

Flush for Change

On-board bio-toilets help minimize accidents at sea, prevent marine pollution and foster healthier ecosystems

A workplace should have a roof, proper flooring, entry and exit points, along with sufficient space for movement during emergency. The floor surface should be flat, stable and dry; it should be appropriate for the nature of work involved. The workplace should also have good lighting and ventilation, so that workers are safe and they breathe clean air. It is also necessary to protect the workers from extreme weather while working. A space for dining, rest places for sick workers, drinking water facilities, and toilets and hand-washing facilities are some of the other basic requirements in the workplace.

Fisher's workplace is their vessels that, often, do not provide the basic facilities. Life on a floating workplace is unsafe. While fishing technology is developing very fast, boat-making techniques and the conditions of onboard facilities lag behind. This problem demands serious interventions from governments, research institutions, non-governmental organizations (NGOs) and other organizations.

Toilets are basic requirements that fishing vessels do not have. One reason for the large number of accidents at sea is the use of the gunwale as a toilet. If a fisher falls from a moving boat while using the toilet, chances are he will hit the propeller and meet his end.

Boat size depends on the type of fishing and the physical conditions of where they operate. Due to space restrictions onboard, toilets are not included in the design. A one-day fishing boat is smaller than a multi-day boat; a deep-sea fishing vessel is larger than a stay-fishing boat. Mostly, the

space is just about sufficient for fishing equipment. The task for boatbuilders, then, is to design toilet models to fit the space restrictions without affecting the work.

In 2016, a team of volunteers took on the task of finding a suitable boat under a pilot project of the Association of Deep Sea Going Artisanal Fishermen (ADSGAF), situated in the southern part of the Indian state of Tamil Nadu. It found support from the Madras Section of Institute of Electrical and Electronics Engineers Artisanal (IEEE), an association of technical professionals in

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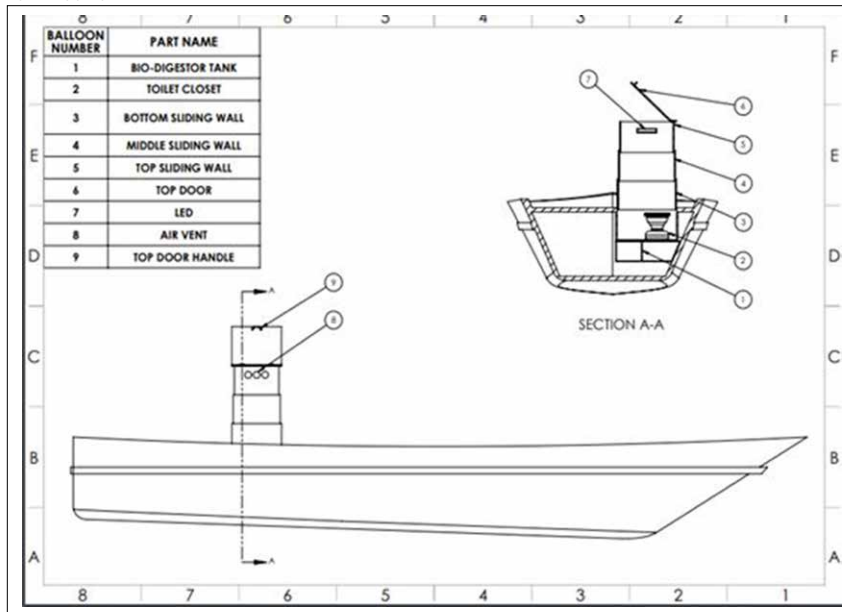
the south Indian state under its Special Interested Group on Humanitarian Technology (SIGHT) programme.

The team was able to select a boat under a subsidy scheme of the state's fisheries department, which required the boat to have a toilet. The team consulted bio-toilet makers from Indian Railways and other service providers of bio-toilets.

It did not yield results. After the project team members left, it became difficult to find volunteers and support staff. Yet, the idea of providing a toilet on a fishing boat was not given up. In 2021, a 3D modelling and designer joined the team. The work got going again. After continuous discussions with the fishermen, a model was designed for boats with no wheelhouse.

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Engineering Drawing. Bio-toilets can be installed on varying types of fishing boats such as outboard motor-fitted fibre-reinforced plastic (FRP) boats and inboard motor (IBM)-fitted FRP boats, steel boats, as well as on wooden boats engaged in trawling, purse-seining, gillnetting and longlining

size and requirements, the bio-digester tank can be designed and installed conveniently anywhere on board the vessels.

In 2021, a real bio-toilet type was prepared and fitted to the model boat kept for demonstration at the boatyard of the South Indian Federation of Fishermen Societies (SIFFS) at Veli, Thiruvananthapuram, India. The four feet by three feet cabin enclosed a Western-style closet with flush tank, hand shower and wash basin, along with a 500-litre biodigester and a solar-powered lamp. The cabin size can be further reduced if space is constrained.

Spreading the habit

This toilet's purpose is to spread the habit of using toilets on board fishing boats. Those who come to the boatyard to buy boats do visit the toilet; no one has shown interest in having them installed on their own boats. After officials from the fisheries department of the neighbouring state of Kerala learnt of the facility, they began encouraging the fishermen to avail of it. Eventually, two owners got interested.

Nabesu, IND KL 08 MM 2564 is the name of a boat in Kannur owned by a person called Usman. Ancil D'cunha is the owner of a boat named *Shymol*, IND KL 05 MM 2275, at Azhekcode. Both of them came forward to have toilets installed in their boats. It is not difficult at the time of building the boat to fabricate the toilet cabins, fit them with bio-digesters and plumbing, and carry out related work. Yet it is very difficult to implement all these on an existing boat. A great deal of manpower went into fitting the toilets in *Nabesu* and *Shymol*. A team of six workers stayed at it for 10 days in two schedules.

The two boat owners and the fisheries officials were co-operative from the beginning and until the work's completion. SIFFS's working team established a communication mechanism with the two boats to assess the performance of the toilets.

The bio-digester technology is the important component of a bio-toilet, which is more expensive than the toilet designs in use. The unique bio-toilet

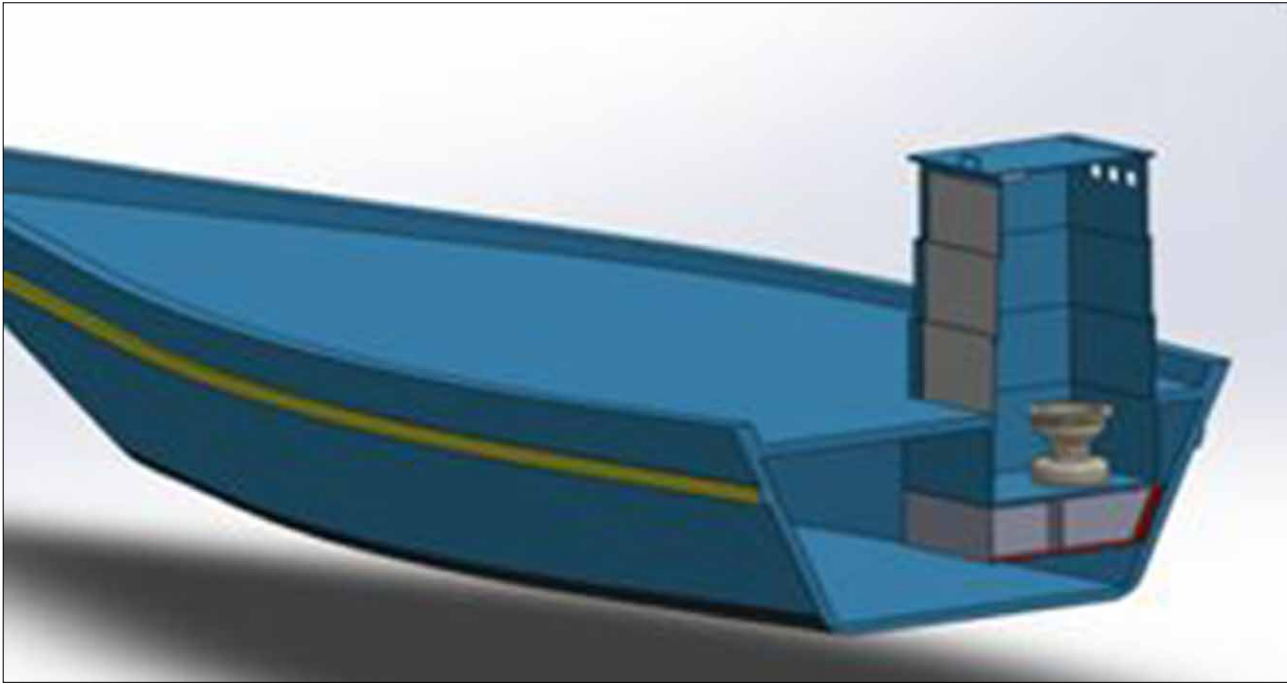
Hardware parts

In this model, the closet and other hardware parts are fixed under the deck; its length is three feet, width two-and-a-half feet and it has a depth of one-and-a-half feet. The dimensions can be customized according to the boat's size.

The top portion of the toilet area is closed with a door. Three levels of vertically sliding walls one-and-a-half feet high cover it. Depending on the convenience of the users, the height can be adjusted to the maximum of six feet. It provides ample space for ventilation and ingress-egress.

In another model, the bio-digester is fixed either underneath the closet area or under the deck, based on convenience. Users open the top door of the toilet and close it after using it. This does not need any extra space to be allocated for the fishers over the deck.

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Bio-toilet design. Toilets are basic requirements that fishing boats do not have. One reason for the large number of accidents at sea is the use of the gunwale as a toilet

decomposes human excreta, using bacteria to convert it into methane gas, water and rich, moist and soil-like material. It eliminates the direct discharge of septage in the sea. The discharge into sea meets pollution standards. Its design can be modified according to the requirements of the end-users. The toilet offers a waste-free solution. It is expensive to build now but further research is expected to reduce costs in the future.

Features of the bio-digester toilet:

- * Anaerobic waste degradation
- * Decomposes 99 percent of the waste
- * Maintenance-free
- * No need for sludge removal
- * Discharge from tank is hazard-free water, odourless and colourless
- * Requires one-third the space needed for a septic tank

It is common now for the houses of fishers in South India to have more than one toilet. The majority of the users are women, aged people, employees and students. The active fishermen are still using the seashore as their toilet. This may be one of the reasons for the deliberate avoidance of toilets

on fishing boats. A generation imbued with the habit of using the seashore as a toilet cannot be changed overnight.

Fewer accidents

One can only anticipate that custom and practice may give way to change. Certainly, encouraging bio-toilets on fishing boats can minimize the rate of accidents at sea and can also contribute to a clean ocean and healthy ecosystems. ♻️

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Indian fishermen skeptical about success of bio-toilets on boats

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