# Mtafiti Monthly

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Content



**Marine News in Brief**

## Improper disposal of COVID-19 face masks likely to hurt ocean health, increase plastic pollution

**By Mr Gilbert Atuga**

"We are at war with a virus", "We are at war with an invisible enemy" - these are some of the metaphors that have been used by various heads of states to describe the newly infectious Coronavirus that has gone viral across the world and which seems to be spiralling out of control.

But as leaders battle the surge in Covid-19 positive cases, another 'war' might be lurking in the dark – plastic pollution menace. The increased use of Personal Protective Equipment (PPEs) poses yet another unprecedented challenge to ocean health!

But are we ready to battle marine pollution occasioned by PPEs?

The Covid-19 pandemic was first reported in Kenya in March 2020, with initial cases in Nairobi and Kilifi. Amid rising concerns over the novel Coronavirus, worldwide countries' economies continue to grapple with huge losses occasioned by the disease. Businesses have been battered, people have lost their jobs, not forgetting the rising cases of gender-based violence being reported. The world literally came to a standstill!

Therefore it is no surprise that the Kenyan government, in a gazette notice published in April this year, made it mandatory for her citizens to wear masks while in public places. Further, the World Health Organisation indicated that Covid-19 is here to stay- meaning PPEs will be part of our day-to-day consumables.

The PPEs such as face masks, hand sanitizers, protective clothing for medical personnel, gloves, and others, are mostly made of or packaged in plastic material. Further, they are mostly single-use items - thanks to the highly infectious rate of Coronavirus. With the heightened fears of infection, recycling of PPE waste may not be possible. Littering and illegal dumping is

*Improperly dumped face masks:* **Photo by OceanAsia.org**

therefore likely to increase accumulation of plastics in the environment, and more so because most counties lack proper waste management systems.

Research has shown that used PPEs may pose health risks to humans because the SARS-Cov-2 (Coronavirus) is more stable on plastics; that is, it can be detected up to 72 hours on these surfaces. This calls for a unique strategy in collecting plastic waste to COVID-19 infection.

With the World Health Organisation declaration that the virus is here to stay, the continued use of plastic protective equipment might water down the gains of the September 2017 plastic bag ban in Kenya, and the recent ban on use of plastic bottles in marine parks.

This means that PPE waste is an emerging problem amidst the Covid-19 pandemic, which calls for proper waste management strategies.

With the enforcement of Covid-19 containment measures such as social distancing and stay-at-home directive,

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garbage collectors are reluctant to collect trash from households. This may lead to dumping near households away from landfills, further posing environmental and health risks.

## COVID-19 plastic waste likely to increase marine pollution

It is projected that by 2050 there will be more plastics in the ocean than fish. The United Nations estimates 13 million tonnes of plastics are dumped into the ocean each year. And the situation is likely to get worse during and after the Covid-19 pandemic.

*Plastic waste washed to the shore*

According to the 2019 census results, Kenya has a population of 47.6 million. If 50 percent of the population uses disposable masks every single day, with medical professionals using more than one disposable mask in a day, this translates to 23.8 million masks used every single day, or 714 million masks in a month.

If only one percent of the masks is not correctly disposed of, then 7.14 million masks are likely to end up on land monthly, with a bigger percentage ending up in rivers and the ocean, mainly during storm water runoff.

If one mask weighs 4 grams, according to the WWF report, this translates to 28.6 thousand kilograms of plastics in the environment monthly, from face masks alone. This amount of plastics poses a big threat to aquatic organisms, and ultimately to the Blue economy if it ends up in our ocean.

## Impact of plastics to the aquatic environment and human

Improperly disposed of PPE waste will most likely clog drainage systems leading to flooding during rainy season. In the ocean, plastics can get into ship propellers during navigation leading to ship damage, triggering constant repairs, and eventual huge economic losses.

Plastic pollution has adverse effects on the aquatic environment. Microplastics may accidentally be ingested by marine organisms leading to the death of the organism.

Plastic may also entangle aquatic organisms to death. This litter further degrades critical habitats such as mangroves, and coral reefs which act as a breeding ground for fish, hence negatively affect the fisheries sector. Plastics may also lead to loss of aesthetic value of our beaches and water bodies, rendering tourist destinations less attractive.

Additionally, the effect of PPE waste ingested by aquatic organisms such as fish is not yet known. That is, if consumed by humans, would such fish be hazardous to humans? Such are the kind of questions researchers will grapple with post-pandemic.


*Turtle ingesting plastic in the ocean:* **Photo by Ocean Conservancy**

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But one thing is for sure – with the 'new normal' during and post-pandemic, the waste quantity and variety of waste on our oceans will change tremendously.

## How can we participate in tackling this problem post quarantine?

The Kenya Marine and Fisheries Research Institute (KMFRI) is in the process of coming up with a strategic road map to address this problem. By so doing, KMFRI will play a leading role in having a long-term goal in monitoring plastic pollution in our aquatic systems. Baseline data generated will be key in informing policy and decision making in waste management. Monitoring will also enable the Institute to assess if intervention measures put in place are working. And give insight into the extent to which Covid-19 PPE waste has spread; and whether the trash has reached rivers and oceans to impact on aquatic organisms.

## Use of mobile technology to monitor plastic pollution can inform policy

KMFRI has already developed a mobile app for plastics data collection. This innovation, that involves use of mobile technology, has been jointly achieved by KMFRI and the University of Antwerp citizen science collaborative project on plastics monitoring in Kenya. The mobile app will be modified to include the Covid-19 type of waste.

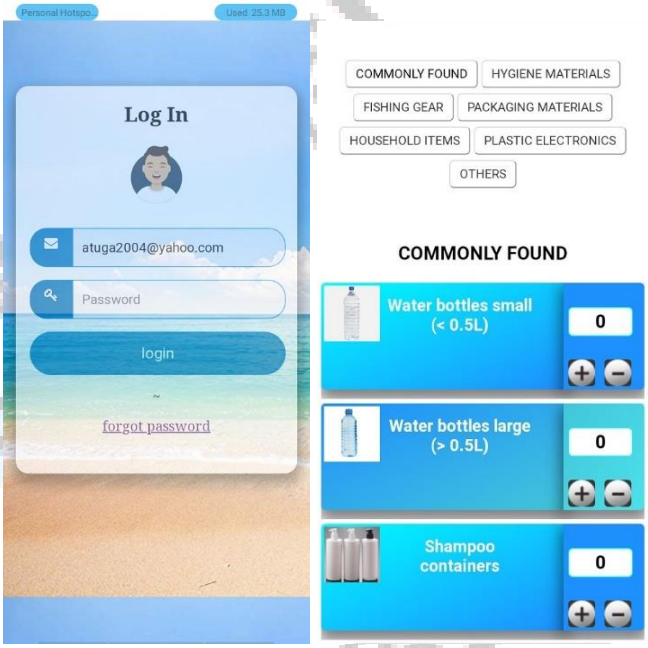
Standard Operation Protocols (SOPs) for plastic litter sampling is in the process of being developed to pave the way for utilization of the app in plastic collection. Subsequently, volunteers and other professionals will be trained on how to collect data, and record in the mobile app using the developed SOPs. This harmonised approach will enable reproducibility and comparability of results from different locations. The initiative will also enable data to be collected on a wider geographical scale to inform policy for target-oriented plastic reduction.

Further, the WHO modeling results suggest that just like HIV, the virus will be endemic. The Ministry of Health is preparing for the 'new normal'. This 'new normal' post-pandemic, calls for researchers to reinvent the wheel in matters of data collection. The mobile app is therefore critical in this aspect.

## Partner with us!

KMFRI recognizes the vital role Private-Public Partnerships play in economic growth. In this regard, the Institute is open to partnerships with like-minded organizations to come up with solutions to tackle the PPE pollution caused by COVID-19 pandemic.

Together let's fight Coronavirus; together lets fight PPE generated waste; together let us strive to keep our rivers and the ocean free from waste.




*Screenshots of mobile app for plastics monitoring; left, a login platform; right, a platform for a list of plastic items in the app.*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*Marine News in Brief*

# Tapping into high-tech acoustic marine research tools likely to boost Blue Economy

**By Mr Noah Ngisiang'e, Mr Samuel Ndegwa & Mr Salim Athman**

The ocean is vast with numerous resources, and marine researchers are taking a deep dive to unveil sea treasures lying underneath. It is home to fish - a rich source of protein; oil and gas, corals, among other sea animals and marine organisms, which if properly exploited will boost the Blue Economy and the overall economic growth of our country.

As it is impossible for researchers to reach deepest parts of the ocean to discover what is underneath, more advanced technology has to be adopted to bridge the gap. Humans are looking to study other planets like Mars, yet the depths of the oceans have not been given much attention to unlock their potential.

With this realization, the Kenyan government has strived to invest in marine research technology tools to better understand the ocean and its treasures. Underwater noise research tools, scientifically known as sound acoustics and satellite telemetry, are some of the digital technology devices being deployed in Kenyan waters. They continue to play a big role in the study of the marine ecosystem and in tracking migratory patterns of sea animals.

With the adoption of futuristic technology, more innovation changes are made, making them user friendly, and equipment less costly. It is also through the use of sound acoustics that the ocean floor and its features can be studied.

The specialized tools assist in detection, assessment and monitoring of underwater physical and biological characteristics for exploitation in the achievement of food security and nutrition, a major pillar of Kenya's Big Four agenda.

The Kenya Marine and Fisheries Research Institute (KMFRI) generates and disseminates information for exploitation of marine resources to enhance food security and alleviate poverty. The research findings are therefore key in informing policy and decision-making in the Blue Economy sector.

Currently, the globe is in the preparatory phase ahead of the United Nations Decade of Ocean Science from 2021-2030, where the UN sustainable development goals for proper ocean governance (SDG14) is a key focus. The main goal is to conserve and sustainably use the ocean, seas, and marine resources for sustainable development. Perceived economic gains from the oceans will be proportional to the efforts by communities to conserve them.

With the global Covid-19 pandemic widening physical distance among people, digital technology has shrunk it and brought the international community together.

Working from home, e-Learning, and contact tracing to map Covid-19 spread, to mention a few areas, has been made possible, thanks to digital tools. Similarly, deployment of hydroacoustics and satellite has been crucial in bridging technological gaps in marine research.

*Drs Noah (front centre) with KMFRI researchers read bathymetry data during Likoni ferry tragedy recovery operation in October last year*

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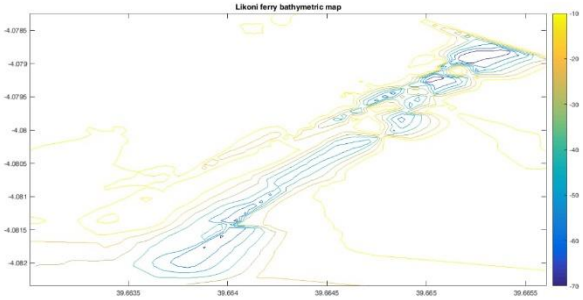
*A satellite map of the Likoni Channel generated using acoustic data*




*A Matlab map showing different depths of the Likoni channel. Yellow signifies shallow depths, while dark-blue indicates deepest parts of the channel.*

## A brief history of hydroacoustics

Hydroacoustics in general is the study and application of sound in water to detect, assess and monitor underwater physical and biological characteristics. It traces its history in the development of water depth measurement using echo sounders. The potential of the echo sounders in the study of fish distribution at sea was tapped in 1920. Further advancements were made during the Second World War. According to Forbes and Nakken, the echo sounders were analog in the 1960s and 1970, and paper echograms were used to visualize the data. With the advancement of technology and digital computing over time, the analysis of the data that was recorded using magnetic tapes could be done on shipboard computers. It has further developed where the data analysis can be done on personal computers.

## Application of hydroacoustics in fisheries stock assessment and seabed mapping

This sounding technique is used to estimate fish stocks and other bioresources within marine and freshwater resources. The fisheries acoustics works by sending signals back to the source once it encounters fish in the waters. These echoes give an indication of fish size, abundance and location.

KMFRI through the government and donor support has successfully undertaken several hydroacoustic surveys within its territorial and Exclusive Economic Zone (EEZ) waters for marine and also freshwater stock assessment in Lake Victoria. Currently, the Institute has SimradEK60 and EK80 hydroacoustic models. The instruments have got both high, medium, and low-resolution transducers attached to them (33,120,333Khz) that vary in intensity and can undertake several acoustic assignments.

The results from the acoustics assessments are always combined with real-time stocks observation to validate them. The devices can also be used to characterise habitats to understand species dynamics, sea formation for purposes of maritime, oil and gas explorations, and search and rescue in support of marine safety. With the right expertise and resources, hydroacoustic can be leveraged to advise on the value of marine resources.


*KMFRI's marine geologist Mr Samuel Ndegwa demonstrates how EK80 echo sounder works*

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## Gaps and future?

The cost associated with procuring and running the equipment is high, and it takes long to identify valid signatures (target strength) for different species with commercial or exploitable value for different stock surveys. The equipment also requires special expertise, especially in data analysis. The research gaps, however, can be bridged through more funding and innovations in the area that will lend the industry to grow and expand.

***KMFRI research scientists Mr Noah Ngisiang'e is a PhD student at Stockholm University, Department of Ecology, Environment and Plant Sciences (DEEP); Mr Samuel Ndegwa is a spatial mapping and marine geologist, while Mr Salim Athman is a Physical Oceanographer.***