ECO-BRICKS - AN EFFECTIVE TECHNIQUE TO MANAGE PLASTIC WASTE AT HOME

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ABSTRACT
Plastics are non-biodegradable pollutants posing serious threat to our environment. Indiscriminate disposal of plastics on land, water and release of toxic gases into the air from burning plastics has been causing serious public health hazards. Hundreds of marine species are dying from the ingestion of plastics. India generates 26,000 tonnes per day of plastic waste amounting to nearly 9.4 million tonnes a year. Of that, only 5.6 million tonnes is annually recycled and the remaining 3.8 million tonnes is left unattended. The Imphal Municipal Area alone generates 130-150 metric tons of solid waste every day with other urban local bodies below 5 metric ton. Considering the growing impacts of plastics on our environment, significant reduction of plastics through effective management is very crucial. Eco-brick is a method/technique by which plastic wastes could be sustainably/effectively managed at household/individual level. This article presents eco-bricks and the ways plastic wastes are to be collected in eco-bricks have also been highlighted.

Keywords: Plastic, Non-biodegradable, Eco-brick

INTRODUCTION
Plastics made up of synthetic organic polymers are widely used in different applications ranging from water bottles, clothing, food packaging, medical supplies, electronic goods, construction materials etc. Plastic pollution is recognized as a major environmental problem, especially in the aquatic environment (Alabi et al. 2019). Globally, plastic production has grown from 2 million tonnes in 1950s to 380 million tonnes in 2018, projecting an exponential growth. China is the largest producer of plastics in the world; it has produced more than the European Union. About 9-10% of total production is only recycled, another 12% is incinerated. A recent study shows that water bottles produced in millions across the world per minute are entering into the oceans, affecting the marine life and by 2050 there could be more plastic in the oceans than fish measured by weight (Goel and Tripathi 2019, Alabi et al. 2019). During the period of 2016-2021, the soft drinks and food industry will be the highest packaging market share gainers, with a growth share of 3.4% and 1.3% respectively. Due to long life of plastics of about 450 years, plastics disposed on land are collected into the landfills. On reaching the water bodies they either continue to stay suspended, or settle in the sediments, blocking transfer of oxygen and percolation of water through the soil. The critical issue is plastics pollution impact on human health (Goel and Tripathi 2019). As in other states of India, Manipur too facing the problem of plastics on the land and aquatic ecosystems. As per official data, the Imphal Municipal Area alone generates 130-150 metric tons of solid waste every day, of which 5 per cent of the total waste is plastic(Jimmy 2018). The extensive use of polythene bags and their dumping along with other wastes has reduced Nambul River to a stinking drain resulting in a deathly blow to its biodiversity. Most parts of Loktak Lake have now been filled with plastics carried by several rivers draining into it. Yangoi River is also becoming shallower as a thick layer of plastics has filled up the river bed (TSE 2018). Taking serious note of the above problems and also to solve the problem of plastics, the concept of eco-bricks has been recently introduced. The present article will highlight about the process of making eco-bricks and the way plastic wastes are to be managed by eco-bricks.

Eco-bricks?
An eco-brick is a plastic bottle packed tightly with used clean and dried plastics or non – biodegradable waste to a set density. Eco-bricks can be made from any size transparent PET plastic bottle. The Eco-brick concept was first used in
the early 2000s in Guatemala, Central America by a passionate eco-warrior called Susana Heisse (Lenkiewicz 2018). Global Eco-brick Alliance (GEA) has been active since 2015, and has made extensive guidelines on how to properly make eco-bricks. Today, the eco-brick movement has gained momentum around the world. Hundreds of thousands of people around the world have turned to eco-bricks as a way to take personal responsibility for their plastic. It has become an increasingly popular construction materials for countries, particularly in the developing countries, as plastic is abundantly present everywhere at home or littered in the streets. Bhavnagar Municipal Corporation (BMC) launched an eco-brick project under the aegis of Dr. Tejas Doshi, a physician.

**How to make an eco-brick?**

In making an eco-brick, we need (i) clean and dry empty plastic bottles; (ii) Used plastic wastes such as wrappers of namkeens and chips, milk bags, gutka and chocolate besides many other plastic items; (iii) scissor; and (iv) bamboo stick. But materials like glass, metals, papers, foods waste, liquids etc are not recommended for making an eco-brick because these materials, if used will have bacterial growth inside the eco-brick. Given below are the steps to be followed in eco-bricking (Fig. 1):

1. To collect and segregate plastic wastes
2. To take a dry and clean empty plastic bottle of uniform size.
3. To cut plastic wastes into small pieces with the help of scissor
4. To add these plastic wastes into the bottle by using a stick and keep adding until the bottle is absolutely full and compact/solid with no space
5. To weigh the completed eco-brick to make a good eco-brick.
6. To tightly cap the eco-bricks
7. The final step is to store the eco-bricks for construction purposes.

**Eco-bricks: Size and Weight**

The Global Eco-brick Alliance (GEA) recommended the minimum density for a passable eco-brick = 0.33 g/ml & for maximum density = 0.7 g/ml

Minimum Eco-brick Weight = Bottle Volume x 0.33

**Fig. 2. Eco-bricks**

Fig. 2 represents the eco-bricks utilized to make tree guard, walkways, sitting benches, small buts, boundary wall, dustbins, etc (Partha 2020, GEA 2020).

**Table 1. Average sizes of bottles and their ideal weight in grams**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Bottle Size</th>
<th>Eco-brick Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>250 ml</td>
<td>100 grams</td>
</tr>
<tr>
<td>2</td>
<td>500 ml</td>
<td>175 grams</td>
</tr>
<tr>
<td>3</td>
<td>1000 ml or 1 litre</td>
<td>350 grams</td>
</tr>
<tr>
<td>4</td>
<td>1500 ml or 1.5 litres</td>
<td>525 grams</td>
</tr>
<tr>
<td>5</td>
<td>1750 ml or 1.75 litres</td>
<td>613 grams</td>
</tr>
<tr>
<td>6</td>
<td>2000 ml or 2 litres</td>
<td>660 grams</td>
</tr>
</tbody>
</table>

Source: (GEA, 2020)

**Advantages & Disadvantages of Eco-bricks**

Advantages are (i) Re-usable; (ii) Low cost/economical; (iii) Non-brittle and durable; (iv) Good insulator; Absorbs abrupt shock loads; (v) Bio climatic; (vi) Easy to make; (vii) Green construction; (viii) Light weight

Disadvantages include (i) Un-decomposable/Un-destructible; (ii) Flammable; (iii) Breakdown as micro-plastics; (v) burning of plastics releases toxic gases.

**Eco-brick campaign**

With a view to promote awareness and encourage people to make eco-bricks, Paryavaran Sanrakshan Gatividhi launched a 3 month long nationwide Eco-brick Campaign, starting from 2nd October, 2020 (PSG 2020). As in other states, the volunteers of Paryavaran Sanrakshan Gatividhi, Manipur has been trying to raise public awareness for eco-
bricks. Notably, Welfare Club, Sagolband Tera Amudon Akham Leikai, Imphal West and Paryavaran Sanrakshan Gatividhi, Manipur have jointly organised an Eco-bricking competition on 27th February, 2021 on the theme “Plastic Free Zone and Eco-brick Making Competition”. Those participants who could present maximum mass/ weight of eco-bricks were awarded prizes along with certificates (Fig. 4a-d). My college students also participated in eco-brick campaign by making eco-bricks as a part of their class assignment/ and submitted to me (Fig. 5a-d). The concept of eco-bricks was also deliberated to the volunteers of an NGO, called Green Brigade from Bishnupur District. This way, the members of Parayavaran Sanrakshan Gatividhi, Manipur have been consistently raising awareness about eco-bricks and consequently, people of Manipur will be increasinglyawaked/ sensitized about eco-bricks to manage plastic waste at domestic level.

Fig. 3. [a-d]. Uses/ applications of eco-bricks: tree guard; furniture; wall fencing; house construction

Fig 4 [a-d]. Eco-brick competition held on 27th February, 2021 at Welfare Club, Sagolband Tera Amudon Akham Leikai (Manipur)

Fig. 5. [a-d] College students from Manipur making Eco-bricks, as part of their class assignment
CONCLUSION
Realizing the profound effects/impacts of plastics on our environment and living organisms, it’s urgently needed to end up the menace of plastic pollution. Eco-brick is one of the simplest and easiest methods/techniques by which plastic waste/pollution could be managed effectively at individual/household level. Every individual (young/old) in different walks of life can make eco-bricks to be used in construction purposes. Eco-bricks not only help in ensuring a clean and healthy environment, but also save our economy. It has been estimated that for each 1 kg of eco-bricked plastic, 3.1 kg of CO₂ can be saved. So, let’s all start making eco-bricks to lead a plastic-free environment.

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REFERENCES


