to 5 dB due to limited shipping during the lockdown. Similarly, in the Indian Ocean Region (IOR) a reduction of nearly 29 dB was recorded by the Maritime Research Centre in India (HT, 2020). It may be noted that after the 9/11 attacks, noise levels decreased in the Bay of Fundy, Canada by nearly 6 dB in the 20-200 kHz range with a significant reduction below 150 Hz (DOSIT, 2020). Such an acoustic reduction creates a healthy marine ecosystem and a healthier ocean.

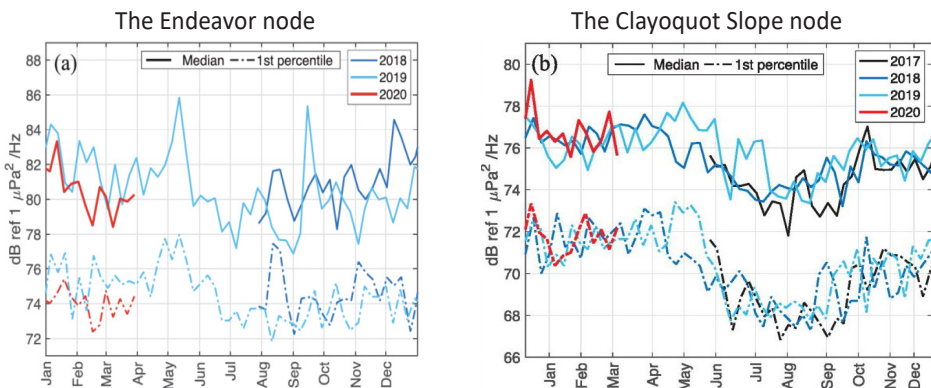


Figure 3: Sound reduction year-over-year at nodes of NEPTUNE observatory (Source: Thomas & Barclay, 2020)

Fisheries

The lockdown has reduced the global fishing hours as seen in Figure 4. Such reduction has helped create 'marine protected areas' thereby increasing the availability of the otherwise overexploited fishes. While the economic impact on fishing community due to unsold catch, lack of transportation and reduced demand have impacted the industry, such MPAs have rejuvenated the ocean space. This would help maintain long-term productivity of fisheries, an area greatly affected by overfishing (Stewart

& Wentworth, 2019) and ensure that current fishing trends of 34% below the biologically sustainable levels (FAO, 2020) can be reversed.

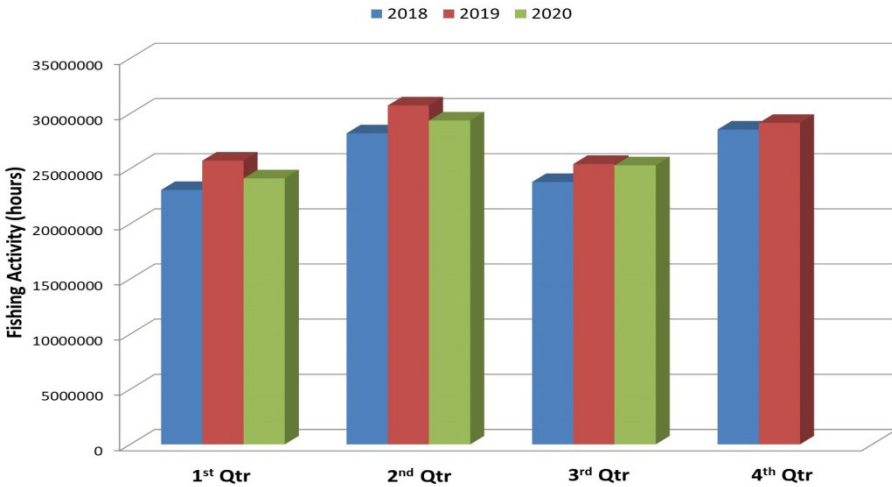


Figure 4: Global Fishing Activity from 2018 to 2020 (Source: Authors; Data from Global Fishing Watch)

Marine tourism

The lockdown has given the nature an opportunity to recover after being exploited by marine tourism with cleaner beaches and waters, lesser litter and increased sea animal sighting due to reduced noise from tourists (Ormaza-González et. al., 2020) in many marine tourist destinations across the globe, including Venice as seen in Figure 1. In addition, lesser fishing activities have contributed to healthier and cleaner beaches.

Marine litter and waste water discharge

It is not that on every front, COVID-19 has shown positives for the health of the ocean. For marine litter and waste water management, the impact has been negative. COVID-19 has increased the quantum of plastic waste reaching the oceans due to increased use of disposable masks and personal protective equipment used to fight the pandemic. The stoppage of recycling activity of the plastic waste during lockdown has compounded and worsened the problem. Similarly, COVID-19 has increased the quantum of polluted water due to frequent washing of hand with soap, which in most cases is being discharged untreated.

Weather related events and epidemics

When weather-related events and epidemics are seen together, one notices that both have a tendency of an increase over the years (Agarwala & Polinov, 2020) as seen in Figure 5. This shows that the occurrence of weather-related events and epidemics are directly related to each other and are a direct reflection of climate change due to anthropogenic factors. Effectively, if the anthropogenic factors are reduced, both epidemic events and weather-related events will reduce.

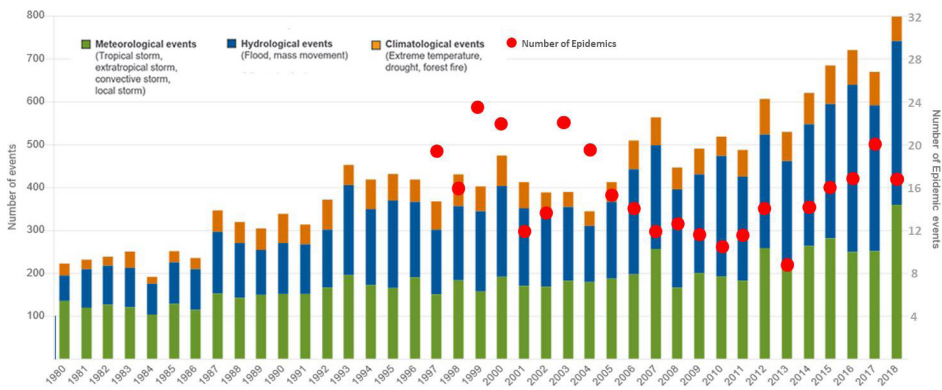


Figure 5: Number of weather-related events worldwide 1980–2018 (Source: Agarwala & Polinov, 2020)

Way Ahead

In the preceding section we have discussed the positive and negative impacts of COVID-19 on the marine environment. While the positive impacts are encouraging, they cannot be considered permanent as once humanity returns to business-as-usual these levels will see new highs due to existing unsustainable procedures for economic recovery. One realises that both epidemics and climate change are here to stay if business-as-usual continues. Since both impact life and economies, they need to be addressed urgently. While pandemics have united the world in finding a cure, climate change is unable to do so. This is primarily due to the varied effects of climate change on different parts of the world and the added cost to resolve the issue with the onus being put on developing and underdeveloped nations. This has disallowed nations to think as one for a solution. Furthermore, since the impact of climate change is hard to see, they are out of the mind and usually ‘not in my term’ resulting in no actionable attention of world leaders.

This said, if overlooked, the damage done may cause serious and irreversible economic and life loss (Kompas, et al., 2018; Doelle and Seck, 2020). With globalized economies, a destroyed economy of a developing nation, as a manufacturing house for the developed nations, will eventually destroy the economy of the developed nations. It is time that the world considers COVID-19 as a wake-up call for overdue actions towards 'climate change'. Eventually, the way ahead will depend entirely on the decision of today that will change our response to future disasters. These decisions need to be based on the lessons learnt from this pandemic to move away from certain destruction. Some of these lessons are:

Lessons Learnt

- (a) A more cautious approach is required when interacting with "Mother Nature" as it is a perfect system that is being upset by humans.
- (b) Scientific data and advice need to be given their due when taking political decisions.
- (c) Nature has the ability to heal itself. This means that nature needs to be exploited sustainably⁸ or else we may force her reboot. Accordingly, the decisions for an exit policy from the present health-emergency must be sustainable ones to help reduce GHG emissions (IPCC, 2013; Oreskes, 2004).
- (d) With 'political will' enormous funds can be mobilized to address any issue, including 'climate change'.
- (e) Humanity needs to adopt planet-healthy work-ethics. During this confinement, offices, research, networking, and the likes were managed efficiently using online meetings and video conferences (Viglione, 2020) so why can't it become the new normal.
- (f) Health emergencies cause economic downsides, job loss and deaths, curtailment of human rights and freedom (Toussaint and Martínez Blanco, 2019), increase the divide between the rich and the poor, and increase marine litter and waste water. These must be avoided.
- (g) Human interaction with the animal kingdom has always been disastrous and has caused anthropogenic stresses such as IUU fishing that causes unsustainable fishing leading to destruction of ocean health and climate change.
- (h) Reduced sale of luxury items are the cause of economic slowdown. They also are a cause of GHG emissions that causes climate change.

8 Such that it meets the needs of the present without compromising the ability of future generations to meet their own needs.

- (j) Today, human life is not a priority or else efforts to control and minimize health emergencies and health-emergencies-in-waiting such as climate change would have been given the required impetus.
- (k) Even after being hit by the pandemic, the human approach to environment is lax and unsustainable. It is essential that impetus is placed on correcting this incorrect approach.

Recommended actions

A healthy planet is one with lesser diseases. While we need to rebuild our economy, however, this needs to be done by investing in 'cleaner and greener' technology paradigms using at least a small portion of the economic bailout package committed by nations for this pandemic bailout and not to give in to pressures of rolling back environmental standards to stimulate the economy. Studies indicate that climate change can cause over 500,000 extra deaths in 2050 from illnesses including cancer, heart disease, and stroke as a result of lack of food alone (Springmann et al., 2016). It is because of this that climate change has been described as the *biggest global health threat* of the 21st century (Costello et al., 2009) and needs to be addressed. Some recommended actions to address climate change for consideration are:

- (a) Sustainability while exploiting flora, fauna and wildlife must be ensured and monitored.
- (b) Scientific data and advice should be given due consideration when making decisions.
- (c) Human intervention to modify nature must be minimized and exercised only in extreme cases.
- (d) Climate change is a public-health-emergency-in-waiting. Political will and unanimity must be created to mobilize both monetary and technological resources to address the anthropogenic causes of climate change.
- (e) Planet-healthy work-ethics must be encouraged and unnecessary travel should be discouraged to reduce GHG emissions.
- (f) Polluting luxury items must be phased out and replaced with greener and cleaner technology items.
- (g) Saving human lives from natural disasters pro-actively should be a priority for governments. Such an approach will help tackle epidemics and climate change better.
- (h) Rebuild the economy by investing in 'cleaner and greener' technologies to reduce anthropogenic causes of climate change.

- (j) Utilise at least a small portion of the economic bailout package for COVID-19 to fight climate change.
- (k) Do not roll back environmental standards to stimulate the economy for recovery.
- (l) The current pandemic should be addressed as a health emergency to bring about environmentally beneficial changes in health and safety standards and achieve the committed goals of the Paris Agreement.
- (m) Marine litter must be checked regularly using technology such as AI (Agarwala, 2020) to ensure a healthier ocean.

Conclusion

The article discusses the maritime domains impacted by COVID-19 to highlight the lessons to learn to address climate change. Accordingly, lessons learnt and some recommendations to address global and long-term climate change issues have been discussed.

One notes that changes due to the forced confinement in the maritime setup have been both positive and negative with regard to the ocean health. This notwithstanding, it is clear that humanity is destroying the ecology and the environment for his personal gain. It is hence important that sustainable means of exploitation are employed or the destruction of the Earth is not far. With climate change being one of the biggest risks and danger looming on humanity, some recommendations have been made to slow down if not roll back the impact of climate change.

Like previous episodes, humans will recover from the present setback. However, this recovery should be on sustainable lines and not by rolling back environmental standards to stimulate the economy. The need exists to evolve new mechanisms to boost the resilience of people and communities (International Federation of Red Cross & Red Crescent Societies, 2004; Broberg, 2019). Though one cannot make predictions, however, the future will be governed by the decisions we make today. The time to act is now. We have been postponing the action against climate change for way too long. We may develop immunity or a vaccine against a virus, but we will never have a vaccine against climate change. For that, we will have to create provisions in the right direction with the know-how we have and the know-how we develop. This will eventually define the future for us Earthlings.

References

Agarwala. N. (2020). Marine Environmental Protection through Sustainability using Artificial Intelligence, Webinar on 'AI for data driven Navy', INS Valsura, 07-09 October 20, <https://www.indiannavy.nic.in/insvalsura/content/ai-webinar-07-09-oct-20>

Agarwala. N. & Polinov. S. (2020). Lessons learnt from Epidemics to address Climate Change, 12 October 2020. <https://hms.haifa.ac.il/index.php/en/component/content/article/19-publication/207-lessons-learnt-from-epidemics-to-address-climate-change?Itemid=107>

Beare, D., Hölker, F., Engelhard, G.H. et al. (2010). An unintended experiment in fisheries science: a marine area protected by war results in Mexican waves in fish numbers-at-age. *Naturwissenschaften* 97, 797–808. <https://doi.org/10.1007/s00114-010-0696-5>

Bloom, David E., Cadarette, Daniel, & Sevilla, J P. 2018. Epidemics and Economics, *Finance and Development*, June 2018, Vol. 55, No. 2, Retrieved from. <https://www.imf.org/external/pubs/ft/fandd/2018/06/economic-risks-and-impacts-of-epidemics/bloom.htm>

Broberg, M. (2019). Parametric loss and damage insurance schemes as a means to enhance climate change resilience in developing countries. *Climate Policy*, 20(6), 693–703. <https://doi.org/10.1080/14693062.2019.1641461>

Colwell, R. R., 1996, Global Climate and Infectious Disease: The cholera paradigm. *Science*, 274:2025–2031, Retrieved from <https://science.sciencemag.org/content/sci/274/5295/2025.full.pdf>

Conis, Elena, (09 March 2020), What History's Economy-Disrupting Outbreaks Can Teach Us about Coronavirus Panic, *Time*, Retrieved from <https://time.com/5799582/epidemics-economies-history/>

Costello A, Abbas M, Allen A, et al. (2009). Managing the health effects of climate change: Lancet and University College London Institute for Global Health Commission. *The Lancet*; 373: 1693–733

DOSIT. (2020). Underwater Acoustic Impacts of COVID-19, <https://dosits.org/underwater-acoustic-impacts-of-covid-19/>

Delivorias, Angelos & Scholz, Nicole, (2020), Economic impact of epidemics and pandemics, *European Parliament Think Tank*, Retrieved from [https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/646195/EPRS_BRI\(2020\)646195_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/646195/EPRS_BRI(2020)646195_EN.pdf)

Doelle. M. and Seck, S. (2020) Loss & damage from climate change: from concept to remedy?, *Climate Policy*, 20(6), 669–680, DOI: [10.1080/14693062.2019.1630353](https://doi.org/10.1080/14693062.2019.1630353)

ESA, 2020, Deserted Venetian Lagoon, (14 April 2020) Retrieved from http://www.esa.int/ESA_Multimedia/Images/2020/04/Deserted_Venetian_lagoon

Ethedde, D. M. et al., (1996), Natural and anthropogenic changes in atmospheric CO₂ over the last 1000 years from air in Antarctic ice and firn, *Journal of Geophysical Research*, Volume 101, Issue D2, pp. 4115-4128. <https://doi.org/10.1029/95JD03410>

FAO. 2020. *The State of World Fisheries and Aquaculture 2020. Sustainability in action*. Rome. <https://doi.org/10.4060/ca9229en>

Friedlingstein, P. et al. (2019) 'Global carbon budget 2019', *Earth System Science Data*. Copernicus GmbH, 11(4), pp. 1783–1838. doi: 10.5194/essd-11-1783-2019

Githeko, Andrew K., Lindsay, Steve W., Confalonieri, Ulisses E. & Patz, Jonathan A., 2000. Climate change and vector-borne diseases: A regional analysis, *Bull World Health Organ*. 2000; 78(9):1136-47. Retrieved from [https://www.who.int/bulletin/archives/78\(9\)1136.pdf](https://www.who.int/bulletin/archives/78(9)1136.pdf)

Global Fishing Watch. <https://globalfishingwatch.org/map>

HT. (2020). Study reveals marked decline in noise levels in Indian Ocean Region during lockdown, 21 May 2020. <https://www.hindustantimes.com/mumbai-news/study-reveals-decline-in-noise-levels-in-indian-ocean-region-during-lockdown/story-KZyDAXX19LuGM9FXjYQ3H.html>

Halpern, B. S., Walbridge, S., Selkoe, K. A., Kappel, C. V., Micheli, F., D'Agrosa, C., Watson, R. et al. (2008). A Global Map of Human Impact on Marine Ecosystems. *Science*, 319 (5865), 948–952. doi: 10.1126/science.1149345

Halpern, B.S., Frazier, M., Potapenko, J. et al.. (2015). Spatial and temporal changes in cumulative human impacts on the world's ocean. *Nat Commun* 6, 7615 (2015). <https://doi.org/10.1038/ncomms8615>

Halpern, B.S., Longo, C, Lowndes, J.S.S, Best, B.D, Frazier, M, Katona, S.K, et al.. (2015a). 'Patterns and Emerging Trends in Global Ocean Health'. *PLoS ONE* 10(3): e0117863. <https://doi.org/10.1371/journal.pone.0117863>

Hunter, P. R. (2003) 'Climate change and waterborne and vector-borne disease', in *Journal of Applied Microbiology Symposium Supplement*. doi: 10.1046/j.1365-2672.94.s1.5.x

Huppert, H. E. & Sparks, R. S. J. (2006) 'Extreme natural hazards: Population growth, globalization and environmental change', *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*. Royal Society, 364(1845), pp. 1875–1888. doi: 10.1098/rsta.2006.1803

IPCC (2013) Climate change 2013: The physical science basis. Working Group I contribution to the IPCC Fifth Assessment Report. Cambridge, United Kingdom: Cambridge University Press. www.ipcc.ch/report/ar5/wg1.

IPCC. (2018). Global warming of 1.5°C. *IPCC*. Available at: https://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

International Federation of Red Cross and Red Crescent Societies. (2004). *World Disaster Report 2004. Focus on Community Resilience*. Kumarian.

<https://www.ifrc.org/Global/Publications/disasters/WDR/58000-WDR2004-LR.pdf>

Isaifan, R. J. (2020) 'Global Journal of Environmental Science and Management The dramatic impact of Coronavirus outbreak on air quality: Has it saved as much as it has killed so far?', *Global J. Environ. Sci. Manage*, 6(3), pp. 275–288. doi: 10.22034/gjesm.2020.03.01

Jones, N. (2019). Ocean uproar: saving marine life from a barrage of noise, *Nature* 568, 158-161. <https://doi.org/10.1038/d41586-019-01098-6>

Ketchell, Misha. (22 October 2018). The risk of 'cascading' natural disasters is on the rise, *The Conversation*, Retrieved from <https://theconversation.com/the-risk-of-cascading-natural-disasters-is-on-the-rise-104192>

Kompas, T., Pham, V. H. & Che, T. N. (2018). The Effects of Climate Change on GDP by Country and the Global Economic Gains from Complying with the Paris Climate Accord, *Earth's Future*, 6(8), pp. 1153–1173. doi: 10.1029/2018EF000922.

Lüthi, D. et al. (2008). LETTERS High-resolution carbon dioxide concentration record 650,000-800,000 years before present, *Nature Publishing Group*. doi: 10.1038/nature06949.

Lipp, E.K., Anwar Huq, & Colwell, Rita R., 2002. Effects of Global Climate on Infectious Disease: the Cholera Model, *Clinical Microbiology Reviews*, Oct. 2002, p. 757–770, Vol. 15, No. 4, Retrieved from <https://cmr.asm.org/content/cmr/15/4/757.full.pdf>

McCauley, R., Day, R., Swadling, K. et al. Widely used marine seismic survey air gun operations negatively impact zooplankton. *Nat Ecol Evol* 1, 0195 (2017). <https://doi.org/10.1038/s41559-017-0195>

Marshall, B., Hsiang, S.M. and Edward, M. (2012) 'Climate and conflict', *Earth*, p. 6. doi: 10.1146/annurev-economics-080614-115430

Murray, I.R., Howie, C.R. and Biant, L.C. (2011) 'Severe weather warnings predict fracture epidemics', *Injury*, 42(7), pp. 687–690. doi: 10.1016/j.injury.2010.12.012

NatCatSERVICE analysis tool, Retrieved from <https://www.munichre.com/en/solutions/for-industry-clients/natcatservice.html>

Oreskes, Naomi, (2004) *The Scientific Consensus on Climate Change*, *Science*: 306 (5702) p. 1686, doi: 10.1126/science.1103618

Ormaza-González, Franklin I., Divar Castro-Rodas. (2020). Covid-19 impacts on beaches and coastal water pollution: Management proposals post pandemic, <https://doi.org/10.20944/preprints202006.0186.v1>

Reinhold, Joanna M., Lazzari, Claudio R., & Lahondère, Chloé, 2018, Effects of the Environmental Temperature on *Aedes aegypti* and *Aedes albopictus* Mosquitoes: A Review, *Insects*. 2018 Dec; 9(4): 158. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6316560/>

Rolland, R. M., Parks, S. E., Hunt, K. E., Castellote, M., Corkeron, P. J., Nowacek, D. P., Wasser, S. K., & Kraus, S. D. (2012). Evidence that ship noise increases stress in right whales. *Proceedings of the Royal Society B: Biological Sciences*, 279(1737), 2363–2368.

<https://doi.org/10.1098/rspb.2011.2429>

Ryan, S.J., Carlson, C.J., Mordecai, E.A., & Johnson L.R, (2019), Global expansion and redistribution of *Aedes*-borne virus transmission risk with climate change. *PLOS Neglected Tropical Diseases* 13(3): e0007213. , Retrieved from

<https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0007213>

Seaton, A. et al. (1995) 'Particulate air pollution and acute health effects', *The Lancet*, 345(8943), pp. 176–178. doi: 10.1016/S0140-6736(95)90173-6

Springmann, M., Mason-D'Croz, D., Robinson, S., Garnett, T., Godfray, H.C.J., Gollin, D., Scarborough, P. et al.. (2016). Global and regional health effects of future food production under climate change: a modelling study. *The Lancet*, 387(10031), 1937–1946. doi:10.1016/s0140-6736(15)01156-3

Stewart, J. & Wentworth, J. 2019, Climate Change and Fisheries, POSTNOTE, No. 604, June 2019.

<https://post.parliament.uk/research-briefings/post-pn-0604/#fullreport>

Thomson, D. J. M., & Barclay, D. R. (2020). Real-time observations of the impact of COVID-19 on underwater noise. *The Journal of the Acoustical Society of America*, 147(5), 3390–3396.

<https://doi.org/10.1121/10.0001271>

Toussaint. P. & Martínez Blanco. A. (2019) A human rights-based approach to loss and damage under the climate change regime, *Climate Policy*, 20(6), 743–757. [10.1080/14693062.2019.1630354](https://doi.org/10.1080/14693062.2019.1630354)

Trenberth, K. E. (2011) 'Changes in precipitation with climate change', *Climate Research*, 47(1–2), pp. 123–138. doi: 10.3354/cr00953

Viglione, Giuliana. (20 March 2020). A year without conferences? How the coronavirus pandemic could change research, *Nature* 579, 327-328 (2020), doi: 10.1038/d41586-020-00786-y

Impact of climate change and extreme weather events on maritime transport

Semion Polinov

Climate change has a crucial impact on all areas of life, including water, public health, agriculture, energy, biodiversity, coastal infrastructure, economics, natural damage insurance, national security, and human health. In the oceans, the main climate changes are sea level rise and sea surface temperature rise, leading to an increase in the frequency of extreme weather events, all of which affect maritime transport. Emission control regulations will also increase operating costs for the maritime industry but may delay ocean acidification process. On the other hand, melting ice caused by climate change will seasonally turn the Arctic into a sea for navigation and create new shipping routes across the Arctic Sea. Ice melting will also enable the conditions for oil and gas production in the Arctic. Increased ship traffic and offshore oil drilling may lead to pollution of the Arctic ecosystem. Climate change-driven change in agricultural patterns probably will also affect the ship movements due to changes in the agricultural areas and the markets. Different stakeholders of the industry should take the necessary steps for adaptation to be better prepared to meet the new situation. In addition, the maritime sector should forcefully adopt minimum emission practices in order to try to mitigate the impact of the maritime industry on global warming.

Introduction

All people on Earth depend directly or indirectly on the ocean and cryosphere. The oceans cover 71% of the Earth's surface and contains about 97% of the Earth's water. The ocean and cryosphere support unique habitats and are interconnected with other components of the climate system through the global exchange of water, energy, and carbon. Human communities in close connection with coastal environments, small islands, polar areas are particularly exposed to ocean and cryosphere change, such as sea-level rise, extreme sea level, and shrinking cryosphere. Other communities further from the coast are also exposed to changes in the ocean, such as through extreme weather events (IPCC, 2019). There is no doubt that today we live in a period when significant climate changes are taking place, which, among other things, lead to more frequent and more extreme weather events. These changes greatly affect human health, stability at local and regional levels in a wide range (Cheung et al., 2009; Butchart, 2010). Also, the maritime sector, which accounts for 80% of all world trade, is highly dependent on climate change and extreme weather conditions. It follows that some of the most serious future challenges will be in the marine area, but it is unclear to what extent changes in the marine ecosystem will affect political and economic stability as a result of an increase in both extreme weather events and other manifestations of climate change (Marshall, Hsiang and

Edward, 2012). Some recent studies have shown that global ocean temperatures are steadily increasing (Jones et al., 1999; McMichael et al., 2006), extreme climatic events and related disease outbreaks are becoming more frequent, faunas are shifting (Hunter, 2003), and invasive species are spreading (Galil, 2007; Molnar et al., 2008) and this is only a small part of global changes with serious consequences. Moreover, the recent COVID-19 crisis has affected all aspects of everyday life and work, and heavily impacted the global economy (Manzanedo and Manning, 2020). These circumstances appear to have accelerated the implementation of the maritime sustainability agenda with increased awareness (UNCTAD, 2019). This article try to deal with two main question and dilemmas: How does climate change affect the maritime transport and how maritime transport contribute to the climate changes?Climate change and the shipping industry.

It looks like a new norm is being set in the maritime sector, reflecting the modest growth of the global economy and efforts to tackle the impact of the shipping sector on climate change and the opposite (Kontovas, 2020). This important step is the result of the realized understanding of decision-makers that climate change is a serious problem for the marine industries, and humans are making a great contribution to this change (Mitchell et al., 2006). As results of this new realm, the last decades of the maritime industry have been characterized by significant technological and legislation changes to improve ocean ecology condition and minimize human impact on the ocean (Becker et al., 2018; Joung et al., 2020; Zis and Cullinane, 2020). The introduction of new technologies in the maritime sector such as Automatic Identification System (AIS) made which was originally designed to prevent accidents at sea (Bye and Almklov, 2019) has found wide applications to solve environmental problems through the monitoring of shipping activities (Ferraro et al., 2007, 2009; Fiorini, Capata and Bloisi, 2016). Below presented some of the impacts of climate change on maritime transport, in particular on its efficiency and profitability.

By analyzing the relation loop presented in Fig. 1, we can see an overall picture of the impacts of climate change on shipping activities. It is interesting to notice that one climate change phenomenon – ice melting is conducive to a growing maritime industry. All other climatic events like sea surface temperature rise, sea-level rise, and climate change policy or emission control regulations will have negative impacts on shipping activities. Moreover, we can see, if shipping activities increases, offshore and onshore maritime industries also increase. The growth of maritime industries will be decreased with the reduction of shipping activities.

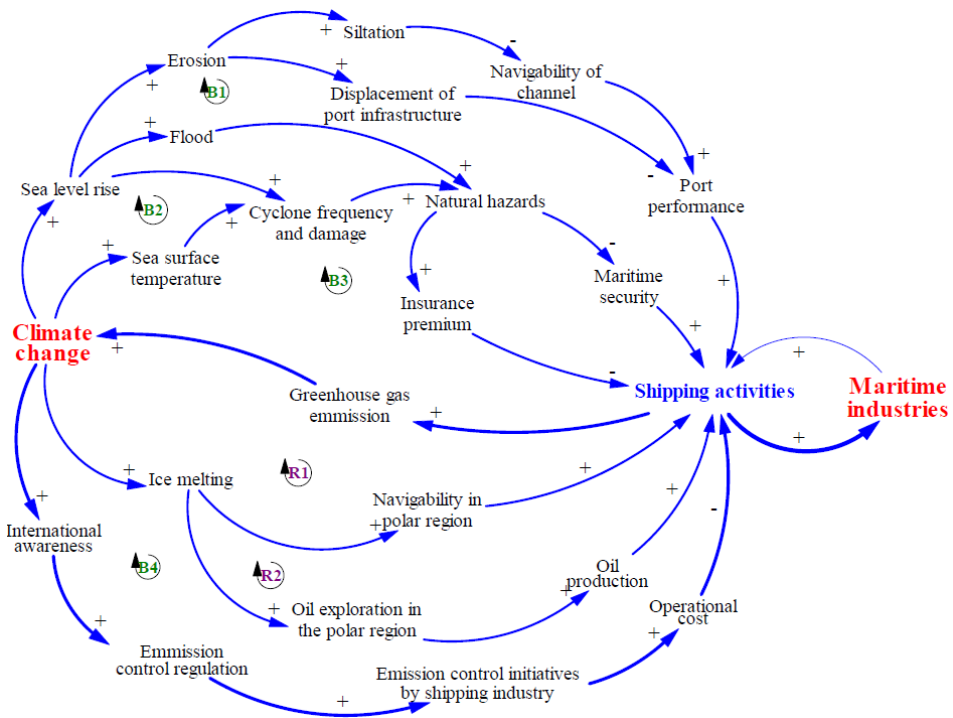


Figure 1: loop relationships among climate change, natural hazards, and shipping¹

Shipping Decarbonization

All transportation sectors face decarbonization process in order avoid raising global average temperature (Bows-Larkin, 2015). Emissions from international shipping accounted for an average of 2.4% of global annual greenhouse gas (GHG) emissions between 2007–2012 and are expected to increase by 50–250% by 2050 in a 'Business as Usual' b scenario. However, in order to stay within the 1.5°C global average temperature increase threshold, it is necessary that all sectors reach net-zero emissions by 2050. International shipping can significantly reduce GHG emissions using existing technical and operational measures, while a full decarbonization requires further research and development and rapid deployment of technology (Kachi, Mooldijk and Warnecke, 2019).

Globally there are around 52,000 merchant ships contributing to international shipping of goods and passengers (see Fig. 2 left). For a sense of scale, these ships produce engine capacity, more than Europe's entire fleet of fossil-fueled power stations.

1 https://commons.wmu.se/cgi/viewcontent.cgi?article=1275&context=all_dissertations

There is significant heterogeneity across the merchant fleet with different ships, fuels, emissions and regulations, thus there is no one-size-fits-all decarbonization solution. The greatest source of GHG emissions within shipping are from container ships, bulk carriers and oil tankers. This is due to these vessels conducting longer journeys to deliver their cargo – international and intercontinental, rather than domestic and coastline routes. The spatial distribution of these emissions is shown in Fig. 2 (right) and covers most of the oceans and seas in the northern hemisphere (Balcombe et al., 2019).

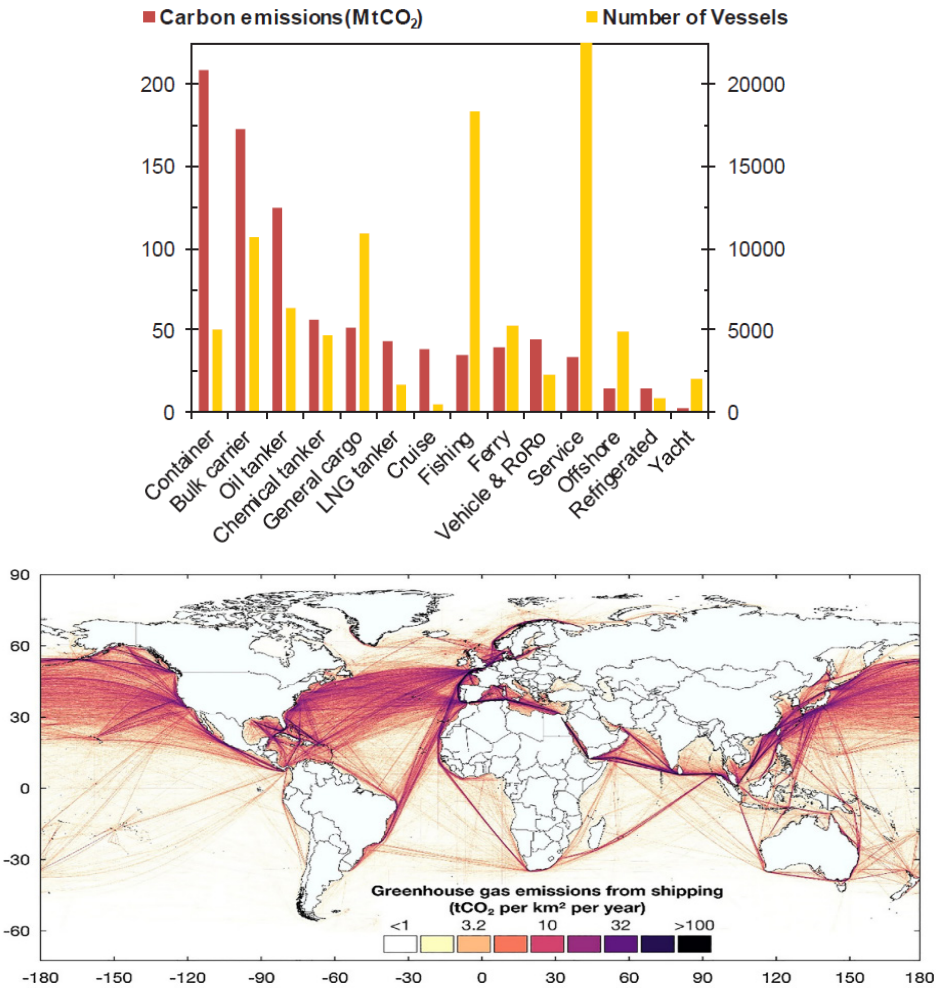


Figure 2: Number of merchant ships and their carbon emissions, by category (Upper image) and Map of the global distribution of greenhouse gas emissions from shipping (Lower image) in 2017 (from Balcombe et al., 2019)

Over the past several decades, significant legislative action has been taken through the International Maritime Organization (IMO) to decarbonize transport to avoid further temperature increases and lower GHGs emissions from shipping (Joung et al., 2020; Kontovas, 2020).

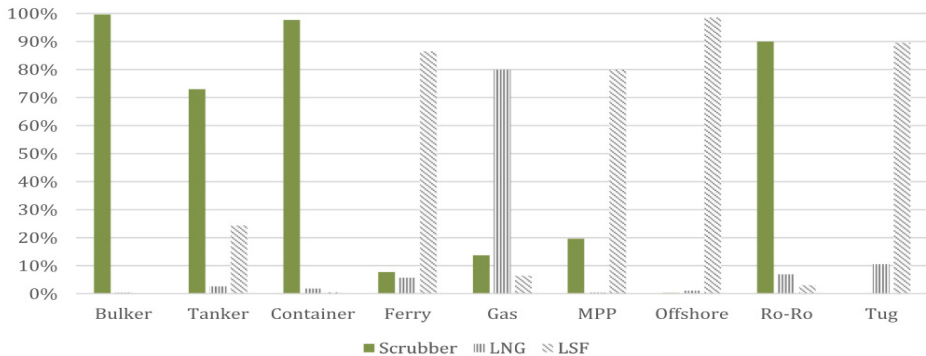


Figure 3: Share of vessels turning to three different compliance methods by fleet type (Li et al., 2020)

However, such policy and legislative measures to tackle the increase in CO₂ and other GHGs remain grossly inadequate (Bows-Larkin, 2015). The second "However" it's the nature of the contribution of the various gases emitted from ships to climate change is complex (Kontovas, 2020). One of the major advances in minimizing the impact of shipping on climate change appears to have been the adoption of the 2020 IMO resolutions to reduce GHGs emissions from ships (especially SO_x²). Although SO_x gases are generally not considered greenhouse gases, they have a cooling effect that plays a role in climate change and negatively impacts human health and the environment (Zis and Cullinane, 2020). With the introduction of the sulfur limitation IMO 2020, shipowners have three main abatement options: (1) switching to low sulfur fuel (LSF); (2) installation of sulfur oxide scrubbers; (3) runs on liquefied natural gas (LNG). In fig. 2 clearly shows significant differences between fleet types depending on how ship operators respond to the new 2020 IMO sulfur limit. Almost all bulk carriers, containers, and Ro-Ros ships are equipped with SO_x scrubbers, while the majority of tugs, and ferries have switched to LSF. Most of the gas vessels are LNG-powered; this is as expected, as are most LPG vehicles such as LNG and liquefied petroleum gas (LPG) (Li et al., 2020). The new IMO 2020 regulation, which should lower the sulfur limit from 3.50 percent to 0.50 percent, is expected to bring significant benefits to human health and minimize human impact on climate change.

2 https://ec.europa.eu/commission/presscorner/detail/en/IP_19_6837

Given the acceleration of climate change due to the elimination of the cooling effect of SO_x emissions, more ambitious carbon reduction targets may be required (Kontovas, 2020).

Impact of extreme weather events on shipping

Various aspects of the maritime industries are becoming increasingly susceptible to extreme weather events, mainly as a result of climate change. Quite obviously that in the present we experience an increase in the numbers of natural disasters a year, resulting in devastating consequences (Knutson et al., 2010). Climate change primarily affects the frequency of extreme weather events such as storms, hurricanes, waves regime, as well as the vulnerability of coastal areas to sea-level rise (Huppert and Sparks, 2006). The catastrophic consequences can only intensify if more effective ways to mitigate the consequences are not found (Mitchell et al., 2006). Extreme weather events are particularly challenging, which can affect simultaneously multiple countries, while the largest events can have global implications (Huppert and Sparks, 2006). Continuous efforts are needed to identify areas at risk and to take action to apply scientific evidence before events occur.

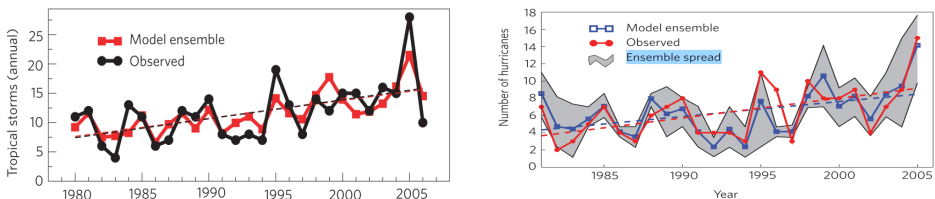


Figure 4: Simulated versus observed Tropical cyclone (left image) and Hurricanes between years 1980–2006 (based on Knutson et al., 2010)

In fig. 3 shows changes in the annual number of tropical cyclones and hurricanes with relatively conflicting results. A manifestation of the ambiguity of the results is fluctuations in the frequency and intensity of tropical cyclones with a large amplitude, which significantly complicates the identification of long-term trends, despite the general trend towards an increase in the number. Future projections based on different theories and models indicate that warming from anthropogenic greenhouse gases will increase the global average tropical cyclone intensity towards more severe storms, with an increase of 2–11% by 2100 (Knutson et al., 2010).

Conclusion

As climate change risks have become increasingly recognized and understood by the scientific community, vulnerable sectors such as shipping, ports, and supply chains

are now beginning to consider implications for both their long-lived infrastructure and the efficiency and resilience of their operations. Here are just some of the major changes and outputs expected to impact business as usual scenario:

1. Increased regulation on maritime transport, such as GHGs emissions (Joung et al., 2020).
2. Increased operating costs and movement of freight (Curtis, 2009).
3. New shipping lanes, mainly Arctic (Wright, 2013).
4. Higher risk of port infrastructure damage (Hanson et al., 2011; Messner et al., 2013)

Future trends and recommendations

- With climate change and its impacts, the marine industry will be affected to a certain extent and the environmental regulation requirements on the industry will grow.
- The maritime sector, which is highly dependent on various effects of climatic changes, must be very interested in minimizing climate impacts, as inaction now will be costly in the future.
- With the increased range, intensity and severity of climate change impacts, existing shipping routes are no longer as safe and easy to navigate as they used to be, new routes need to be planned. Re-routing can be very inconvenient and reduce productivity for both the client and the shipping line because instead of continuing with their normal operations, shipping companies must devote time and financial resources to route planning. For the customer, an increase in delivery time will affect their delivery.
- Autonomous vessels will allow shipowners to more effectively control vessel traffic, reduce fuel consumption and emissions, thereby reducing the contribution of shipping to climate change.
- Work in partnership—climate impacts do not respect borders, working with relevant partners contributes to more effective outcomes; building "regional redundancy" capacity can help damaged ports bounce back from storm events more quickly by accessing resources (e.g., equipment and cargo rerouting) at nearby facilities.

References

Balcombe, P. et al. (2019) 'How to decarbonise international shipping: Options for fuels, technologies and policies', *Energy Conversion and Management*. Elsevier Ltd, pp. 72–88. doi: 10.1016/j.enconman.2018.12.080.

- Becker, A. et al. (2018) 'Implications of climate change for shipping: Ports and supply chains', *Wiley Interdisciplinary Reviews: Climate Change*. Wiley-Blackwell. doi: 10.1002/wcc.507.
- Bows-Larkin, A. (2015) 'All adrift: aviation, shipping, and climate change policy', *Climate Policy*. Taylor and Francis Ltd., 15(6), pp. 681–702. doi: 10.1080/14693062.2014.965125.
- Butchart, S. H. M. (2010) 'Global Biodiversity: Indicators of Recent Declines', *Science*, 328(5982), pp. 1164–1168. doi: 10.1126/science.1186777.
- Bye, R. J. and Almklov, P. G. (2019) 'Normalization of maritime accident data using AIS', *Marine Policy*. Elsevier Ltd, 109. doi: 10.1016/j.marpol.2019.103675.
- Cheung, W. W. L. et al. (2009) 'Projecting global marine biodiversity impacts under climate change scenarios', *Fish and Fisheries*, 10(3), pp. 235–251. doi: 10.1111/j.1467-2979.2008.00315.x.
- Curtis, F. (2009) 'Peak globalization: Climate change, oil depletion and global trade', *Ecological Economics*, 69(2), pp. 427–434. doi: 10.1016/j.ecolecon.2009.08.020.
- Ferraro, G. et al. (2007) 'Towards an operational use of space imagery for oil pollution monitoring in the Mediterranean basin: A demonstration in the Adriatic Sea', *Marine Pollution Bulletin*, 54(4), pp. 403–422. doi: 10.1016/j.marpolbul.2006.11.022.
- Ferraro, G. et al. (2009) 'Long term monitoring of oil spills in European seas', *International Journal of Remote Sensing*, 30(3), pp. 627–645. doi: 10.1080/01431160802339464.
- Fiorini, M., Capata, A. and Bloisi, D. D. (2016) 'AIS Data Visualization for Maritime Spatial Planning (MSP)', *International Journal of e-Navigation and Maritime Economy*. Elsevier BV, 5, pp. 45–60. doi: 10.1016/j.enavi.2016.12.004.
- Galil, B. S. (2007) 'Loss or gain? Invasive aliens and biodiversity in the Mediterranean Sea', *Marine Pollution Bulletin*, 55(7–9), pp. 314–322. doi: 10.1016/j.marpolbul.2006.11.008.
- Hanson, S. et al. (2011) 'A global ranking of port cities with high exposure to climate extremes', *Climatic Change*, 104(1), pp. 89–111. doi: 10.1007/s10584-010-9977-4.
- Hunter, P. R. (2003) 'Climate change and waterborne and vector-borne disease', in *Journal of Applied Microbiology Symposium Supplement*. doi: 10.1046/j.1365-2672.94.s1.5.x.
- Huppert, H. E. and Sparks, R. S. J. (2006) 'Extreme natural hazards: Population growth, globalization and environmental change', *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*. Royal Society, 364(1845), pp. 1875–1888. doi: 10.1098/rsta.2006.1803.
- IPCC (2019) *Summary for Policymakers. Climate change 2007: Impacts, adaptation and vulnerability., Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change*. Hamish Pritchard. Available at: <http://www.gtp89.dial.pipex.com/AR4.htm>.
- Jones, P. D. et al. (1999) 'Surface air temperature and its changes over the past 150 years', *Reviews of Geophysics*, 37(2), pp. 173–199. doi: 10.1029/1999RG900002.

Joung, T.-H. et al. (2020) 'The IMO initial strategy for reducing Greenhouse Gas(GHG) emissions, and its follow-up actions towards 2050', *Journal of International Maritime Safety, Environmental Affairs, and Shipping*. Informa UK Limited, 4(1), pp. 1–7. doi: 10.1080/25725084.2019.1707938.

Kachi, A., Mooldijk, S. and Warnecke, C. (2019) *Carbon pricing options for international maritime emissions*. Available at: <http://newclimate.org/publications/>.

Knutson, T. R. et al. (2010) 'Tropical cyclones and climate change', *Nature Geoscience*, pp. 157–163. doi: 10.1038/ngeo779.

Kontovas, C. A. (2020) 'Integration of air quality and climate change policies in shipping: The case of sulphur emissions regulation', *Marine Policy*. Elsevier Ltd, 113. doi: 10.1016/j.marpol.2020.103815.

Li, K. et al. (2020) 'Determinants of ship operators' options for compliance with IMO 2020', *Transportation Research Part D: Transport and Environment*. Elsevier Ltd, 86. doi: 10.1016/j.trd.2020.102459.

Manzanedo, R. D. and Manning, P. (2020) 'COVID-19: Lessons for the climate change emergency', *Science of the Total Environment*. Elsevier B.V., 742. doi: 10.1016/j.scitotenv.2020.140563.

Marshall, B., Hsiang, S. M. and Edward, M. (2012) 'Climate and conflict', *Earth*, p. 6. doi: 10.1146/annurev-economics-080614-115430.

McMichael, A. J., Woodruff, R. E. and Hales, S. (2006) 'Climate change and human health: Present and future risks', *Lancet*. doi: 10.1016/S0140-6736(06)68079-3.

Messner, S. et al. (2013) 'Climate change and sea level rise impacts at ports and a consistent methodology to evaluate vulnerability and risk', *WIT Transactions on Ecology and the Environment*, 169, pp. 141–153. doi: 10.2495/CP130131.

Mitchell, J. F. B. et al. (2006) 'Extreme events due to human-induced climate change', *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*. Royal Society, 364(1845), pp. 2117–2133. doi: 10.1098/rsta.2006.1816.

Molnar, J. L. et al. (2008) 'Assessing the global threat of invasive species to marine biodiversity', *Frontiers in Ecology and the Environment*, 6(9), pp. 485–492. doi: 10.1890/070064.

UNCTAD (2019) *2019 Review of maritime transport*. Available at: [https://unctad.org/en/Pages/Publications/Review-of-Maritime-Transport-\(Series\).aspx](https://unctad.org/en/Pages/Publications/Review-of-Maritime-Transport-(Series).aspx).

Wright, P. (2013) 'Impacts of climate change on ports and shipping', *MCCIP Science Review 2013*, (November), pp. 263–270. doi: 10.14465/2013.arc28.263-270.

Zis, T. P. V. and Cullinane, K. (2020) 'The desulphurisation of shipping: Past, present and the future under a global cap', *Transportation Research Part D: Transport and Environment*. Elsevier Ltd, 82. doi: 10.1016/j.trd.2020.102316.

The Port of Ashdod Prepares for Competition

Moshe (Shiko) Zana

The global shipping industry accounts for more than 80 percent of the global traffic in goods, and it is the main player in the management of the global supply chain. In this context, the ports of Israel handle about 98 percent of Israel’s shipment of freight (in terms of weight) and the Port of Ashdod is the largest and leading port in Israel for dry bulk cargo. From the perspective of shipment of cargo, Israel operates as an ‘island economy’ that is dependent on maritime commerce and as such the importance of the functioning of its ports is critical to the economy. For this reason, the Port of Ashdod (like other ports) is defined in the port regulations as being essential to the State of Israel.

The incorporation of the port in 2005 as part of the reform of the port sector created a basis for business competition between the government port corporations in Haifa and Ashdod and has significantly increased the efficiency of the ports within the Israeli supply chain sphere. The total increase in freight at the Port of Ashdod, and primarily in the number of containers (which account for about 65 percent of the port’s activity), has exceeded the total average long-term growth in freight activity in the State of Israel and this is the direct result of competition between the ports.

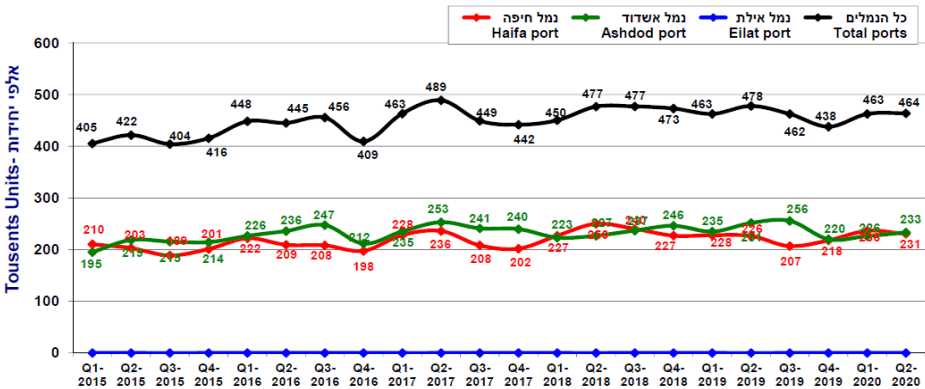


Figure 1: Container traffic in the ports of Israel, 2015–20; data for the Port of Haifa include about 30 percent transshipment

Figure 1 shows that 2015 was the turning point for the Port of Ashdod, which began the ‘era of competition’ with a 35-percent market share of container traffic and increased it to 50 percent and more.¹

1 The Ministry of Transportation – The Shipping and Ports Authority, Economics and Foreign Relations Branch (Table 2.3: Containers in thousands of units – Total traffic in the Israeli ports). (Hebrew)

Another factor that contributed to competition and growth was the reform carried out in the method of pricing calculation, which was implemented in October 2010. This reform, which was a result of Israel's admittance to the OECD, primarily involved the adoption of the "cost plus" method of calculating the price of handling, which replaced the cross-subsidization method. Another direct result of the port reform was greater efficiency, which was focused on increasing revenue, together with the assimilation of innovation in work methods and the accelerated introduction of advanced technologies into the port operations.

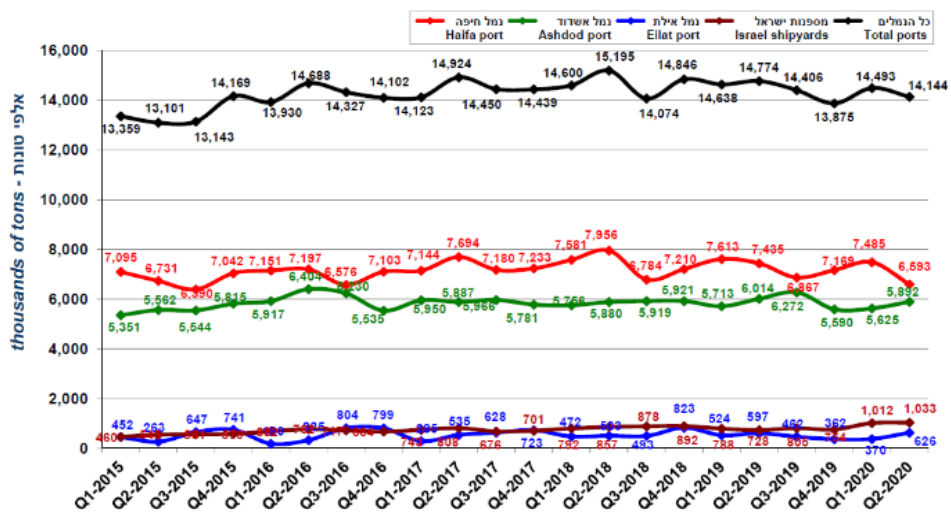


Figure 2: Total freight traffic in the ports of Israel (in thousands of tons), 2015–20²

The golden age of growth in the Port of Ashdod continued uninterrupted for about 12 years but has slowed in the last three. The port essentially reached its maximal capacity in total freight handled and it was not possible to expand the activity on existing piers beyond about 24 million tons annually (containers, general cargo and bulk). There are a variety of reasons, not only to do with infrastructure. They also include labor relations and labor agreements that were not compatible with the pace of change in the demand for the port's services. These and other factors led the government of Israel to decide on the creation of two private and competing ports that would begin operation in mid-2021, the privatization of the Port of Eilat (2013), and the accelerated privatization of the Port of Haifa, which is currently in process.

2 The Ministry of Transportation – The Shipping and Ports Authority, Economics and Foreign Relations Branch (Table 2.1: Containers – Total traffic in the Israeli ports). (Hebrew)

The Port of Ashdod, as a container port, has in recent years been listed on the top 100 largest ports in the world (out of a total of 1000 active ports worldwide).³ In 2017, the port was ranked 94th in the world, and in 2018 it was ranked 103rd; however, the Port of Ashdod's uniqueness lies in its ability to deal with all the types of freight arriving in Israel: containers, vehicles, bulk of all types, metals, general cargo and special projects.

In coming years, two new terminals will be inaugurated in Israel: 'Hadarom' in the South which will be operated by Terminal International Limited (TIL) and 'Hamifratz' in the North which will be operated by Shanghai International Port Group (SIPG). This will increase the level of competition between the ports in Israel to unprecedented levels. Starting from mid-2021, there will be significant excess capacity in the ports of Israel and at its peak the handling ability of Israel's four Mediterranean ports is expected to be approximately 8 million TEU as opposed to domestic demand of about 3.2 million TEU (not including transshipment).

The vision of the Port of Ashdod

The vision of the port is to expand the terminals for freight activity and essentially to open the Israeli ports to regional competition with the other ports in the Eastern Mediterranean. In order to achieve this vision, the Port of Ashdod Company has formulated a long-term strategic plan for investment, in the unprecedented amount of about NIS 2.5 billion (~700 million US\$). This program, which is already being implemented, includes the deepening of Pier 21 in order to allow the intake of giant ships – up to 24 thousand TEU, with a length of 400 meters and a width of up to 62 meters. This expansion will provide the Port of Ashdod Company with the ability to compete with the new ports as an equal.

The challenge facing the Port of Ashdod Company in coming years is to overcome its unique constraints as a government company which is subject to excess regulation relative to the private ports. The Port of Ashdod Company must shift from being a company that concentrates on revenue and technological improvements to a company that aims at greater efficiency in inputs and costs that are equal to those of private companies. The main problem is that the private port companies and the Port of Ashdod, which is a government company, do not operate under the same rules of competition, primarily in view of the fact that the new port companies in Israel are efficient, private and not subject to collective labor agreements.

3 Source: Container Management 2019.

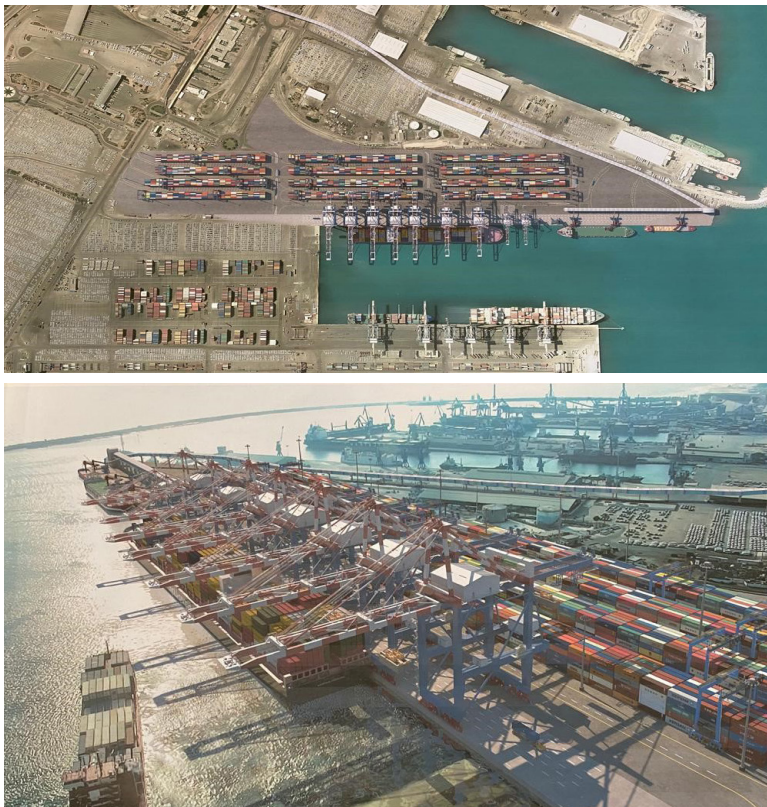


Figure 3–4: Illustration of Pier 21 – the new container terminal that is currently under construction to serve mega-size ships of up to 24 thousand TEU



Figure 5: illustration of a pier that specializes in the conveyance of seeds to the Ashdod granaries, which will operate with an unloading capacity of up to 1,500 tons per hour. The completion of the project is planned for the end of 2022

The Port of Eilat, the Israel Shipyards Port and soon the Port of Haifa operate under regulations that are identical to those applying to the new private terminals; however, while the Port of Ashdod will continue to operate under excess government regulation (the Tender Obligation Law, the Commissioner for Wages, the Government Companies Authority, etc.). The challenge will be to operate together in order to "reinvent the new port of Ashdod" so as to allow for intensive and efficient competition.

It is encouraging that there are examples of success of this sort in other countries. For example, the Port of Hamburg – HHLA in Germany is successfully competing with private terminals. What is less encouraging is the fact that there are not many such examples and therefore the challenge facing us is without precedent in the terminal industry.

The Response of the Ashdod Port Company to the COVID-19 Crisis

Moshe (Shiko) Zana

The Port of Ashdod was well-prepared for the COVID-19 crisis. However, the initial drop in trade and the effect that it appears to be having on the Company's business results is surprisingly large. The year 2020 was meant to be a year of accumulation of profit in order to prepare for the introduction of competition among the ports in Israel, which is planned for 2021 when the new ports open ('Hadarom' and 'Hamifratz'). This situation changed as a result of the COVID-19 crisis, in which the Ashdod Port Company is attempting to deal with the shortfall in revenue relative to the expectation presented in the work plan at the end of 2019.

The first wave

A black swan arrived in mid-February and reached a peak in March–April; characterized by uncertainty and preparations for the next quarter. The pandemic, which began in China and spread to the rest of the world in January–February, reached its peak in March and April and is causing massive disruption worldwide. In the Port of Ashdod itself, the effect was different in several aspects and the adaptations during a situation of uncertainty changed from one month to the next.

Containers – During the first wave, the port experienced a drop of about 15 percent in revenues from container activity; however, as of September the decline moderated to only about 4 percent with an expectation of equaling the figure for the previous year.

At the start, a small number of ships were delayed due to concern about infected crew members or about the ship's port of origin. However, almost immediately, rules and regulations were put in place which made it possible to preserve Israel's chain of supply.

Vehicles – The original estimates foresaw a 30 percent drop in revenue from vehicle handling. Currently, it is expected that the decline will only be about 20 percent this year. This is a major blow to this segment of the port's activity and is explained by the large number of workers sent on unpaid leave and to the rising unemployment in Israel since the beginning of the crisis, which of course led to a drop in the demand for new vehicles.

In addition, this decline in demand also contributed to the slowdown in production of the auto manufacturers in Europe during these months. They gradually began

to recover in May but have still not returned to full production (as of September 2020). The effect of the auto industry on the revenue of the port and its profitability is almost as large as that from container handling. The situation in this segment is expected to continue at least until the end of 2020.

Bulk cargo (cement, clinker, phosphates, grain, etc.) – Despite the fear of a drop of 10 percent in the activity of the port in this segment, the actual drop in bulk imports passing through the Port of Ashdod fell by only a few percent and the port has managed to grow by a significant 8 percent as of September. This is thanks to the major effort by the port to maximize trade activity in this segment. Essentially, bulk cargo has hardly been affected by the COVID-19 crisis, apart from during the first wave and there was an impressive recovery already on exiting from it.

Cruises – This is a growing industry that was meant to reach a new record this year, both worldwide and in the Port of Ashdod. Eighty visits of cruise ships owned by the largest international companies had been approved and the vast majority of them were cancelled immediately with the onset of the pandemic. We estimate that the recovery in the activity of the cruise lines will continue even after the conclusion of the COVID-19 crisis, which is still beyond the horizon. In other words, in our estimation, the recovery of the cruise industry will take at least two years. As of now, more than 90 percent of world's cruise ships are inactive and the monthly cost of anchoring them ranges from one to three million dollars per ship.

This is a major blow to the industry and the end is not yet in sight. The cruise industry has flourished during the last decade with consistent growth of about 6 percent per year and about 30 million passengers annually (32 million in 2019). The global revenue of this industry stood at about \$150 billion annually and it employs more than one million crew members. Currently, the industry is basically paralyzed.

The cruise industry is undoubtedly the most affected within the maritime sectors. The Port of Ashdod views this sector as an important source of growth in the coming era of competition. However, as of now, it appears that during the next two years no cruise ships will be appearing in Israel or in the Port of Ashdod.

The onset of the COVID-19 epidemic

The port quickly adjusted to the pandemic according to the rules laid down by the Ministry of Health and the Ministry of Transportation. This included coordination that was meant to create order among the workers who understood the scope of the challenge and who were willing to do what is necessary to continue the port's operations. Simultaneously with this process, I took up the position of CEO of the

company, which required me to quickly get acclimatized and to close any gaps in knowledge that might interfere with day-to-day operations.¹

The captains of the ships that visited the Port of Ashdod were asked to report on the temperatures of all their crew members and also not to allow them to come ashore, as well as not allowing them to move around on the deck during the loading / unloading of the ship in the port. This was in order to prevent contact between the port workers and the crew.

It was decided right away to create a 'Corona Forum' headed by the CEO and to hold meetings of the forum every morning. The port's security officer was designated to manage the day-to-day activity related to the COVID-19 crisis, including to minimize infection among the port workers and preserve redundancy. The frequent announcements and updates were issued to all of the stakeholders as necessary.

Our goal was to immediately stabilize the operational situation and to meet the needs of both customers and the Israeli economy, alongside the players that are in constant interface with the port activities: the Customs Authority, the Ministry of Health, the Ministry of Agriculture, the Ministry of the Economy and the relevant security organizations.

The directives were tightened up and all of the workers and those coming into contact with the port were required to work according to the rules that apply to the general public. A full plan was prepared for risk management, starting from working in capsules and preventing contact between workers during the change in shifts (which slowed the pace of work for defined periods). Furthermore, all of the areas of mass gatherings in the port were closed (restaurants, the synagogue, the gym and the rest lounges). The workers were instructed to wear masks when moving around the port area, and disinfectant products were made available wherever workers gathered.

In addition, there were daily evaluations made which were led by the Minister of Transportation and with the participation of the chairmen and the CEOs of the ports, together with the various regulators, with the goal of identifying trends and creating a dialogue to solve problems.

Exit from the first wave (May to September)

During the months of May–September and prior to the imposition of the second lockdown, the port worked consistently to stabilize its "windows" activity. The level

1 Shiko Zana became the CEO of the Port of Ashdod Company on March 10th (comment by the editor).

of day-to-day activity rose from week to week. The port operated without any capacity constraints, except during the peak of grain imports (which characterizes the end-of-winter period and the harvest period), during which there was stability with stable growth.

During May, there were worrying signs of an increase in infections in Israel, particularly in the area of City of Ashdod. However, following another announcement of reassurance from the officer in charge of managing the COVID-19 crisis in the port, the port continued to operate according to the directives.

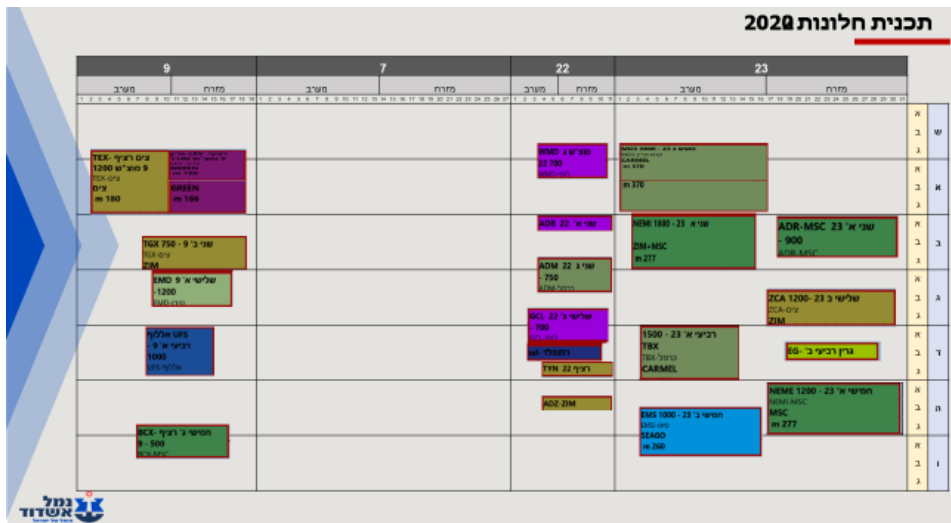


Figure 1: An example of the port’s weekly workplan

Figure 1 presents an example of the weekly "windows" plan for the port. The plan includes the arrivals and duration of stay of every container ship in the port and their ports of origin and ports of destination. The available Pier 7 is designated for ships arriving as part of the operational queue and without any predetermined planning. The plan comprises about 20 thousand containers per week, both in pre-planned windows and from the operational queue.

The second wave – recovery (September to October)

The preparations of the Port of Ashdod for the second wave were meant to minimize the gaps created as a result of the lockdown imposed on the economy; however, most of Israel’s trade partners returned to their normal business activity (at least during this period). There were still "economic ripples" from the closure processes

and the restrictions that we are seeing will affect the continuation of economic activity, primarily containers and vehicles.

The effect of the lockdown diminished prior to The Jewish religious festivals (The Jewish new year and the holidays follows it) which created new processes of demand in the Israeli economy. We are preparing for every scenario with expectations of an aggressive exit from the crisis, when such an exit occurs, in terms of cargo.

Signs of a 'Corona routine' – The current situation

One should be careful not to have overly optimistic expectations. An article in the Economist on September 26th, 2020,² presented the position that many governments in the West are adopting the wrong measures and are trying to solve economic problems "on the fly". These include more than a few of Israel's trading partners in East Asia and certainly in the rest of the world. Therefore, the return to full cargo activity with Israel's trading partners will be largely dependent on the measures their governments adopt.

In contrast, things are different in the maritime container trade. The shipping companies that belong to the three large alliances, i.e. Ocean Alliance, THE Alliance and 2M, which are active along the import routes from East Asia and China by way of the Indian Ocean on the way to the Suez Canal and Israel, have not returned to routine supply on the routes leading to Israel. This includes the cancellation of arrivals on an unprecedented level. This is contributing significantly to the profitability of the shipping companies who are maximizing activity at the expense of service; however, these activities are a direct result of the COVID-19. For example, THE Alliance line, which includes four shipping companies: Hapag Lloyd, Yang Ming, HMM and ONE, which arrives once a week in Israel, will have approximately three times more cancellations of planned arrivals than in the previous year. This amounts to about 12 less arrivals with an average of about 2,200 containers per week and this is simultaneous with about a 30 percent drop in imports through the port.

"30% to 60% outbound shipping capacity withdrawn in Asia-Europe marine routines have severely disrupted trade activities". Alphaliner

The cancellation of arrivals is a recurring theme in many ports of the world. In Israel, the phenomenon is not as common as in the rest of the world. Thus, while prior to the crisis, the port planned for 8 percent growth in container activity, it will finish the year at the same level as in the previous year.

2 Why governments get covid-19 wrong?, The Economist (26 September 2020)
<https://www.economist.com/weeklyedition/2020-09-26>

The growth forecast of the Port of Ashdod in container traffic for 2021 is about 6 percent on a national level (the entire Israeli economy) and on the condition that the intensity of the COVID-19 crisis diminishes or is even completely halted.

What is expected in the future? A cautious evaluation for the near future

The IMF, in the beginning of its most recent study, defined the crisis as unprecedented, and therefore there is no indication of any certainty this year. There is no region of the world that has not been affected to one extent or another and the mutual effects between countries are pervasive. According to the data gathered by the IMF, the nations of the world have spent more than \$8 trillion in fiscal assistance.

There has been a major decline in global output and the IMF is forecasting a drop of about 6 percent this year in Israel. If the crisis continues in Israel, together with the second lockdown, the Ministry of Finance expects a drop of 5 percent in GDP.

The WTO barometer³ for consumer goods is showing a decline to a historic low for the second quarter of 2020. The effect of the second wave is unclear, but clearly it will not be positive.

The impact on container trade is correlative. A return to the pre-crisis routine is expected, according to various forecasts, only after the crisis is behind us or after we have learned to live with the COVID-19 within a healthy economic routine. This means a full return to work globally, and primarily in the large economies of the world.

The scenarios of the various research organizations in the industry are being updated on a quarterly basis. The port, like many other organizations in the Israeli economy, must adapt itself to this period of uncertainty.

Competition in a time of Corona

Following are a number of issues that in our opinion will be the focus in the era of competition in the ports of Israel and will be accompanied by the COVID-19 crisis:

1. Making it as easy as possible, within the rules for safety and health, for ships to visit without any mishaps, while taking into consideration the ships' crews.
2. Technology as an essential factor.
3. Upgrading of the ability to work remotely.

3 WTO trade barometers. https://www.wto.org/english/res_e/statis_e/wtoi_e.htm#top

4. Communication with customers – Greater importance given to existing relationships and the development of continuous communication.
5. A fundamental need for greater efficiency and the adjustment of the company to change.
6. Focus on cost saving and improving the customer experience.
7. Getting more with less effort.
8. The ports of the Eastern Mediterranean as the port of Ashdod's competition.
9. Israel as a transshipment center.
10. Improving the tradeoff faced by governments and companies between closing the economy and quarantining it as a response to the COVID-19 pandemic on the one hand and the opening of the economy in order that life can continue as usual to whatever extent possible on the other hand.

Conclusion

The Port of Ashdod Company, the shipping industry and the supply chain in general must prove themselves during this period of uncertainty and therefore the Port of Ashdod is doing all it can to adapt itself and to maintain flexibility in providing a response to the challenges it faces during this period.

In my opinion, the Port of Ashdod has been successful in providing an optimal solution for the economy during the first wave, and certainly during the second. Currently, as the leading governmental port in Israel, we are prepared to support the economy in maintaining its day-to-day routine, with the possibility of providing for all of the State's essential needs.

Israel's Energy Sector Between Peace and Plague

Elai Rettig

A number of global and regional events in the past year directly affected Israel's energy sector, both strengthening its energy supply security while weakening its export potential. On the one hand, COVID-19 has caused a global slump in energy prices and investment, further distancing Israel's hopes of exporting gas to Europe via pipeline. On the other hand, recent normalization agreements between Israel and its regional neighbors have opened new trade routes for oil and made Israel a more attractive destination for international energy companies, albeit with some new environmental risks included. Finally, the entrance of Chevron into Israel's energy sector will bring with it economic opportunities, but also legal challenges.

The impact of COVID-19 on energy production and export in the East Mediterranean

Even before the COVID-19 pandemic first emerged in early 2020, Israel had a very challenging task of finding foreign markets for its gas. While both Jordan and Egypt signed long-term supply deals with Israel's Tamar and Leviathan fields, this only accounts for 30% of the gas that Israel has earmarked for exports. Without additional markets, Israel will struggle to attract new companies to explore for gas without a clear buyer on the horizon.

The COVID-19 epidemic made the prospects of the East-Med Pipeline even more dubious, as energy demand in Europe declined and led to gas prices going to an all-time low of under \$2 per BTU. The economic slowdown also led to an unprecedented slump in global energy investments across the board – from fossil fuels to renewables and new electricity grid developments. The hardest hit sector is the oil and gas upstream (exploration and production of new fields) which declined by 35%, from \$483b in 2019 to an estimated \$313b in 2020.¹ Even before the COVID-19 pandemic, European gas prices have been steadily falling due to increased competition brought on by a flood of new liquified natural gas (LNG) suppliers, mainly from the USA, Australia and Russia. From \$6 per BTU on the European spot-market in 2018, they went down to \$4 in 2019.² European gas prices are expected to remain low until the middle of the decade even when COVID-19 subsides.

1 Investment estimates for 2020 continue to point to a record slump in spending (23 October 2020), IEA. <https://bit.ly/3mVzzuh>

2 Mike Fulwood and Jack Sharples, "\$2 Gas in Europe: Down, Down, Deeper and Down". Oxford Institute for Energy Studies. <https://www.oxfordenergy.org/publications/2-gas-in-europe-part-iii-down-down-deeper-and-down>

Under these conditions, the prospect of new pipelines and new production projects in the East Mediterranean by private energy companies seems much less likely in the upcoming years. While tensions over gas finds and maritime borders between Turkey and Greece escalate, the economic sense in producing these fields diminishes since any gas exported from the region to Europe can't compete with current prices. Although it is tempting to view deep-sea energy discoveries as the main reason for these recent clashes between Turkey and its neighbors, this conclusion seems to be less convincing given the current state of the global oil and gas markets. As the economic viability of deep-sea gas production in the East Mediterranean Sea is steadily decreasing, maritime clashes between Turkey and Greece have only intensified. This indicates that while energy may have motivated Turkey's initial expansion into the sea, it is now being used mainly as an excuse to pursue much broader geopolitical goals.

Both Turkey and Greece/Cyprus are aware that any new gas discoveries will likely stay in the ground for the time being, but both sides are using these fields to strengthen alliances in the region. For Turkey, the desire to strengthen ties with Libya's Government of National Accord (GNA) is masked by its actions to block the East-Med gas pipeline by expanding its EEZ to Libya's maritime border. For Greece, Cyprus and Israel, it is an opportunity to strengthen security and strategic ties over the construction of a pipeline that is economically unviable. For both sides there's an interest to continue the rhetoric over the East-Med Pipeline, even if it never materializes.

Chevron Buys Noble

The global slump in oil prices did bring with it an unexpected development for Israel. On July 2020 one of the biggest U.S. oil companies in the world – Chevron – announced that it intends to take over Noble Energy, which operates the Tamar and Leviathan gas fields in Israel. The deal, which is estimated at about five billion dollars, was made possible by the COVID-19-induced crash in oil prices which severely damaged Noble Energy's investments in the US oil shale industry and forced it to sell its assets at relatively low prices.

Chevron's entry as a partner in the gas fields in Israel entails many economic and political opportunities. It is one of the largest and most stable private energy companies in the world and is very active in the USA, Australia, Nigeria, Angola and Kazakhstan. Its entry into the Israeli energy sector could send an encouraging message to other companies that have so far feared investing in Israel due to political reasons. Chevron's presence in the eastern Mediterranean can also help promote

regional cooperation between Israel and its neighbors, which are necessary for the export of Israeli gas to Europe. Together with the Tamar and Leviathan fields, Chevron will also gain control of the Aphrodite field, which is currently shared jointly by Cyprus and Israel, in addition to the search concessions it recently acquired from Egypt in the Red Sea.

The combination of interests between Israel, Cyprus, Greece and Egypt for joint export has existed for many years, but under the leadership of a major international oil company in the form of Chevron, there is now more chance of finding funding for ambitious production and export projects. Israel's maritime border negotiations with Lebanon can also move forward with some pressure from Chevron, if it indeed chooses to place its weight on the issue.

At the same time, it is still too early to assume that the Chevron-Noble deal will improve Israel's economic and energy prospects. Unlike Noble Energy, the fact that Chevron is a huge company with large currency reserves and many global projects also allows it to delay the development of its oil and gas fields and wait until global prices recover. This is inconsistent with Israel's ambitions to explore for more oil and gas fields and expedite the development of Phase II of Leviathan.

In addition, Chevron may turn out to be a tougher partner than Noble Energy when it comes to negotiating gas prices for the domestic Israeli market, especially during the expected negotiations with the Israeli Electricity Company (IEC) after its contract with the Tamar field ends in 2021. While the Israeli government struggled to withstand the various political pressures exerted by Noble Energy when signing the original contract with the IEC in 2012 and approving the much-contested "gas framework" in 2016, it will find it even more difficult to do so in the face of one of the largest and most powerful companies in the world. This might also prove a bigger challenge for the various environmental groups that protested offshore and onshore gas infrastructure in Israel while they were still under the management of Noble Energy. Like many other major oil companies in its caliber, Chevron has a reputation for litigating against environmental NGOs and even individual activists that disrupt its activities.

Another possible scenario that Israel should prepare for is that Chevron may in one point in the future, prefer to sell its share of the gas fields in Israel and altogether remove itself from Israel's energy sector. Politically, Chevron's involvement in Israel may block it from operating in other countries, although today this barrier is not as strong as it used to be, following the thawing of relations between Israel and the Arab Gulf states ("Abraham Accord" 2020). Another reason for leaving may be

Israel's notoriously unstable and politicized regulatory system, which was exposed at its peak during the public debates over the gas framework. Chevron may not be interested in inheriting the negative image left behind by Noble Energy among large sections of the public, and may prefer to bring in another entity that will buy its assets in Israel.

Any future move to leave Israel is expected to delay the exploration and development efforts of additional fields or the ability to sign new export deals, and might create concern among Israeli decision-makers who are now looking towards Israel's newly-created "sovereign wealth fund" (which absorbs gas revenue to prevent the "Dutch Disease") as a solution to recover Israel's economy in the post-COVID-19 world. Israel must now monitor Chevron's moves after completing control of Noble Energy's assets and ensure that existing plans to develop gas fields in Israeli waters are not harmed as a result of the takeover process. If Chevron chooses to sell its stake in the Israeli reserves, Israel must ensure that the new investor is in line with Israel's national interests and its relations with the United States, especially in a scenario where the buyer is a Russian or Chinese company.

Regional peace deals and Israel's Energy Sector

The second half of 2020 also brought with it a series of historic normalization agreements between Israel and its regional neighbors – the UAE, Bahrain and Sudan – with additional countries in the Gulf rumored to sign similar agreements soon. While these agreements are not expected to drastically alter Israel's energy sector or relieve its various export constraints, they will open up an important maritime route for Israel's oil imports during emergencies, encourage regional cooperation and make it easier for international energy companies to operate in Israel's waters.

In the upcoming years Israel might begin to receive some oil from the UAE, both in the form of direct imports and by serving as a transit state for Emirati oil travelling between the Red Sea and the Mediterranean Sea through the Eilat Ashkelon Pipeline (EAPC).³ In October 2020 a memorandum of understanding (MOU) was reportedly signed between EAPC and a consortium of UAE and Israeli semi-private holding companies (MRLB, Lubber Line Capital, and AF Entrepreneurship) to provide oil from the UAE through Israel.⁴ While this deal won't lower fuel prices for consumers in

3 Israel has already been receiving oil from South Sudan (through Sudan) since at least 2013, but the recent agreement may increase these volumes as well.

4 Amiram Barkat. "Agreement signed to operate Israel pipeline for UAE oil", *Globes* (October 20, 2020). <https://en.globes.co.il/en/article-agreement-signed-to-operate-israel-uae-oil-pipeline-1001346340>

Israel's domestic market (which are mostly determined by taxes, VAT and marketing fees, not by the actual cost of oil), it can increase transit revenues for the Israeli government (reportedly, up to \$700m every year) and will help strengthen the diplomatic ties between Israel and these countries. This does, however, come with a potential environmental cost in the shape of markedly increased tanker volume in the gulf of Eilat (Aqaba), substantially increasing the possibility of an oil spill that will cause damage to marine life and to the beaches in Eilat.

In addition to environmental risks, there may be indirect political implications for Israel if the new oil transit deal with the UAE comes at the expense of the routes offered by Egypt. Currently, Emirati oil seeking the shortest route to the Mediterranean Sea can go through Egypt's Suez Canal or the Suez-Mediterranean Pipeline (SuMed) which is partly owned by Egypt, Saudi Arabia and the UAE. If the new deal between Israel and the UAE takes away traffic from Egypt, this will result in a loss of valuable transit revenue for Egypt which may create political tensions with Israel, even if the loss is not significant.

In terms of security of supply, the agreement with the UAE and Sudan opens the possibility of importing oil from another maritime route during an emergency, and this has important security implications. Today, most of Israel's oil passes through Turkey, either through the Baku-Tbilisi-Ceyhan pipeline (BTC) that transfers oil from Azerbaijan through Georgia and into Turkey, or through oil tankers from Russia in the Black Sea that pass through the Bosphorus Straits on their way to Israel. If the Turkish maritime route is interrupted for political or technical reasons, or if the BTC pipeline is sabotaged as part of the ongoing conflict between Azerbaijan and Armenia over Nagorno-Karabakh, temporary imports of oil from the UAE or Sudan via the Red Sea could prove to be critical until the disruption is resolved.

Beyond purchasing oil, Israel can benefit from exporting cleantech products and renewable energy technology to Sudan and the Arab Gulf states – diversifying away from just weapons and surveillance systems which Israel often uses as a crutch when building foreign trade relations. About 13% of the oil that the UAE produces is marketed to the local population, which enjoys subsidized electricity, fuel and water, and is thus more wasteful in how it consumes it. Israeli technologies that help streamline energy and water use, lower costs for desalinated seawater, and increase the efficiency of renewable energy, will help the UEA "release" some of its oil and gas for export, thus strengthen its economy. This goal also aligns with the targets set forth by several Arab Gulf States to diversify their economy beyond energy products, as a way to reduce their vulnerability and exposure to the volatile global oil market.

Lastly, the agreement with the UAE removes a geopolitical barrier that for decades had impeded on Israel's ability to attract major international energy companies to invest in it. Companies such as Exxon, Chevron, Total and BP have traditionally refrained from exploring Israel's land and economic waters for fear of an Arab boycott. Instead, they turned to mostly barren searches in Lebanon and Syria's waters. The Israel-UAE agreement gives companies confidence in entering the Israeli market, and this may also have a bearing on Chevron's decision whether to sell the Israeli gas reserves that came under its control after taking over Noble Energy.

Conclusions

The three major events of the past year that have affected Israel's energy sector (the slump in global energy prices, Chevron's takeover of Noble Energy, and the normalization agreements with UAE/Bahrain/Sudan), did not drastically alter Israel's energy projections and constraints, but rather accelerated ongoing trends. As such, a number of recommendations are in place:

1. As global and European energy prices continue to fall, Israel's target of exporting its gas to distant regions will be put on hold. It is becoming increasingly apparent that the gas finds will mainly remain a regional source for energy. As such, Israel should focus on utilizing gas for domestic consumption in sectors other than electricity (petrochemicals, heating, transportation) and encourage its neighbors to do the same.
2. While Chevron's entry into the Israeli market brings with it many economic opportunities, Israel should keep a close eye on Chevron's plans regarding the future development and ownership of the gas fields. In the event that Chevron wishes to delay further development of Leviathan, or prefers to sell its Israeli assets altogether, Israel must ensure that the new investors are in line with Israel's national interests and development goals.
3. Israel's deal to transit UAE oil through its pipeline holds political and economic benefits for both sides. The Israeli government must conduct a comprehensive strategic assessment before finalizing the oil transit deal with the UAE, considering both risks and opportunities. Notwithstanding, Israel should be aware of the environmental risks included in the deal. The substantial increase of tanker movement that this deal entails in the small bay of Eilat can turn even a small oil spill into a potential environmental disaster. Israel should enforce strict protocols and monitor this activity. In addition, the Israeli government should consider the potential competition it is creating for Egypt which could lead to a decline in transit revenue to its neighbor and may be a source of political tensions.

Tax benefits under special tax regimes for the shipping industry¹

Ofir Kafri

Introduction

Special tax regimes for the shipping sector exist in various countries in the international tax system. These tax regimes are a type of subsidy offered by the respective state to its maritime sector. The operation of these regimes is intended to assist in attaining objectives such as an increase in shipping operations, refurbishing of commercial fleets, increasing human resources in the area and the like.² Processes occurring in the global shipping sector such as international competition, the move to using flags of convenience (FOC) and the increased use of government subsidies, have put pressure on various countries to allocate assistance that also include tax benefits to their shipping industry.³

Studies that have examined the use of tax instruments in the international shipping sector support the importance of selecting efficient tax instruments that suit the objectives that have been established. Lessons from from the international system show that the local and international environments and their mutual influences on the tax regime must be closely studied prior to putting a new one in place as well as while it is in effect. Research shows that in certain cases tax benefits for the shipping sector only partially achieved their objectives or even failed, because of, among other reasons, misalignment. For example, it has been claimed that the use of a tonnage tax to significantly strengthen human resources in the British shipping industry did not succeed. It was asserted that the tonnage tax intended to bolster the gross tonnage increase of the fleet from 5.6 million tons to around 12 million within six years. In contrast, the increase in the number of jobs in the same period

- 1 This paper is based on academic research focusing on 'Special Tax Regimes for the Maritime Sector in the International System'. It is not intended to present complete legal information, and should not be seen as offering legal advice or used as such. Because of space limitations, the paper does not include all the legal issues and complexities in this field.
- 2 It must be noted that there are cases in which government subsidies are allocated to private shipping companies in order to safeguard or develop a strategic fleet meant to help the state in an emergency, e.g., the U.S. Maritime Security Program (MSP), Maritime Administration, U.S. Department of Transportation. <https://www.maritime.dot.gov/national-security/strategic-sealift/maritime-securityprogram-msp>
- 3 ITF (2019), "Maritime subsidies: Do they provide value for money?", International Transport Forum Policy Papers, No. 70, OECD Publishing, Paris.

benefitted seamen coming from countries outside of the European Union.⁴ Another example is the use of a tonnage tax as a means of strengthening or maintaining the number of ships registered in a country. In this context, it has been claimed that in certain cases, the broadening of the tonnage tax in the international system weakened to some extent the effect of this tax instrument in achieving the above objective.⁵

The tax instrument mix, which is used to attain objectives, is varied and changes at times from state to state. These tax regimes tend to present benefits such as tax credits, tax exemptions, reduced taxation relative to other sectors, etc. Tax regimes may comprise taxes that are specific to the maritime sector, such as a tonnage tax, and types of taxes that are not unique to the sector such as company tax, employer tax, income tax and value added tax.⁶

This paper will present examples of tax instruments that states use in the maritime sector. In addition, tax benefits given in special regimes to the maritime sector will also be discussed. Likewise, examples of the conditions set by the governments for awarding tax benefits, and the participation in the special tax regimes will be presented. To show examples of the range of methods and instruments, issues in special tax regimes for the shipping industry that exist in Australia and Singapore will be offered. Lastly, a partial list of the policy recommendations that may perhaps assist in states' decision-making processes related to the use of special tax regimes for the shipping industry will be presented.

4 For additional reading about the problems in supporting maritime human resources in Britain using a tonnage tax, see: Gekara, V. (2010), "The stamp of neoliberalism on the UK tonnage tax and the implications for British seafaring", *Marine Policy*, Vol. 34, pp. 487–494; Leggate, H. and J. McConville (2005), "Tonnage tax: Is it working?", *Maritime Policy & Management*, Vol. 32:2, pp. 177–186.

5 For additional reading about the decreased effect of tonnage tax in the international system and other problems, see: Bergantino, A. and P. Marlow (1998), "Factors influencing the choice of flag: Empirical evidence", *Maritime Policy and Management*, Vol. 25:2, pp. 157–174; Marlow, P. and K. Mitroussi (2008), "EU shipping taxation: The comparative position of Greek shipping", *Maritime Economics & Logistics*, Vol. 10, pp. 185–207; Marlow, P. and K. Mitroussi (2011), "Shipping taxation: Perspectives and impact on flag choice", *International Journal for Shipping and Transport Logistics*, Vol.3:4, pp. 349–364.

6 For additional reading about tonnage tax models, implications and results of using it, see the following sources: Leggate H. and J McConville (2005), "Tonnage tax: Is it working?", *Maritime Policy & Management*. 32:2, 177–186; Marlow, P., and Mitroussi, K. (2008), "EU shipping taxation: The comparative position of Greek shipping", *Maritime Economics & Logistics*, 10(1–2), 185–207.

This paper relates to test cases of states in which special tax arrangements for the maritime sector exist, and does not deal with general state tax regimes that also affect the maritime sector. Due to lack of space, only the main examples drawn from the test cases will be presented, and the complete benefits and existing conditions in each case will not be discussed.

Tax instruments, types of benefits and limitations included in tax regimes for the maritime sector

As noted above, states use a range of tax instruments as part of their tax regimes for the maritime sector. The combination of types of taxes used by states can differ from state to state. The following presents some instruments and benefits that are used, classified for convenience according to capital taxes and company income tax, labor tax and energy tax.

Benefits related to capital and corporate income may be, for example, a tonnage tax for companies that allows them to pay a reduced tax. Many states, e.g., Greece, Norway, and Japan, use different types of tonnage taxes. Additional benefits are different types of reduced corporate or business taxes for entities in the maritime sector and accelerated depreciation on ships and maritime equipment. In addition, states can reduce taxes on dividends, tax deferral in cases of selling of a ship and purchase of another one, reduction or exemption from value added tax on products related to ship operation and the like.⁷

Instruments and benefits that are used in the context of human resources are reduction or exemption from income tax for seamen, foreign earning deduction for seamen, tax benefits for social benefit payments and so forth. For example, Germany, Britain, South Korea and additional countries allowed tax deductions, in certain cases, on seamen's work. Countries such as France, Sweden and Holland reduced taxes or gave tax rebates on salary expenses and social benefit payments. Benefits related to the area of energy also exist in the shipping industry; e.g., reduction or exemption from fuel and electricity taxes, exemption from carbon emission taxes (in those areas where such taxes exist). Countries such as Greece, Australia and Portugal awarded exemptions from the excise tax on fuel for ships that operated according

7 Ernst & Young. Shipping Industry Almanac 2016; Ernst & Young. Worldwide Corporate tax 2019. https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/tax/hc-alert/eyworldwide-corporate-tax-guide-2019.pdf; Ernst & Young. Worldwide VAT, GST and Sales Tax Guide 2019. https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/tax/hc-alert/ey-2019-worldwide-vat-gst-and-sales-tax-guide.pdf

to conditions established by legislation. Sweden conferred exemptions from carbon emission tax to local commercial shipping operations.⁸

In some countries, limitations and conditions were imposed on tax regimes in the attempt to prevent misuse of benefits and harm to local and international maritime operations. These conditions were intended to help meet, among others, targets and local economic policy, agreements and international limitation, and prevent situations such as the use of the maritime sector for the creation of tax havens.⁹ There are many examples of tax benefit limitations. For example, a cap on tax benefits on the income of local seamen only, tax benefits for local corporations and so forth.¹⁰ In some countries in the international system, the limitations on tax regimes are relatively constrained. As a result, and because of other reasons, trends such as a surge to register ships in specific countries and an international race to the bottom in terms of tax benefits are created.

A special tax regime for the Australian maritime industry

Australia, in recent years, carried out reforms in its shipping sector, which included also changing the tax regime and that was intended to reduce blockages and deficiencies in the area.¹¹ The package of instruments and incentives that emerged following the reform included new tax legislation that can be seen, for example,

- 8 ITF (2019), "Maritime subsidies: Do they provide value for money?", International Transport Forum Policy Papers, No. 70, OECD Publishing, Paris. Page 9–11, 20, 33; Ernst & Young Shipping Industry Almanac 2016.
- 9 To read about international activities to reduce damage caused by international tax competition and problematic tax regimes, see: Organisation for Economic Co-operation and Development (OECD). Addressing base erosion and profit shifting. February 12, 2013. Organisation for Economic Cooperation and Development (OECD). Action plan on base erosion and profit shifting. July 19, 2013. https://read.oecd-ilibrary.org/taxation/action-plan-on-base-erosion-and-profitshifting_9789264202719-en#page1
- 10 One can see examples of limitations and conditions that were imposed by states on tax benefits given to the maritime sector in the following sources: Ernst & Young. Global Oil and Gas Tax Guide 2019. <https://www.ey.com/eng/tax-guides/global-oil-and-gas-tax-guide-2019>; Ernst & Young, Shipping Industry Almanac 2016.
- 11 For additional reading on the reasons for the reform, see the following sources: Australia. Parliament of Australia Senate. Farrell, Sen Don (ALP). BILLS – Shipping Reform (Tax Incentives) Bill 2012, Shipping Registration Amendment (Australian International Shipping Register) Bill 2012, Coastal Trading (Revitalising Australian Shipping) Bill 2012, Coastal Trading (Revitalising Australian Shipping) (Consequential Amendments and Transitional Provisions) Bill 2012, Tax Laws Amendment (Shipping Reform) Bill 2012 – Second Reading. 18 June 2012.

in the Shipping Reform (Tax Incentives) Act 2012.¹² Likewise, changes were made regarding the maritime sector in the 1997 Income Tax Assessment Act.¹³ The reform was intended, among others, to increase competition in the international arena, to safeguard the state's shipping industry, and to increase the number of jobs in the industry. Australia used regulatory and tax changes to increase the number of ships flying the Australian flag, which was shrinking. In addition, it acted to create conditions for revitalizing the state's commercial fleet, increase the scope of investments in the area, and upgrade and increase the sector's human resources. In contrast to other countries, it chose a model that does not also use a tonnage tax but rather other tax instruments, because, so it claimed, the method it chose is more structured, cost-effective to operate since it uses the existing tax regime, provides certainty to the taxpayer and follows the law.¹⁴ The government published an analysis of the scope of approvals that it issued in 2012–2019 to those eligible for the central tax benefits allowed as part of the reform. The data show lack of use or limited use of the tax benefits. The tax exemption benefit was an exception, relatively speaking, as in 2019, 25 exemptions were issued to ships.¹⁵

The change in tax legislation focused on the some of the following central benefits. Four of these benefits require that their beneficiaries meet certain conditions and limitations set by law.¹⁶ One of these is an exemption from income tax according to conditions established by law regarding activities conducted on passenger ships and cargo ships. The core activities include, for example, loading and unloading cargo from a ship and so forth. Likewise, an exemption was possible for activities ancillary to the core activities but this covered a relatively minor range of activities, with

12 Australia. Shipping Reform (Tax Incentives) Act 2012. No. 53, 2012. Compilation date: 5 March 2016. <https://www.legislation.gov.au/Details/C2016C00434>

13 Australia. Income Tax Assessment Act 1997. Subsections 40-102(4) and 40-285(5), sections 40–362 and 51–100 and Subdivision 61-N. Act No. 38 of 1997. Date of Assent 17 Apr 1997. <https://www.legislation.gov.au/Series/C2004A05138/Amendments>

14 Australia. Parliament of the Commonwealth of Australia. Tax Laws Amendment (Shipping Reform) Bill 2012. Revised Explanatory Memorandum. 2010–2011–2012. Pp 5–8, 14.

15 Australia. DITRDC. Consolidated Information on Certificates and Notices. Last Updated: 3 January, 2020. https://www.infrastructure.gov.au/maritime/business/tax_incentives/certificates_issued.aspx

16 Australia. DITRDC. Eligibility Requirements for Certificates and Notices. https://www.infrastructure.gov.au/maritime/business/tax_incentives/eligibility.aspx. Australia. Shipping Reform (Tax Incentives) Act 2012. No. 53, 2012. Compilation date: 5 March 2016. <https://www.legislation.gov.au/Details/C2016C00434>

constraints.¹⁷ Getting an income tax exemption was made contingent on satisfying a process that determined conditions and constraints. For example, applicants had to get government approval for an exemption from shipping income tax attesting to the fact that they met a series of conditions related to, among others, operations conducted in Australia, and demands related to human resource training.¹⁸

The second benefit was the possibility of enabling accelerated depreciation of ten years per ship instead of twenty years, as was the law prior to the reform. The declared purpose of the benefit was to create an incentive to move to using new ships. According to the government, newer ships would decrease problems of safety and environmental pollution, and enable the integration of advanced technologies. This benefit was awarded after getting exemption approval for the ship from the government. A third benefit allowed the deferment of tax payments according to conditions established by the law about profits from selling a ship, which issued it a government certificate of approval for the tax benefit. This benefit was awarded in cases when a new ship was purchased using the profits from the sale of another ship (i.e., roll-over relief), which also required government approval to get the tax benefit. The purchase must be done within a period of time established by law and according to the legislated constraints. The main reason that this benefit was included in the reform, similarly to the accelerated depreciation, was to incentivize the purchase of new ships.¹⁹

A fourth benefit allowed a refundable tax offset on salaries and other payments as established by law, and that were paid to Australian seamen. This benefit was limited and contingent on meeting a number of conditions. For example, employing a seaman on a ship for a minimum period with government approval as determined by the Shipping Reform Law (Tax Benefits) 2012. The purpose of the benefit was

17 Australia. Department of Infrastructure, Transport, Regional Development and Communications. Shipping Exempt Income Tax Incentive. Last Updated: 18 October, 2018.

https://www.infrastructure.gov.au/maritime/business/tax_incentives/ShippingExemptIncomeTaxIncentive.aspx

18 Australia. Department of Infrastructure, Transport, Regional Development and Communications. Additional Requirements for a Shipping Exempt Income Certificate. Last Updated: 21 February, 2017. https://www.infrastructure.gov.au/maritime/business/tax_incentives/additional.aspx

19 Australia. Department of Infrastructure, Transport, Regional Development and Communications. Accelerated Depreciation and Roll-Over Relief. Last Updated: 21 February, 2017. https://www.infrastructure.gov.au/maritime/business/tax_incentives/AcceleratedDepreciationRollOverRelief.aspx

to enable Australian seamen to gain experience.²⁰ An additional benefit exempted Australian companies from withholding tax on payments for leasing a ship from a foreign entity, as defined by law. There are a number of conditions for this benefit such as the agreement being on a bareboat basis.²¹ The purpose of this benefit was to decrease leasing costs of foreign ships for Australian companies. These companies were forced to sign contracts that imposed the withholding tax expense on them. Likewise, the benefit was intended, according to the government, to open up work opportunities for Australian seamen.²²

Special tax regime for the shipping industry in Singapore

Singapore serves as an international maritime operations center offering a developed maritime industry services such as courier, logistics, financial, legal etc. companies.²³ In Singapore there is a tax regime that has a range of tax instruments related to many areas in the maritime sector beyond the shipping industry. The tax regime includes various tax benefits intended to strengthen the international competitiveness of the maritime industry. Below are several examples of the main tax benefits.²⁴

Singapore operates a tax benefit program called Maritime Sector Incentive – MSI. The program has a number of benefit tracks that address various areas in the maritime sector. For example, the track for getting a tax benefit called the Approved International Shipping Enterprise Award (MSI–AIS) is intended to encourage international ship owners and operators to establish their commercial operations base in Singapore. The MSI–AIS tax benefit enables these owners and operators to get an exemption on taxes on certain income as determined by law. For example, they can get an exemption from income from foreign ships operating in international

- 20 Australia. Department of Infrastructure, Transport, Regional Development and Communications. Tax Incentives–Australian Shipping. Seafarer Tax Offset. https://www.infrastructure.gov.au/maritime/business/tax_incentives/seafarertaxoffset.aspx
- 21 Bareboat basis is the leasing of a ship without crew and fuel. To read the dictionary definition of this concept, see: Cambridge Dictionary. Bareboat charter. Cambridge University Press. 2020. <https://dictionary.cambridge.org/dictionary/english/bareboat-charter>
- 22 Australia. DITRDC. Royalty Withholding Tax Exemption. Last Updated: 21 February 2017. https://www.infrastructure.gov.au/maritime/business/tax_incentives/RoyaltyWithholdingTaxExemption.aspx
- 23 Lam J.S.L. (2016) Strategy of a transshipment hub: The case of Port of Singapore. In: Lee P.T.W., Cullinane K. (eds.) "Dynamic shipping and port development in the globalized economy". Palgrave Macmillan, London. pp. 12–38.
- 24 For further details about the paragraphs relevant to the maritime sector that appear in Singapore's income tax law, such as paragraph A13 (Exemption of shipping profits) and paragraph F13 (Exemption of international shipping profits), see: Singapore Income Tax Act (ITA). Current version as at 22 Nov 2020. <https://sso.agc.gov.sg/Act/ITA1947>

shipping lanes according to the conditions established by law. The program has additional tracks such as the track that offer benefits when leasing a ship, the Maritime Leasing (MSI–ML) award. There is another track, the Shipping-Related Support Services (MSI–SSS) award, which confers benefits for operations defined as supporting the maritime sector, e.g., courier and logistics companies, shipping agencies and more.²⁵

There are a number of additional benefits such as withholding tax exemption. This benefit on interest and certain payments related to purchase financing arrangements or the construction of a ship is given to businesses determined to be eligible. The benefit is contingent on a series of conditions and constraints.²⁶

Another benefit is related to companies operating Singapore-registered ships. These companies are eligible for tax benefits on income from operations that occurred outside of the port of Singapore, as delineated in paragraph A13 of the Singapore Income Tax Act. The tax benefit is awarded in cases such as transport of cargo and passengers on ships, towing or maritime rescue operations, profit from selling a Singapore-registered ship and others.²⁷ Likewise, Singapore offers certain benefits to the maritime sector under the Goods and Services Tax Act, which tariff is equivalent to value added tax.²⁸

- 25 Maritime and Port Authority of Singapore. Maritime Sector Incentive. <https://www.mpa.gov.sg/web/portal/home/maritime-companies/setting-up-in-singapore/programmes-to-support-your-maritime-business/maritime-sector-incentive>
- 26 Maritime and Port Authority of Singapore. Withholding Tax (WHT) Exemption. <https://www.mpa.gov.sg/web/portal/home/maritime-companies/setting-up-in-singapore/programmesto-support-your-maritime-business/withholding-tax-exemption> Inland Revenue Authority of Singapore. Payments That Are Not Subject to Withholding Tax. Payments for the Charter of Ships. <https://www.iras.gov.sg/irashome/Other-Taxes/Withholding-tax/Non-residentcompanies/Payments-That-Are-Not-Subject-to-Withholding-Tax/#title5>
- 27 For further details about the operations and situations that make companies eligible for tax benefits, according to the conditions laid out, see the following source: Inland Revenue Authority of Singapore. Specific industries – Shipping Companies. <https://www.iras.gov.sg/irashome/Businesses/Companies/Working-out-Corporate-/Income-Taxes/Specific-industries/Shipping-Companies>
- 28 Inland Revenue Authority of Singapore. GST-registered businesses – Specific business sectors. Marine and Shipping. <https://www.iras.gov.sg/irashome/GST/GST-registeredbusinesses/Specific-business-sectors/Marine-and-Shipping>; Inland Revenue Authority of Singapore. GST Guide for the Marine Industry. 25 Oct 2019. https://www.iras.gov.sg/irashome/uploadedFiles/IRASHome/e-Tax_Guides/eTax%20Guide_Guide%20for%20the%20Marine%20Industry_Second%20Edition.pdf

Discussion and significance for Israel

Over the years, the state of Israel awarded certain tax benefits to the Israeli maritime sector.²⁹ For example, operations that were conducted under the auspices of legislation such as the Law for Encouragement of Capital Investments 1959, which formed the basis for awarding benefits to Israeli ships by the Ministry of Industry and Commerce (MIC), as part of the tax benefit track that included reduced corporate tax, accelerated depreciation and reduced capital gains tax.³⁰ In addition, in Israel, government support that is not through tax benefits is also available. This support comprises a total of 20 million shekels, for a period of four years, and is intended to support employment of Israeli seamen in Israeli ships (carrying an Israeli flag or Israeli owned), thus requiring that Israeli seamen be employed.³¹

Israel is considering a tax change in the area of shipping along the lines of tonnage tax legislation. The proposed income tax law (Vessel Operation Income Tax by Tonnage), 2018, notes that passage of the aforesaid legislation will bring the law into line with that used around the globe. In the opinion of the Israeli government, the proposed tax regime may help prevent the move of Israeli ships to operations as part of foreign companies. Furthermore, the benefits may motivate foreign shipping companies into becoming Israeli ones, and will advance the establishment of new companies in the industry, as well as strengthen industries ancillary to shipping. It has been claimed that this will bolster international competitiveness and support for maritime training, as well as maintain environmental protection.³²

Some central issues must be considered when discussing the special tax regime for the shipping industry before creating it and also while implementing it. Below is a list of a number of issues arising from test cases in other countries that used tax regimes

- 29 To get an impression of the legislative activity, see the following examples: Income Tax Ordinance [New Text], 1961, paragraphs 5, 70–74, (amendment no. 22) 1975 (amendment no. 132) 2002, paragraph 130A (amendment no. 142) 2004, etc.; the Law for the Encouragement of Industry (Taxes) 1969; The Knesset's Economic Affairs Committee, protocol no. 137, proposed Exemption from Tax for Seamen and Vessel Owners Law 1994, June 1994; Income Tax Regulations (Percentage of Depreciation for Ships), 2001.
- 30 For further reading, see the following source: The Encouragement of Capital Investment Law, 1959. <https://main.knesset.gov.il/Activity/Legislation/Laws/Pages/LawPrimary.aspx?t=lawlaws&st=lawlaws&lawitemid=2000780>
- 31 Government decisions, Airport Authority and Improvement of the Competitiveness of Israeli Shipping, government decision no. 3373 of 11 January 2018.
- 32 For further details about the reasons and objectives of Israel in promoting this law, see the following source: Proposed Income Tax Law (Vessel Operation Income Tax by Tonnage), 2018, 18 July 2018. https://www.nevo.co.il/law_word/law15/memshala-1251.pdf

in this area.³³ The list does not exhaust all the aspects that should be related to when discussing the tax regime but can be a good basis for the examination.

1. It is better for the state to determine what goals it is trying to achieve through the instruments, e.g., tax benefits, that are available to it in terms of the maritime sector and other related factors. Setting goals will allow it to assess the effectiveness of the instruments in achieving the targets and evaluate the changes, to the degree required, that will promote the desired results. A national goal, in the case of Israel, may be, for example, to maintain and strengthen Israel's commercial maritime connectivity that may be called upon in emergencies, through a fleet under Israeli control.
2. An investigation into what is the appropriate tool or the best combination of tools to achieve the goals set by the government should be conducted. Sometimes, instruments that are not tax benefits are more effective and a better means for attaining goals.
3. If tax benefits are to be used, then it should be determined which are the correct eligibility features that should be set that will help meet their intended purpose. Determining the tax benefit features must be done after examining legal, financial, commercial and other aspects that impact the maritime sector's operations. Misidentifying the appropriate features may lead to undesirable results, as noted above.
4. An important issue is the examination of the cost of tax benefits to the state, versus the expected gain. In addition, the other affects of tax benefits on the maritime sector and other factors should also be examined. Sometimes the tax benefits may cause undesirable results that will impact efficient operations negatively.
5. After the tax benefits become effective, the state must examine the level of their success, and adjustment them accordingly. Conducting an impact study on the maritime sector tax regime may help. Similarly, the predicted data, which were used as the basis for the decision to implement tax benefits and determine their features, should be examined to see whether they are appropriate and if not, a new examination should be conducted.
6. Regulatory, economic and other changes in the local and international maritime sector may affect the success of tax benefits over time. Nevertheless, there is also a danger that subsidies, including tax benefits, will create unwanted distortions in the maritime sector. Such changes and possibilities mandate a reexamination of the benefits, and if necessary, they must be modified.

33 An example of recommendations, some of which may help achieve higher quality goals when using subsidies in the maritime sector: ITF (2019), "Maritime subsidies: Do they provide value for money?", International Transport Forum Policy Papers, No. 70, OECD Publishing, Paris. Page 7–8.

Logistic Corridors between the Indian Ocean and the Mediterranean – Existing trade routes, planned ones and China possible future involvement

Ehud Gonen

Introduction

This chapter surveys the main trade routes (both existing and planned) that connect between the Indian Ocean and the Mediterranean. It describes the main overland routes, the ports that they connect to and the political and economic challenges they involve.

The main conclusion presented is that in the existing political situation in the Levant there is greater feasibility for projects that are contained within the borders of a single country while the feasibility of large cross-border projects is relatively low. Nonetheless, the rise of Iran as a regional power and the formation of a Sunni-Israeli alliance in response increases the chance of creating routes from the Gulf region by way of Jordan to the port of Haifa (Israel).

Similarly, and despite the ‘boom’ in infrastructure investment in western Asia as a result of China’s Belt and Road Initiative, it appears that in the foreseeable future China will not be involved in investment in overland cross-border logistic projects in the Levant (such as railways) due to the political risk involved. On the other hand, China is deeply involved in investment in the region’s seaports.

The factors influencing the trade routes

The main trade route between Asia and Europe is of course the Suez Canal and it is one of the most important trade routes in the world. Approximately 10%–13% of global trade passes through it (Hellenic Shipping News, 2019; Reuters 2020). The efficiency of seaborne trade makes the Suez Canal the most economically alternative for long-distance trade between China and East Asia on the one hand and Europe on the other.¹ At the same time, there are discussions among the various players and countries in the Levant region regarding additional options for establishing trade routes (some of which are new while others are a revival of old routes) between the Indian Ocean (its northwestern extension, namely the Red Sea, and its northern

1 In recent years, there has been discussion of another route between Asia and Europe along the northern coast of Russia.

extension, namely the Persian Gulf) and the Mediterranean. These overland routes would achieve several goals for the countries involved and in principle they can be divided into three categories:

1. **Financial gain:** There is a massive flow of trade between Asia and Europe. Even a small fraction of revenue derived from such trade for logistic and transshipment services represents a major source of income. In addition, a major trade route is accompanied by trade-related economic development such as financial services (banking, insurance and legal services), development of manufacturing industry, etc (Hall et al., 2011 pp 81).
2. **Political leverage over users of the trade routes:** In view of the economic dependence of most countries on trade, such as the import of energy and food products, the control of trade routes creates political leverage that can be translated into a higher international status and economic growth.
3. **Diversification of independent trade routes as a component of national security:** We have already mentioned the leverage attained by the owners of trade infrastructure over its users and therefore it is reasonable to assume that countries which feel constrained or threatened if their trade routes are controlled by a competing country or non-state organization will seek to diversify their trade routes, including the development of independent routes. In the Mediterranean region, the maritime trade routes converge to a number of chokepoints, namely the Strait of Hormuz at the entrance to the Persian Gulf, the Bab el Mandeb Strait at the southern entrance to the Red Sea and the Suez Canal that connects between the Red Sea and the Mediterranean. The convergence of sea routes in the Middle East to a number of chokepoints, some of which are located in political unstable areas, constitutes a potential risk to the flow of international trade and a risk to the supply chain.

The construction of infrastructure for trade routes is primarily influenced by three types of factors: geography, politics and technological-logistic considerations, which are related to the economics of trade. From a **geographic** perspective, the movement of trade is influenced by the terrain and topography of the land, such as mountain ridges, deserts, swamps, etc., while the sea routes are influenced primarily by the location of straits. There are also **political** factors that are critical in the movement of people and goods. Closed borders between states that are enemies; areas with a low level of personal safety due to terror and piracy; and administrative restrictions on movement or alternatively the encouragement of trade are among the factors with a significant influence on the movement of people and goods. However, political constraints—unlike mountain ridges or rivers—are a manmade obstacle and can

apply differentially to people of different nationalities or religions and to different types of goods. **Technological and logistic** factors also play an important role. Technology allows the construction of infrastructure that facilitates the movement through hard terrain and also the creation of new passages, such as the digging of tunnels through mountain ranges, the expansion and deepening of straits, bridging over wide valleys, etc. At the same time, technology also makes it possible to build means of transportation with greater capacity (such as ships, trains, etc.) and that are more efficient and lowers the cost of trade through economies of scale.

The advantages in creating overland connections between the Indian Ocean and the Mediterranean, alongside the surge in investment in infrastructure created by China's Belt and Road project (see below), which has also attracted local partners, have created an expectation in the Levant region of land corridors being built between the Indian Ocean and the Mediterranean.

China's Belt and Road Initiative

In 2013, China announced the Belt and Road Initiative which is meant to connect China to Eurasia and East Africa by means of physical infrastructure. The initiative includes a land component consisting of logistic corridors in Central Asia and Western Asia (since essentially there has been no significant land trade through Central Asia since the days of the Mongols and the ancient Silk Route) and the expansion of maritime connectivity by means of a network of seaports between China and Europe, including in the Mediterranean. Although the academic literature, the media and the public often treats the initiative as a single unit, it is in fact two separate frameworks: (a) the 21st Century Maritime Silk Road and (b) the overland Silk Road Economic Belt. These two initiatives were announced separately by President Xi of China: the Economic Belt Initiative was announced in September 2013 in Kazakhstan and the maritime Silk Route was announced in October 2013 while the Chinese President was visiting Indonesia (State Council et al., 2015). The two initiatives are each of interest to different players inside China: the Silk Road Economic Belt Initiative involves the building of logistic corridors that include rail lines, energy pipelines (natural gas and oil) and highways (including tunnels, bridges, etc.). It is instrumental in economic development within China and primarily the development of the western provinces, as well as regional development of the West and Central Asia.

In contrast, the Maritime Silk Road primarily involves the building and operation of seaports, as well as the accompanying industrial zones. The industrial zones often include industrial parks that are built and managed by the Chinese and house factories of Chinese manufacturers. In addition, there are Chinese investments in

heavy infrastructure, such as mines, energy facilities, etc. The core of the initiative is to ensure sea routes for the export of Chinese goods (both from China and by Chinese companies operating abroad, primarily in the aforementioned industrial parks) and also the import of energy products and inputs by China. For this reason, the Maritime Silk Road initiative is more relevant for the broader commercial and business sectors in China (Gonen, 2018).

The Chinese initiative has led to a wave of infrastructure investment throughout Eurasia, and there are many additional plans for investment throughout the Middle East.²

Chinese companies operate the following container terminals in the Mediterranean (COSCO, 2020; Hutchison Ports, 2020; Israel Ports Company, 2015):

1. Alexandria (Egypt): two terminals owned by the Hutchison company of Hong Kong (Dekheila and Alexandria) and a planned third terminal (Abu Qir).
2. Port Said (Egypt): The COSCO company controls 20 percent of the Suez Canal Container Terminal (SCCT), which is the main transshipment port on the Suez Canal, together with CMA CGM.
3. Haifa (Israel): concession held by the Shanghai International Port Group (SIPG) for the operation of the Hamifratz Port starting from 2021 and for a period of 25 years.
4. Piraeus (Greece): the COSCO company.
5. Saloniki (Greece): the Terminal Link company, a subsidiary of the China Merchant Port Holding company.
6. Kumport (Turkey): China Merchants Port Holding company.

Furthermore, in the context of the Belt and Road Initiative, both China and Chinese construction and operating companies have been mentioned as being involved in the building of overland trade routes in the Middle East (for further details on Chinese involvement—if it exists—see the description of the routes below).

2 In the context of the building of infrastructure, a differentiation should be made between direct investment (FDI) and the export of services. FDI consists of investment that leaves the source countries for the target country and includes ownership over the assets and infrastructure at a rate of over 10 percent of the asset's value and a major say in its management. On the other hand, the export of services involves the building of infrastructure by a foreign company only in the role of subcontractor. This is a service provided for payment and when completed the subcontractor has fulfilled his function; it is not an owner of the asset nor does it have any influence over its management.

Trade and transportation routes between the Indian Ocean and the Mediterranean

This section describes the main potential trade routes between the Indian Ocean and the Mediterranean (some of which are new and some of which have existed for many years), including a description of the initiators of the route, its advantages and disadvantages and the risk in the development of the routes as perceived by the players in the region. It is worth emphasizing that maritime trade is significantly more efficient than overland trade and it is not being suggested that land transportation projects will replace the flow of trade through the Suez Canal. What is being suggested is that the overland projects will provide diversification and flexibility in trade routes and the creation of excess capacity in view of potential barriers that may arise at one of the chokepoints described above, as well as providing logistic services to in-land destinations.

From a geographical perspective, the overland routes can be divided into two categories: routes that connect the Red Sea to the Mediterranean and routes that connect the Persian Gulf to the Mediterranean.

Suez Canal (Egypt): The original canal was inaugurated in the mid-19th century. When President al Sisi came to power in Egypt in 2014, a project to expand the Suez Canal was announced that would include a doubling of its width (though not along its entire length) with the goal of allowing more and larger ships to use the canal. The expanded canal was partially opened in August 2015. Alongside the expansion of the canal, the project included the establishment of industrial parks alongside it. The expansion of the canal was funded by Egyptian internal sources, including a loan from its citizens and the voluntary collection of gold jewelry in the streets. This is a national project that was financed independently, an important achievement for Egypt. The expansion of the canal was accompanied by the building of transshipment ports and industrial parks in order to provide employment to Egypt's huge and relatively young population and in order to take advantage of Egypt's position along the canal, which is a major global trade artery, while providing additional export, logistics and port services.

Apart from the element of self-reliance, the Chinese Tianjin Economic-Technological Development Area (TEDA) company³ built and invested in an industrial park outside the city of Sokhna at the southern end of the canal. In the context of national infrastructure development in Egypt, it is worth also mentioning the building of the

3 For further information see. <http://www.setc-zone.com/eng/zatdsysjmhqz/index.shtml>.

new administrative capital of Egypt which will be located in the area between Cairo and the Suez Canal.

Europe Asia Pipeline Company (EAPC) – Formerly Eilat Ashkelon Pipeline Company (Israel): During the 1960s, a joint project was carried out by Iran (pre-revolutionary Iran under the rule of the Shah) and Israel which included oil terminals at the cities of Eilat and Ashkelon and a pipeline between them. Over the years, the Company's energy infrastructure was expanded to allow for the two-way flow of oil, the enlargement of the Company's storage and the expansion of its activity also to natural gas.

All of EAPC's activity is confidential according to law and is not subject to public scrutiny (*Law for Oil Conveyance and Storage by an Operator*, 2017). Israel and Iran are currently in a process of international mediation—at least officially—with regard to the profits from the project (Harris, 2013).

Connection of a rail line to the city of Eilat (Israel): The idea of connecting the southern city of Eilat to the Israeli national train grid was already proposed in the 1950s and is brought up for public discussion in Israel every few years. Such a rail connection would make it possible to transport goods by rail from the port of Eilat on the red sea to Israel's Mediterranean ports and from there to Europe and also in the opposite direction, thus circumventing the Suez Canal. In theory, this can already be done today using trucks (and indeed there are sometimes containers that are transported overland from the port of Ashdod to the port of Eilat in this manner); however, this occurs only on a small scale and transportation by truck is not feasible on a large scale.

From an engineering perspective, this is a massive project but nonetheless feasible. Such a rail line would be about 300 km in length from Eilat to the city of Dimona and from there the goods would be conveyed by existing rail lines to the port of Ashdod or Haifa. The rail line would pass through the Arava desert region which is part of the Great Rift Valley, an almost completely desolate strip of land about 200 km in length through which the rail line would reach the southern Dead Sea area, which is about 400 meters below sea level. From there, it would climb 1200 meters to Ramat Arad (at the heights of 800 meters). Such a project would also involve moving the port of Eilat from its present location (see below).

It is not within the scope of this chapter to discuss the project in detail. We would only mention that a project of this scale would naturally have both positive and negative impacts of various types (for a more detailed discussion, see Feitelson et al.,

2013). If and when Eilat is connected to the Israel Railways system it will apparently have a huge positive impact on the development of the Arava and Negev regions, as well on regional commerce; however, it will also have an adverse effect on the economic and demographic fabric of Eilat, and will have far-reaching implications for the marine environment in the Gulf of Eilat. It is also worth mentioning the possible geostrategic implications for relations between Israel and Egypt.

The current port of Eilat is quite small and is meant to meet only the local needs of the Israeli economy. Israeli trade with the ports of Asia travels through the Suez Canal on the way to Israel's Mediterranean ports. Eilat's port cannot handle the flow of global trade and from a geographical perspective, namely due to mountain ridges surrounding Eilat, there is no room for the logistic yards that such a large port would require. The quarrying of the hard granite mountains around Eilat in order to build a logistic yard would be difficult and costly. The upshot is that if it is decided to make the port of Eilat into a major port it must be moved northward to the area of Nahal Arava, located on the border with Jordan, and it will be necessary to build a canal port, such that a ship will enter an excavated canal and its cargo will be transferred by cranes from both sides. From an environmental perspective, such a project will destroy the coral environment due to the suspension of sand in the water. From an economic and demographic perspective, the project would transform Eilat from a tourism and marine center into a port city, since massive ships and trains cannot coexist with tourism.

From an economic perspective, the basic analysis points to the high cost of construction due to the topographic obstacles, which require the establishment of a double rail line and uninterrupted railway traffic in order to justify the financial investment. Such railway traffic will feed into the Israel Railways system which is already overburdened. For example, cargo trains do not currently travel during the daytime in order to leave the routes open for passenger traffic, primarily during rush hour. Thus, such a project will place a burden on the existing railway infrastructure in the Center of Israel at the expense of passenger traffic.

While the business sector in Israel of course supports the project and both Prime Minister Netanyahu and Minister of Transportation Miri Regev have spoken of its necessity, the connection of the port of Eilat to the railway network has political, social and environmental implications that will likely delay its implementation for many years. The main political implication is competition with cargo traffic through the Suez Canal. The new Suez Canal is the flagship project of President al Sisi and the project could be interpreted as an Israeli provocation. The revenues from the Suez Canal are estimated in 2019 to be 104.6 billion Egyptian liras (\$6.65 billion) which

represents about 10 percent of the Egyptian government's total revenue (Reuters, 2020). In other words, the building of a rail line might be interpreted as an economic threat to Egypt, as a provocation to the Egyptian President personally and as a threat to Egypt's state revenue, even if overland transportation would not constitute a major threat to the flow of cargo through the Suez Canal. The peace treaty signed between Israel and Egypt in 1977 is one of Israel's main strategic assets and it can be assumed that Israel does not want to endanger it (Halevi, 2014).

The second issue is social-demographic and is related to the character of the city of Eilat, which is currently a tourist city whose main revenue is generated by hotels. It offers recreation on the coast of the Red sea, diving among corals, sailing and numerous other attractions in a desert atmosphere. It has a population of about 50 thousand and it is visited by over 2.5 million tourists annually, much of which is domestic tourism (ISR Ministry of Tourism, 2020). Becoming a regional hub port that is part of one of the world major trade route would mean transforming Eilat into a logistics center. Tourism and water sports cannot coexist with the traffic of massive ships and the continuous arrival and departure of train traffic.

Thus, it would appear that a project to connect the port of Eilat to Israel's national railway system would be a problematic venture and an expensive—though feasible—engineering endeavor. Such a project is also feasible from the perspective of internal Israeli politics and does not require international coordination as do cross-border projects. Nonetheless, it is strategically problematic for Israel's relations with Egypt and if it is carried out will completely transform Eilat – from a tourist city to a logistics center and there will be huge implications for the local population as well as for the marine environment in the northern part of the Gulf of Eilat.

An Aqaba-Ma'an-Irbid-Haifa railway connection

The port of Aqaba is Jordan's only access to the sea. The Jordanian coast is only about 26 km long and there is a shortage of coastline for the building of infrastructure.⁴

Jordan's population is largely concentrated in the northwestern region of the country, about 400 km from the port of Aqaba. In other words, cargo that is handled at Aqaba has a long overland distance to travel either to or from the country's population and

4 An exchange of territory between Jordan and Saudi Arabia, which was carried out within the framework of a 1965 agreement, gave Jordan additional waterfront.

industrial centers. The port of Aqaba also exports phosphates which are brought there by a slow rail line that connects the city of Aqaba to the city of Ma'an.⁵

The Jordanian railway network is in a rundown condition and most transport of goods is by truck. From a historical perspective, the Hijazi railway line cuts across Jordan from North to South but is not operational. According to media reports, Jordan has completed a feasibility study for expanding the old—though still active—railway line from the port of Aqaba to the city of Ma'an. According to the reports, the building of the railway line will be financed by the Saudis. The city of Ma'an is located on the historic Hijazi rail line and there are plans to rehabilitate it (Jordan Times, 2019).

From a geographic perspective, the most attractive option for logistically serving Jordan's large population centers in the northwestern part of the country is from the port of Haifa which is only 70 km from the border crossing between Israel and Jordan near the city of Beit Shean (the Sheikh Hussein Bridge). Israel recently inaugurated a new railway line to the city of Beit Shean and there is work being done to connect it to the border crossing. (The new railway line is also following the route of the branch of the Hijazi train). From the border crossing, it is only 30 km to the city of Irbid and 70 km to the capital of Amman, as opposed to 400 km and 330 km, respectively, from the port of Aqaba.

In other words, by building a railway line of only a few dozen kilometers to the northwestern part of the country, it is possible to logistically serve the large population centers in Jordan from the port of Haifa on the Mediterranean and by means of a modern railway system. This will eliminate the need for goods traveling between Jordan and Europe (such as fresh agricultural produce) to traverse the Suez Canal. Not only is the route much shorter but it also saves the cost of passing through the canal,⁶ the cost of transshipment at the port of Aqaba and the overland transport of goods for about 400 km between the port of Aqaba and the northwestern region of Jordan (Frantzman, 2018).

5 During the Iran-Iraq war, Iraq's ports on the Persian Gulf were closed. As a result, all of Iraq's trade flowed through the port of Aqaba. This was a period of prosperity for the economy of southern Jordan through which trucks carrying goods traveled for hundreds of kilometers by way of the desert. In peace time, when Iraq's ports are operating normally, the transport of goods between the port of Aqaba and Iraq is too costly, and certainly in the case of trucking (as opposed to rail transport).

6 The cost of passing through the canal for a medium-sized ship can be up to \$250 thousand.

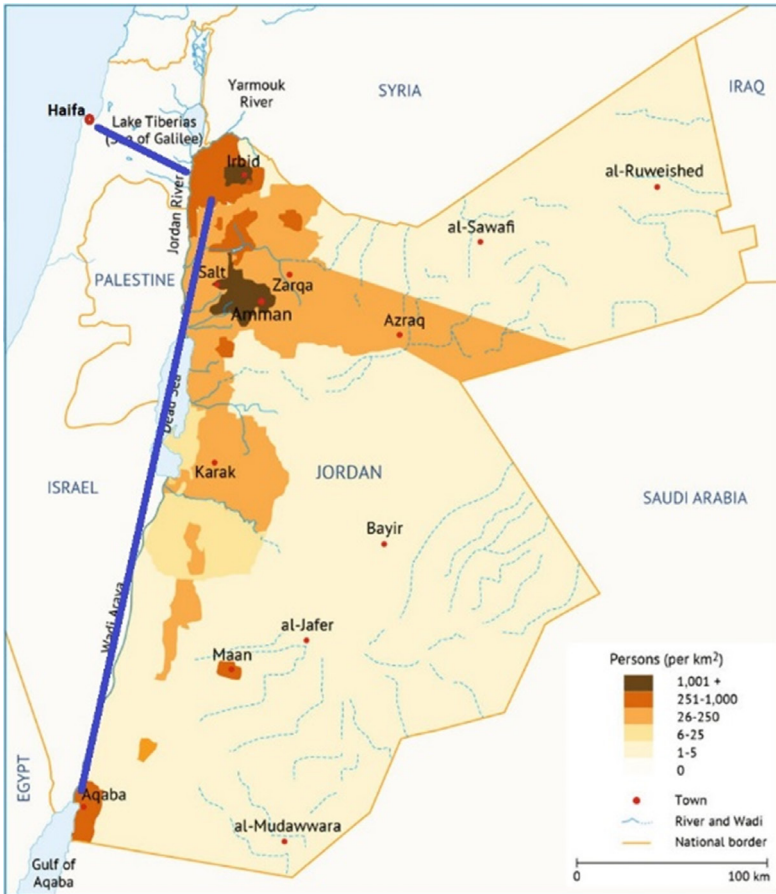


Figure 1: The distance for overland transport from the ports of Haifa and Aqaba to the Irbid area in Jordan (author's modifications of the original picture – Almuhtady et al., 2019)

In addition to the possible railway connection between Israel and Jordan in the area of Beit Shean, Israel is conveying water to Jordan in this location in compliance with the 1996 peace treaty between the two countries. Furthermore, a gas pipeline is currently being built from Israel's gas fields in the Mediterranean to Jordan in the same route. The sale of the natural gas is by way of an Italian mediate company (Reed, 2014; Cohen and Barakat, 2014).

The overland corridor from Haifa to Jordan and the Persian Gulf states

A discussion of the overland corridor that connects Haifa on the shores of the Mediterranean and Jordan must also take into account the countries located beyond Jordan, to the East and to the South, namely Saudi Arabia and some smaller states

(the UAE and Bahrein) which are located on the Persian Gulf. There are numerous reports in the media of a warming of relations between Israel and the Sunni world, thus strengthening the alliance against (Shiite) Iran, the common enemy. In this context, it is of course worth mentioning the normalization agreements between Israel and the UAE (the Abraham Accords) and between Israel and Bahrein, which were signed in September 2020 at the White House.

In addition, there are friendly relations between Israel and Oman and Prime Minister Netanyahu visited the Omani Sultanate in 2018 (Government of Israel, 2018). These developments would not have been possible without the explicit approval of Saudi Arabia, the dominant player in the region.

Saudi Arabia is surrounded geographically by three straits: the Strait of Hormuz in the East, the Bab el Mandeb Strait in the South and the Suez Canal in the North. Saudi Arabia is experiencing rapid infrastructure growth which includes a railway network on a more or less East-West axis and the development of ports on the Red sea. These projects are also partly a reaction to the Iranian threat on its eastern shores and the shift of economic activity westward, partly due to national programs for the diversification of the country's economy away from the traditional dependence on oil exports (Saudi Vision 2030). Nonetheless, in addition to the Saudi move westward, the country is definitely interested in diversifying its trade routes, with the goal of providing alternatives to the sea route that passes through the aforementioned straits. This includes an overland route to the Mediterranean by way of Jordan, by means of connecting the road systems (and rail lines in the future) of Saudi Arabia and Jordan at the Al Hadithah border crossing and from there using the Jordanian transportation system in the direction of the port of Haifa.

The UAE and Bahrein are in an even more difficult position, in that their sea trade is by way of the Strait of Hormuz which is under Iranian control. Thus, they would definitely be interested in the diversification of their trade routes to the west by way of a land corridor to the Mediterranean.

A railway connection, as described above, between the port of Haifa on the Mediterranean eastward to Jordan's population centers and from there to the city of Irbid and the capital city of Amman and southward in the direction of Aqaba on the basis of the historic Hijazi rail line, as planned by Jordan, on the one hand, and in the direction of Saudi Arabia, on the other hand, will connect the Indian Ocean and the Mediterranean. Such a connection makes a lot of sense economically and essentially will connect the cities of Jordan to two ports – in the South, a port on the Red Sea- Aqaba, and in the West, a port on the Mediterranean- Haifa.

However, the establishment of long-distance trade routes across the Middle East would create significant security challenges to protect the routes against terror and crime.

The possibility of using the port of Haifa to serve northern Jordan is feasible and has been discussed for many decades. As described, Israel and Jordan are connected through the supply of water and in the near future through the supply of gas. Nonetheless, and despite the economic and commercial advantage of transshipping goods by way of the port of Haifa to Jordan, there is no significant movement of goods along this route. There are two main reasons for this:

The first is opposition on the Jordanian street to any ties with Israel. In this context, it is worth mentioning that the Palestinian minority in Jordan makes up about 30 percent of the population and therefore there is opposition to consuming goods that arrive by way of Israel. The second is that by local Jordanian procedure, containers are prohibited to be transported through the border crossing between Israel and Jordan and the goods must be transferred "back to back" from one truck to another. The transfer of the goods between trucks is time-consuming and does not allow for trade on a large scale. This situation is the result of both security considerations and Jordan's desire to maintain as much economic activity in the port of Aqaba as possible, in addition to the fact that the King's power base is located in the South of Jordan, where Aqaba is located (Ehud Gonen, 2020).⁷ For these reasons, and despite the large-scale plan for reviving the railway network in Jordan, including from the city of Aqaba northward, Jordan is not apparently planning a connection to the border crossing with Israel at this stage. This is despite the fact that this would be a short connection of only a few dozen kilometers that would reduce the costs of Jordanian trade.

Overcoming the political issues of a trade route between Israel and Jordan can be accomplished by the mediation of a foreign operator, as in the case of the gas pipeline between Israel and Jordan (which as mentioned is mediated by an Italian company) or by means of a partnership with companies from the Arab countries that would operate the old port of Haifa (the current government owned port), which is currently in the process of privatization. Press reports have mentioned the interest of a Dubai company in being part of a consortium that would purchase the port (Ben Gedalyahu, 2020). A partnership with a Dubai company in the port of Haifa may blunt the public opposition in Jordan to trade by way of Israel.

7 Gonen, E. (2020). Interview with prof Professor Asher Susser.



Figure 2: Summary of the discussed trade routes

Trade between Jordan and Syria has often been disrupted in recent years due to the closing of the border crossing between the countries due to the civil war in Syria. Nonetheless, the border crossings between Jordan and Syria at Nassib and Alramatha were opened in 2019 and it appears that Jordanian traders prefer this route to the Mediterranean by way of ports in Syria and Lebanon over the route to Haifa. This is in spite of the superior logistical infrastructure in Israel and the lack of political stability in Syria and Lebanon.

The border crossings from Iraq to Syria (the Shiite crescent) are marked in green; the border crossings between Saudi Arabia and Jordan are marked in black. The existing rail lines are marked by solid lines; planned rail lines are marked by dotted lines.

An oil pipeline from Iraq to the Mediterranean

Connecting the large oil reserves in Iraq by means of a pipeline to a port on the Mediterranean will enable the flow of oil while circumventing the Suez Canal and shortening shipping times to Europe. A pipeline has a relatively high capacity (which

is of course dependent on the diameter of the pipeline, the type of pumps, etc.). There are three main historic routes for oil pipelines in the region that's depart from Kirkuk (Iraq): the Kirkuk-Haifa line (Israel), the Kirkuk-Baniyas line (Syria) which branches off from it and the Kirkuk-Ceyhan line (Turkey).

The Kirkuk-Haifa oil pipeline: During the British dominance of the Levant following the First World War, a 940 km oil pipeline was built from the city of Kirkuk in Iraq to the refineries at the Bay of Haifa on the Mediterranean. The pipeline's route connected Iraq and Mandatory Palestine by way of Jordan. Pumping stations were built along the length of the pipeline and airports were built alongside it, most of which are still in use today. The pipeline was in operation during a period of 13 years (1936–1948) until the establishment of the State of Israel. There are no plans to build a new pipeline along this route.

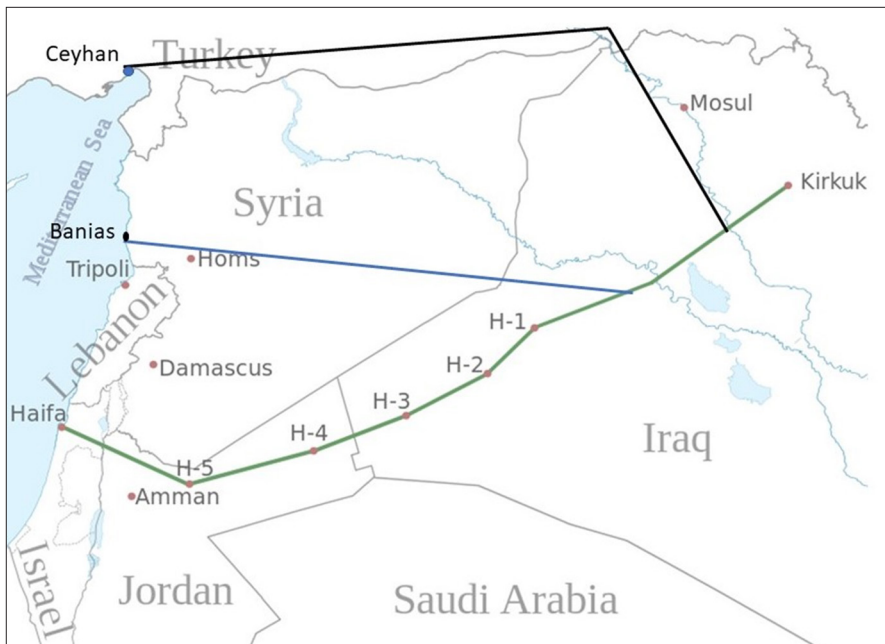


Figure 3: The oil pipelines from Iraq to the Mediterranean – the Kirkuk-Haifa line (Israel), the Kirkuk-Baniyas line (Syria) that branches from it and the Kirkuk-Ceyhan line (Turkey). (Source: the author)

In 1952, a branch of the pipeline was added that connects the city of Haditha in Iraq to the port city of Baniyas in Syria (the Kirkuk–Baniyas pipeline). This branch operated until 2003. Syria, which is ruled by the Alawite Baath party, supports Iran

and therefore it was not willing at times of political tension in the region, to provide Iraq with access to export its oil to the Mediterranean sea through its territory. A subsidiary of Gazprom, the Russian gas company, won a tender to rehabilitate the Syrian portion of the pipeline; however, it does not appear that the pipeline will be rehabilitated but rather it will be reconstructed. If this does occur, it can be assumed that the Russians, who have a significant presence in Syria and engineering capabilities for building a long-distance energy pipeline, will be the ones to implement it.

The **Kirkuk-Ceyhan pipeline** was built in the 1970s and circumvents Syrian territory. The pipeline is active despite repeated attacks on it as the security situation deteriorates in Iraq and on the southern border of Turkey.

The Shiite Crescent

The Shiite crescent is a land corridor that Iran is trying to establish based on a Shiite continuum or the presence of local pro-Shiite groups from Iran to the Mediterranean coast of Syria and Lebanon.

The motivation for building this corridor is primarily based on a military strategy to provide logistic support to Shiite militias that are loyal to Iran in Syria and Lebanon (Hezbollah) and to allow for the movement of military forces along this route and perhaps in the future to establish a naval base or a port on the Mediterranean coast in Syria or Lebanon. Such a corridor will cross the border between Iraq and Syria, primarily in the area between the city of Qam in Iraq and al Bukamal in Syria or south of there in the area of the city of Rutba in Iraq.

This corridor would achieve the strategic objectives of Iran and would allow it to "paddle their feet" in the Mediterranean. More than being an overland logistic corridor for purposes of trade, this is a geostrategic initiative to fulfil Iran's aspirations for religious and national expansion. Iran supports President Assad in the civil war in Syria (which began in 2011) and it is possible that part of the war's endgame from the Iranian perspective is a permanent presence on the shores of the Mediterranean.

Discussion and Conclusion

Following is a table summarizing the main routes discussed above between the Red Sea and the Mediterranean, both existing and planned, including the initiators and the sources of financing:

Route	Initiator and sources of financing	Comments
Expanded Suez Canal	An Egyptian initiative that is self-financed and self-built. There is Chinese involvement in the projects alongside the canal (industrial parks and parallel rail lines).	Long-distance sea transport is more efficient, cheaper and cleaner in terms of ton per km than any other type of transport. The Canal will remain the main trade route between the Mediterranean and the Indian Ocean for the foreseeable future.
An Israeli rail line to Eilat	An Israeli initiative, apparently with Chinese involvement in financing and construction.	Development of the southern part of Israel. Develop regional trade and the Asia-Europe trade. Serious demographic and environmental consequences for the city of Eilat.
Haifa-Irbid rail connection	The Israeli portion will be implemented by Israel (and has almost been completed). The Jordanian part will have international financing probably involving Japan, the World Bank and Saudi Arabia (Gonen, 2018) ⁸	Economically efficient for Jordan and profitable for Israel. The political opposition in Jordan means that the project will remain on the drawing board and there is no actual planning to implement the project. It will provide connectivity to Saudi Arabia and the Gulf State countries.
Aqaba-Amman rail connection	A Jordanian initiative financed and supported by the Saudis and others.	
Iraq-Syria oil pipeline	An Iraqi-Syrian pipeline being built by Russia.	Political friction between Iraq and Syria and an unstable security environment (potential for sabotage) limit the feasibility of the project for the foreseeable future.

1. **The growing presence of China in the Levant region as part of the Belt and Road Initiative:** It appears that the involvement of China in trade and logistic infrastructure in the Levant region at this stage is focused primarily on the domain of seaports. Despite the discussions and the various media reports, it is reasonable to assume that there will not be any major Chinese investment in cross-border overland trade routes in the Levant at this stage. This is apparently due to concerns about political instability in the region. It is possible that China will be involved in logistic projects that do not cross borders (Evron, 2019).
2. **The rise of Iran:** The rise of Iran as a regional power has led to the creation of a regional alliance of Sunni countries together with Israel. This alliance was formally established with the signing of the Abraham Accords between Israel and the UAE in 2020. From the viewpoint of trade routes, it appears that the rise of Iran is pushing Saudi Arabia to diversify its trade routes and to transfer infrastructure to the seaports on the Red Sea in the west of the country, in an effort to circumvent the Strait of Hormuz. In addition, it appears that there are Iranian efforts to

8 Gonen, E. (2018). Interview with Japanese diplomat stationed in Israel.

establish a land connection between Iran and the Mediterranean, perhaps including a future naval base on the Mediterranean in one of Syria's ports. These efforts have met a determined military response from Israel.

3. The rehabilitation of Syria and Lebanon: There is deep Russian involvement in Syria, which includes a naval base and an air force base, as well as a long-term leasing of land at these locations by the Russians (for further details on the Russian presence, see Gilead, 2019). It appears that the Russians will try to collect "payment" for rescuing Bashar el Assad from the revolt against him that started in 2011 by means of, among others, economic compensation, such as royalties from infrastructure use and from energy assets in Syria. Pursuant to paragraph (a) above, it does not appear that any major Chinese investment will be made in Syria in the foreseeable future, since the country is under strong Russian influence and Syria represents a higher political risk profile than China is willing to deal with. Nonetheless, it is possible that there will be Chinese involvement in the financing of the rehabilitation of the port of Beirut following the explosion that destroyed large parts of it (on August 4th, 2020). This is the kind of investment that is in line with Chinese involvement in the region, as surveyed here.
4. The US has not been mentioned in this document and that is not without reason. It appears that the US and American companies are not active in logistic infrastructure in the Levant.
5. There appears to be a low potential for the implementation of cross-border projects in the current political situation in the Levant. Projects that are contained within the borders of a single country (such as the Suez Canal and EAPC) operate without any disruption and there is a high probability that such projects will be implemented in the future (such as connecting Eilat to the Israel rail system). However, the coalition of Sunni countries against Iran, which has been forced to include Israel, raises the chance of large projects involving trade routes in the Sunni-Israel space. This includes the connection of Saudi Arabia, the Persian Gulf states and Jordan to the network that also includes the port of Haifa, although these large-scale projects face political obstacles that arise from the continuing conflicts in the Middle East and the major security challenges involved.

Bibliography

Almuhtady, A., Alshwawra, A., Alfaouri, M., Al-Kouz, W., & Al-Hinti, I. (2019). Investigation of the trends of electricity demands in Jordan and its susceptibility to the ambient air temperature towards sustainable electricity generation. *Energy, Sustainability and Society*, 9. Article no. 39. <https://doi.org/10.1186/s13705-019-0224-1>

Ben Gedalyahu, D. (15.09.2020), From the port of Dubai to the port of Haifa: A giant UAE company is connecting Israel Shipyards owned by Shlomi Fogel, Assi Shmeltzer and Sammy Katzav. *Globes*. <https://www.globes.co.il/news/article.aspx?did=1001342726> [Hebrew].

Cohen, H. and A. Barakat (03.09.2014). Israel will sell natural gas to Jordan in the amount of more than \$15 billion. *Globes*. <https://www.globes.co.il/news/article.aspx?did=1000968817> [Hebrew].

COSCO (2020). COSCO Overseas terminals. <https://ports.coscoshipping.com/en/Businesses/Portfolio/#OverseasTerminals>

Evron, Y. (2019). The Challenge of Implementing the Belt and Road Initiative in the Middle East: Connectivity Projects under Conditions of Limited Political Engagement. *The China Quarterly*, 237, 196–216. <https://doi.org/10.1017/S0305741018001273>

Feitelson, A., M. Givoni, A. Halevi, A. Salomon, D. Rozen, A. Gabai and A. Zevluni (2013). A train to Eilat: An examination of the project's logic. http://www.transportation.org.il/sites/default/files/pirsum/eilat_train_-_summery.pdf [Hebrew].

Frantzman, S. J. (01.11.2018). "Peace train" to Oman? How a rail could link Tel Aviv to Oman. *The Jerusalem Post*. <https://www.jpost.com/middle-east/peace-train-to-oman-a-fantasy-railway-from-tel-aviv-to-oman-570883>

Gilad, I. (2019). The Activity of the Russian Navy in 2018 the Middle East. *The Maritime Strategic Evaluation for Israel 2018/19*, 106–126, The Maritime Policy & Strategy Research Center.

Gonen, E. (2018). China's Maritime Silk Road Initiative. In: S. Chorv and E. Gonen (eds.), *The Maritime Strategic Evaluation for Israel 2017/18*, 198–209, The Maritime Policy & Strategy Research Center.

Government of Israel (2018). Official visit by Prime Minister Netanyahu to Oman. https://www.gov.il/he/departments/news/netanyahu_oman_261018 [Hebrew].

Halevi, A. (2014). Involvement of China in the railway line to Eilat: Is it desirable for the State of Israel? <https://bit.ly/3otjttA> [Hebrew].

Harris, Y. (2013). The Connecting Pipeline, *Hamitan*, 145, 26–27 [Hebrew]. <https://bit.ly/2J1hPyR>

Hutchison Ports (2020). The World of Hutchison Ports. <https://hutchisonports.com/en/ports/world>

Hellenic Shipping News (24.06.2019). SCZone head: 13% of world trade passes through Suez Canal. <https://www.hellenicshippingnews.com/sczone-head-13-of-worldtrade-passes-through-suez-canal>

Israel Ports Company (2014). Future plan for Israel's ports – Hamifratz Port and Hadarom Port. <http://www.israports.org.il/he/PortsDevelop/Pages/default.aspx> [Hebrew].

Office of Statistics of the state of Israel (2020). Tourism and hotels – Statistical Abstract for Israel 2019 – no. 70. <https://bit.ly/3jx3tCN> [Hebrew].

Reed, J. (3.9.2014). Israel to supply up to \$15bn of natural gas to Jordan. *Financial Times*. <https://www.ft.com/content/7744200c-336d-11e4-9607-00144feabdc0>

Reuters. (4.1.2020). Suez Canal revenues increase slightly in 2019 – statement. <https://www.reuters.com/article/egypt-suezcanal/suez-canal-revenuesincrease-slightly-in-2019-statement-idUSC6N29000C>

National Development and Reform Commission (NDEC) People's Republic of China. (20.06.2017). Vision and Actions on Jointly Building Silk Road Economic Belt and 21st-Century Maritime Silk Road. http://english.www.gov.cn/archive/publications/2017/06/20/content_281475691873460.htm

The Jordan Time (10.02.2019). Saudi-Jordanian fund, ASEZA sign MoU to build railway connecting Aqaba, Maan. <http://www.jordantimes.com/news/local/saudijordanian-fund-aseza-sign-mou-build-railway-connecting-aqaba-maan>

An Examination of the Coastal Life Rescue Services in Israel – Does Israel Need a lifeboat service?

Ariel Eshed

Introduction

During the past decade, an average of 30 individuals have drowned on Israel's beaches each year. This number does not include about 20 drownings in natural and artificial ponds and pools throughout Israel. There are three layers of security and rescue on Israel's shores: The navy, which operates out of three bases (Haifa, Ashdod and Eilat) is responsible for guarding the international coastline of the Mediterranean and the Gulf of Eilat. Internal security, enforcement of public order and rescue are the responsibility of the Maritime Police Branch of the Israel Police, which operates out of five bases – Haifa, Tel Aviv, Ashkelon, Eilat and Sea of Galilee. Finally, rescue services on the official beaches are operated by the local councils. This article will examine the question of whether Israel should add another layer to its rescue services in the form of a lifeboat service.

It is difficult to compare sea rescue organizations between countries as the structure and role of those organizations vary between different countries¹ therefore the comparison will be made to a parallel coastal rescue organization, which focuses only on sea rescue – the Royal National Lifeboat Institute (RNLI).

The article consists of four chapters: an introduction; an analysis of the coastal rescue services in Israel and of the demand for those services; a parallel chapter on the situation in Britain (which was chosen as a reference country); and a conclusion with recommendations.

Background

According to the World Health Organization, drowning is the third cause of traumatic death worldwide and accounts for 7 percent of total traumatic deaths. In 2014, 372,000 people drowned worldwide while in 2016, for example, about 320,000 died, most of them children and men. Ninety percent of drownings worldwide occur in the developing World. In Africa, for example, there are twenty times more drownings than in Western Europe. These figures are not precise since countries

1 The Unique Role of the U.S Coast Guard. 2020. <https://www.military.com/join-armed-forces/coast-guard-mission-values.html#:~:text=The%20Coast%20Guard%20is%20the,Port%20Security%20and%20Military%20Readiness>

report on drownings in different ways. Thus, for example, there are countries that do not define a death caused by a flood as drowning, and there are countries that count suicide by drowning as drowning and those that do not. Apart from loss of life, these drownings have an economic cost, since 45 percent of the victims are part of the workforce in their country. In the US alone, the economic cost of drownings is \$273 million per year and for the entire world it was estimated to be \$146.9 billion in 2014.^{2,3}

The regulatory situation in Israel

The total length of Israel's coastline is about 319 km; of which 196 km is on the Mediterranean, 56 km is on Sea of Galilee, 14 km is on the Red Sea around Eilat and about 53 km is on the western side of the Dead Sea, not including the evaporation ponds of Dead Sea Works sites. Of these, only 19 km (6 percent) are defined as open to public bathing and they are organized into 155 official beaches. Most of these are only open for a period of six months during the year.^{4,5}

Apart from the official beaches, there are 162 km (53 percent of the coastline) that are not permitted for public bathing at any time, since they are in use by the Navy or by infrastructure facilities (Israel Electric Company, Israel's ports, etc.). Another 126 km (41 percent) have no status, that is, they are not official beaches for public bathing and have no supervision, although the public has access to them.⁶

Life rescue services in Israel as already mentioned, there are three layers of security and rescue on the coasts of Israel. The outer layer is the naval arm of the IDF. This includes a number of flotillas, where Flotilla 7 (patrol squadrons equipped with Fast rigid patrol boats) and the port Security Unit (Called in Israel – Snapir and equipped with semi-rigid boats) are the relevant ones with respect to rescue at sea. It is unnecessary to describe here the number of boats, the size of their crews or their deployment since the task of rescue at sea and assistance to ships in distress is not part of their mission. The mission of Flotilla 7 is to prevent terrorist activity from

2 World Health Organization – Drowning. 2020.
<https://www.who.int/news-room/fact-sheets/detail/drowning>;

3 RNLI – Estimating the Global Cost of Drowning. 2015.
<https://rnli.org/-/media/rnli/downloads/15452-cost-of-drowning-report.pdf>

4 Israel list of official beaches. <https://www.gov.il/he/Departments/news/beaches-list-2019>

5 Iliia Elihu, (2017); Rescue services on the beaches in Israel. The Knesset research center Israel.
https://fs.knesset.gov.il/globaldocs/MMM/c1bccf17-846b-e711-80d6-00155d0a6d26/2_c1bccf17-846b-e711-80d6-00155d0a6d26_11_9468.pdf. page 4.

6 *ibid.* page 6.

the sea while the Port Security Unit focuses on guarding the ports. In the US, for example, these tasks are the responsibility of the Coast Guard.⁷ Nonetheless, there are extraordinary events, which are usually far from Israel's coast, in which the navy has taken part in rescue operations. This was the case in 2005 when a Syrian bulk carrier sank 56 km west of Nahariya and two Israeli missile boats joined French and American boats in the search for survivors.⁸ In 2005, a patrol boat saved three fishermen whose boat had sunk in a storm in the Bay of Haifa⁹ and in 2016 the navy's control center directed a commercial vessel and an air force helicopter in the rescue of two individuals from a yacht that sank in the Bay of Haifa.¹⁰

The second layer of defense and rescue is the Maritime Police Unit of the Israel Police. This unit, which until 1977 was called the Coast Guard, is equipped with about 10 Hornet-type boats (semi-rigid fast rescue boats) and a number of smaller rubber dinghies and Jet-skies (PWC – personal watercraft). Its mission is defined as enforcing the law and maintaining order along Israel's coasts, as well as rescue operations at sea. In order to carry out these missions, the Unit has five operational bases: Haifa, Tel Aviv, Ashkelon, Eilat and Sea of Galilee. Each base is under the authority of the district in which it is located and professionally they report to the commander of the Maritime Police, who is based in the National Headquarters in Jerusalem. Each base includes about two Hornet-type boats and a number of PWC's. According to the police bylaws, the Maritime Police are responsible for rescue on non-official beaches (which constitute a majority of Israel's beaches) and for the location and rescue of bathers who have gotten too far from shore, whether intentionally or that they were carried away. In the Mediterranean, the distance between the Haifa station and the Tel Aviv station is about 90 km and the distance from the Tel Aviv station to the Ashkelon station is about 50 km. The maximal speed of a Hornet, which is the main boat of the Maritime Police, is 40 knots. In other words, the first boat will reach an event that takes place between Tel Aviv and Haifa in about 40 minutes.

Following are the bylaws of the Israel Police that specify their coastal duties, as revised in 2000:

Objective: To fulfil police duties along Israel's coast in general and the enforcement of the law relating to vessels in particular. Tasks:

1. To carry out rescue operations at sea when necessary (apart from on official beaches).

7 IDF web site. <http://navy.idf.il/Article/3808>

8 Ynet (21 April 2005). <https://www.ynet.co.il/articles/0,7340,L-3075442,00.html>

9 Yney (16 October 2005). <https://www.ynet.co.il/articles/0,7340,L-3155806,00.html>

10 Maritime Heritage watch website. <https://bit.ly/3jbRZ7T>

2. Enforcement of laws regarding the use of small boats operating at bathing beaches.
3. To assist in rescue operations carried out by other maritime organizations.
4. To prevent the entry or exit from Israel of people and vessels (apart from ships) not by way of the ports, which serve as border checkpoints.
5. To carry out maritime patrols in order to prevent smuggling by small boats of drugs, valuables and weapons.
6. Enforcement of the law regarding the licensing of vessels and their operators.
7. Maintaining public order on the coasts of Israel.¹¹

In addition to the Maritime Police, there are a number of diving units in Israel whose task is to locate and rescue missing persons in bodies of water. Two of them (Divers-North and Divers-South) are part of the Israel Police. The Israel Firefighters have divers as part of their Special Rescue Unit. The divers of the Firefighters are the only employed divers while those in the other units are volunteers. In certain circumstances, when these units are unable to locate a missing person, the navy's Unit for Underwater Works, which has more advanced equipment, is called in and given responsibility over the event. The two most prominent instances of intervention by that unit in civilian searches were in the location of the bodies of three drowned individuals during Passover 2017¹² and the location of the body of soldier, who drowned in the Sea of Galilee while on vacation in 2014.¹³ It is unnecessary to describe these units since they are not involved in rescue but rather in the location of bodies of those that were not rescued.



Figure 1: Divers-North in action in Sea of Galilee (photo by the author)

- 11 Israeli police general secretary orders (11 June 2000). https://www.police.gov.il/menifa/01.02.03.07_1.pdf
- 12 Ynet (18 April 2017). <https://www.ynet.co.il/articles/0,7340,L-4950067,00.html>
- 13 Walla (14 May 2015). <https://news.walla.co.il/item/2854363>

The third layer of rescue, and essentially the one closest to the coast is the lifeguards on the official beaches. Usually, this layer is the most active and it is here that most bathers are located. The rescue services on Israel's coast bring together a number of government and regional organizations: the certification of lifeguards is the responsibility of the Ministry of Labor; the operation of official beaches and their supervision is carried out according to the regulations of the Ministry of the Interior; and the lifeguards and other beach workers are employed by the local municipalities directly or are subcontracted by them. The lifeguards have rescue equipment that includes a loudspeaker system, life belts, a Hasake' (Local Israeli style stand-up large paddleboard), and on some beaches also PWC's that make it possible to extend the range for rescue.¹⁴

In addition to rescue equipment, the lifeguards have basic resuscitation equipment and all of them are qualified to provide first aid (Basic Life Support – BLS). One of the problems that has been raised by the Knesset Research Department (in a 2016 document that describes the situation on the coasts) is the fact that only some of the official beaches have direct communication between the second layer and the third, that is, between the lifeguards and the Maritime Police Unit. On the rest of the beaches, the lifeguard must call the Police hotline (100) in order to bring in the Maritime Police.¹⁵ It is estimated that today most of the beaches have cellular communication between the lifeguards and the Maritime Police with whom they are in constant contact; however, this communication is not subject to formal work protocols.



Figure 2: PWC of the Haifa Maritime Police (photo by the author)

¹⁴ see note 5.

¹⁵ see note 5, p. 13.



Figure 3: A *Hornet* boat of the Sea of Galilee Maritime Police (photo by the author)

Rescue activity in Israel

According to the report of the Knesset Research Center, the most up-to-date document on this subject, in 2016 the Maritime Police carried out 523 rescues of individuals, 461 cases of assistance provided to individuals and 206 searches for missing persons. The vast majority of the activity took place in the Sea of Galilee in which many bathers use inflatable toys and are carried away by the western winds that blow onto the lake during the afternoon hours, and require assistance in order to return to shore.¹⁶

The attempt to gather precise data on drownings and rescues on the various beaches in Israel is quite difficult since the various organizations relate to different events and to different periods. Thus, for example, Magen David Adom (MDA – Israel's first aid organization) relates to all events in which an ambulance was dispatched to a beach and on an annual basis, while the Ministry of the Interior relates only to events that resulted in death and its data relates only to the season when the beaches are officially open for bathing. Some of the organizations specify where the drowning occurred (the Mediterranean, the Red Sea, etc.) while others do not. And so on. However, *on* the bottom line, it is possible to create an overall picture in which the trend is clear, even if the exact numbers are not. The data are summarized in Table 1.

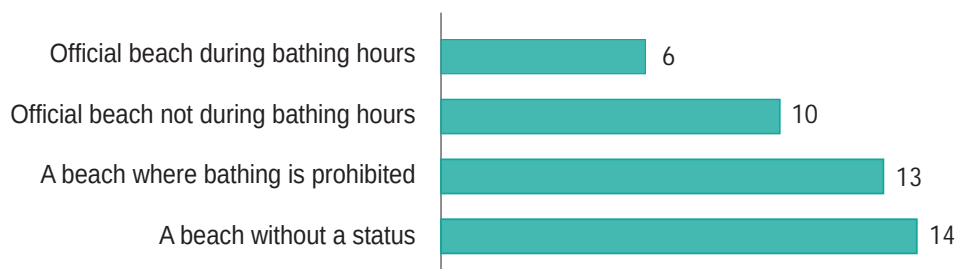
For the purposes of this discussion, drownings in public and private pools, as well as in rivers and streams, will not be considered since we wish to relate to drownings in the Mediterranean, Red Sea and Sea of Galilee only, as stated in the introduction, which occur at a rate of about 30 per year.

¹⁶ see note 5, p. 14.

Table 1: Number of drownings in Israel, 2015–19¹⁷

Year	Number of fatal drownings	Mediterranean	Pools and lakes	Number of rescues and cases of assistance to vessels by the Maritime Police
2019	46	27	19	617
2018	72	29	43	779
2017	39	30	9	866
2016	57	40	17	770
2015	30			652

It is worth mentioning that most of the drownings occur at non-official beaches or on official beaches but not during the official bathing hours: 14 percent when a lifeguard is on duty and the rest after the official beach hours or on a non-official beach. The distribution of drownings according to type of beach is presented in Figure 4.

Figure 4: Drownings in 2016 according to type of beach¹⁸

Rescue in Britain

In Britain, a country with a long maritime culture and history, there are also a number of layers of rescue and coastal protection. As in Israel, the Royal Navy is responsible for the defense of Britain against various threats and there are maritime police units which are part of the various police districts and are responsible for maintaining law and order and guarding the coast. However, there are two additional organizations in Britain that do not exist in Israel: the Coastguard, which is responsible for rescue in Britain's territorial waters and along the coast (people that have fallen from coastal cliffs or become stranded in tidal areas, for example) and the Royal National Lifeboat Institute (RNLI). Most of the RNLI activity is coordinated by the Coastguard where the RNLI is active in the maritime range while the Coastguard has a helicopter wing

¹⁷ Table sources: see note 5, pp. 22–23. <https://www.mdais.org/news/271019>; <https://www.ynet.co.il/articles/0,7340,L-5614856,00.html>; Data from Israeli Police as for 17 August 2020.

¹⁸ see note 5, pp. 22–23.

that provides assistance when needed. In any case, even if the call goes directly to the RNLI, the Coastguard has responsibility for the commanding of the event.¹⁹

The RNLI was established in 1824 and since then has rescued more than 140,000 people. It is operated primarily by volunteers and operates on three levels: rescue at sea, which involves about 444 lifeboats at 238 stations along the coast of England, Scotland and Northern Ireland. The RNLI is also responsible for the training of lifeguards on the official beaches and for teaching children about water safety. For example, in 2018 alone, 756,378 children and youths attended some sort of lecture or training on the subject of water safety given by one of the organization's volunteers.²⁰

The RNLI is proud that apart from the station on the Thames River in London and in the Port of Portsmouth (which due to the high level of activity are operated 24/7 and by full-time employees), all of the others stations are operated by about 5,600 volunteers who live nearby, which is in addition to a salaried foundation workers that manages the organization and maintains the boats. The RNLI has set itself a limit of less than 10 minutes to dispatch a lifeboat from the time a call comes in and it has met that goal. For example, the national average for 2018 was 9.7 minutes.

The RNLI provides a number of rescue and prevention services. The most famous of them is the lifeboats themselves. There are a number of types of lifeboats, ranging from small rubber dinghies for assistance close to shore (a swimmer who gets carried away, vessels stranded on a sandbar close to shore, etc.) to the larger boats for assistance out at sea, which are capable of going out under any weather conditions. The RNLI has 82 lifeboats for the open sea (of five different types), four hovercraft (which operate primarily in areas where the high and low tides cover particularly large areas) and another about 330 rubber boats of four different types.

In addition to the operation of these lifeboats, the RNLI operates 248 bathing beaches, and provides consulting to several hundred more throughout the UK. In addition, it has a comprehensive educational program for children in kindergarten up to high school. Some of these programs only involve lectures while others involve hands-on teaching in pools and in the sea. All of the programs are grouped under the name "Respect the Water".

19 OTS News. 2019. Do You Know the Difference Between the Coastguard and the Lifeboats <https://www.otsnews.co.uk/know-difference-coastguard-lifeboats>

20 RNLI. 2018. Operational Statistics. https://rnli.org/-/media/rnli/downloads/20173445_ops_stats_report_2019_v6_lr_single_pages.pdf; Morris, High. 2017. 27 things you'd never know about Britain if it were not for Ordnance Survey. <https://www.telegraph.co.uk/travel/destinations/europe/united-kingdom/articles/ordnance-survey-facts-about-great-britain>

As mentioned, the RNLI operates 238 stations along the coasts of England, Scotland and Ireland (although Ireland is an independent country, the RNLI is also active there and includes Ireland in its annual figures). It is responsible for 31,368 km of shoreline, of which 19,267 is on the main island and Ireland.²¹ The RNLI has 15 stations on the smaller islands, such that if we divide the coastline of the main island and Ireland (19,267 km) by the number of stations on them (223), we obtain an average of 86.4 km per station. This is only an average and there are less populated areas in northern Scotland where the distance between stations is greater than in more populated areas.²²



Figure 5: A Shannon-type boat is urgently dispatched from the Hoylake station (photo: RNLI 2018)

Table 3: Number of drownings in Britain and Ireland, 2015–2019²³

Year	Number of drownings	Number of rescue operations	Successful rescue with certainty	Number of emergency dispatches of boats
2019	223+64	38,713	374	8,941
2018	263+79			8,964
2017	255+72	32,116		8,436
2016	265+94	20,538	558	8,851
2015	321+92	14,814		4,300

21 Different sources are liable to cite different distances based on whether one measures every small bay, or a straight line is drawn that circumvents them and other factors.

22 RNLI 2018, see note 19.

23 Table sources: RNLI 2018, see note 19; National Water Safety Forum. 2019. Reports and Data. <https://www.nationalwatersafety.org.uk/waid/reports-and-data>; Water Safety Ireland. 2020. Statistics. <https://watersafety.ie/statistics>; RNLI. 2016. Annual Report and Accounts. <https://www.green-park-jobs.co.uk/RNLI-FD/downloads/annual-report-and-accounts-2016.pdf>; Walker, David. 2016. Figures reveal 321 people died in accidental drownings in 2015. <https://nationalwatersafety.wordpress.com/tag/statistics>; *Irish Examiner*. 26.11.2019. 64 people have drowned in 2019 so far. <https://www.breakingnews.ie/ireland/64-people-have-drowned-in-2019-so-far-966587.html#:~:text=64%20people%20have%20drowned%20in%20Ireland%20so%20far%20this%20year,11%20Irish%20citizens%20drowning%20abroad>

Notes:

- Number of drownings – England + Ireland
- Not including suicides in bodies of water and bodies dumped in the water following a criminal act.
- Although the annual totals are exact, they are not always identical in their criteria over the years and therefore some of the cells in the table are blank.
- The RNLI does not specify how many people drowned and where (near the shore, in a lake or out at sea).

The table points to an interesting trend, namely that the number of rescue operations has increased over time and accordingly the number of drownings has declined.

Discussion and Conclusions

As we have seen, the collection of accurate data is not a simple task, neither in Israel nor in Britain and Ireland. In Israel, there is no organized gathering of data and each organization (Magen David Adom and the Ministry of the Interior) counts the events differently. In Britain as well, which is better organized in this area, there are differences in the criteria for calculating annual figures. Since the figures for Britain do not specify how many people drowned on the beach, how many drowned in a lake or river and how many went down with their boat out at sea, it is difficult to carry out an accurate comparison to Israel. Nonetheless, using all of the sources and the data that was gathered an overall picture can be arrived at.

Britain's population was 67,530,172 in 2019.²⁴ To this should be added the population of Ireland, i.e. 4,882,445.²⁵ In that year, the population of Israel was 8,519,377 (not including Judea and Samaria).²⁶ The average number of drownings in Israel in 2019 can then be calculated as one for every 185,203 individuals, while in Britain and Ireland the figure is one for every 252,308 individuals. In theory, the ratio of drownings in Israel is much higher than in Britain and Ireland, a fact that might justify the expansion of the rescue services in Israel; however, this statistic doesn't tell the whole story. First, while in Britain swimming lessons are part of the curriculum in the schools and as mentioned there are numerous educational activities in order to

24 World Meter. 2020. UK Population.

<https://www.worldometers.info/world-population/uk-population>

25 World Meter. 2020. Ireland Population

<https://www.worldometers.info/world-population/ireland-population>

26 World Meter. 2020. Israel Population

<https://www.worldometers.info/world-population/israel-population>

teach children about correct behavior in the water, in Israel there are sectors in the population that rarely go to the beach and their children do not learn how to swim. Unfortunately, most of the drownings occur among these sectors.

Furthermore, in 2017, the public in Britain owned 1,185,243 private boats of various types (which include only boats that require a license and not small sailboats, kayaks, etc.).²⁷ In Israel there were only 24,000 boats in that same year (2,900 of which are anchored in marinas and the rest on the shore).²⁸ In other words, there is a boat for every 57 people in England while in Israel the figure is one for every 339 people (which is a subject for a different study – namely, why are so few Israelis involved in water sports?). Also in England's European neighbors there are a large number of boats and every so often the RNLi provides assistance to European vessels visiting British waters. In any case, this statistic may explain, in my opinion, why the RNLi carries out so many missions in order to rescue vessels as compared to the Maritime Police in Israel. This figure also explains why most of the drownings in Israel occur near the shore rather than while boating (as mentioned, the vast majority occur either on a non-official beach or on an official beach when a lifeguard is not present).

If we compare the preparedness of the Maritime Police in Israel in the provision of assistance and rescue to vessels, then Israel's situation is no worse, and perhaps even better than that of Britain. Thus, the average distance between stations is similar (about 80 kilometers in both cases), the speed of the various vessels is similar and the fact that the Maritime Police in Israel is composed mainly of full-time salaried employees on call in the stations or on the boats at sea shortens the response time relative to the RNLi, which is largely made up of volunteers. While most of the RNLi stations have one lifeboat for rescue at sea under any weather conditions and one rubber boat for assistance near the shore, the Maritime Police in Israel have two boats for rescue at sea and a water scooter for assistance near the shore.

In sum, the character of maritime activity in Israel (sport and recreation) for most of the public involves bathing at a beach and to a much lesser extent activity far from shore, such as sailing in small boats. This is apparently the reason for the small number of rescues by the Maritime Police and the navy along the coast of Israel (apart from Sea of Galilee). In my opinion, the Maritime Police are well-prepared for their missions. It appears that the scope of maritime activity and the need for rescue

27 Statista. 2020. Total number of boats owned by household in the UK from 2015–2017 <https://www.statista.com/statistics/530382/boat-ownership-numbers-united-kingdom-uk>

28 Ynet (11 June 2019). <https://www.ynet.co.il/articles/0,7340,L-5523075,00.html>

services at sea in Israel do not justify the creation of an additional protective layer such as the Coast Guard or the RNLI.

If we wish to reduce the number of drownings each year, as Britain has done, and despite the increase in Israel's population, then as a country on the Mediterranean coast where recreational activity at the beach is deeply engrained in the culture, the State (i.e. the government and the local councils) need to invest more in the teaching of swimming for all and in water safety education for children and youth. In addition, the State needs to encourage the local councils, that have not yet done so, to reinforce the existing rescue framework: more lifeguards, longer bathing hours and a longer bathing season since people go to the beach both before Passover and after the High Holidays (which is the official season for the beaches in Israel).

Since the cost of creating and operating official beaches is high and the local councils are reluctant to open additional official beaches as a result, the State needs to provide budgetary assistance or to open beaches that it will operate rather than by the local councils. In addition, there is a possibility of declaring certain beaches as official only during the bathing season or even only on weekends. Furthermore, the possibility of paid parking at official beaches should be considered; this provides the local councils with the possibility of offsetting part of the cost of maintaining the beach, although on the other hand this might encourage bathers to use non-official beaches and thus endanger themselves and their families.