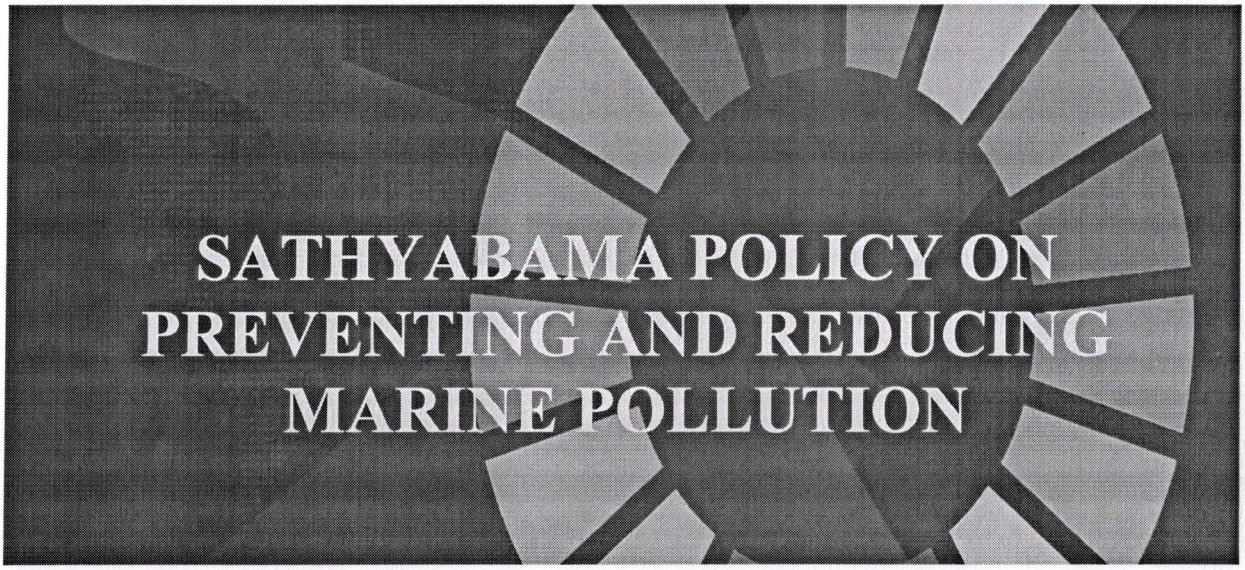
SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited "A" Grade by NAAC | 12B Status by UGC | Approved by AICTE

www.sathyabama.ac.in



SIST

JUSTICE PEACE REVOLUTION

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

DEEMED UNIVERSITY

THE GLOBAL GOALS

CENTRE FOR OCEAN RESEARCH

COR

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

19/8/22

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

SATHYABAMA POLICY ON PREVENTING AND REDUCING MARINE POLLUTION

TABLE OF CONTENTS

Editorial Team

- **Dr T Sasipraba,** Vice Chancellor
- **Dr B Sheela Rani,** Director - Research
- **Dr. D. Inbakandan,** Scientist E, Centre for Ocean Research
- **Dr. S.S. Dawn,** Scientist E, Centre for Waste Management
- **Dr. S. Prakash,** Scientist C, Centre for Climate Changes
- **Dr. Amit Kumar,** Scientist C, Centre for Climate Changes
- **Dr. Thanga Suja**, Scientist C, Centre for Climate Changes
- **Dr. K Nagamani,** Scientist C, Centre for Remote Sensing and Geoinformatics
- **Dr. Mary Kutty Abraham,** Scientist E, Centre for Remote Sensing and Geoinformatics
- **Dr A Chitra Devi,** Associate Professor, School of Management Studies
- **Dr Preethi Sheshadri**, Associate Professor, School of Management Studies

19/8/22

SCIENCE AND TECHNOLOGY * SATHYABAMA INSTITUTE OF

SATHYABAMA
POLICY ON PREVENTING AND REDUCING MARINE POLLUTION

1 PREAMBLE

We live on a blue planet, with oceans and seas covering more than 70 per cent of the Earth's surface. Oceans feed us, regulate our climate, and generate most of the oxygen we breathe. They also serve as the foundation for much of the world's economy, supporting sectors from tourism to fisheries to international shipping. But despite their importance, oceans are facing unprecedented threats as a result of human activity. Every year, an estimated amount of 8 million tonnes of plastic waste end up in the world's oceans. At the same time, climate change is damaging coral reefs and other key ecosystems; overfishing is threatening the stability of fish stocks; nutrient pollution is contributing to the creation of dead zones; and nearly 80 per cent of the world's wastewater is discharged without treatment. India is fortunate to have a vast coastline of more than 8,000 km. Today our oceans face many challenges. Some of these issues include growing levels of plastic pollution, industrial waste, unsustainable fishing, unregulated tourism, and unplanned coastal development. Sathyabama University's mission is focused on actions that will keep our oceans healthy by preventing marine and plastic pollution.

2 GLIMPSES OF LAND BASED POLLUTION

Sathyabama Education, Innovation and Research Policy is always focused towards the SDG targets and planning to bring about the More Sustainable Future, and extensively reduce pollution in the campus and the surrounding premises, every now and then, and plan to continue this movement beyond

13/8/22

SCIENCE AND TECHNOLOGY ★ SATHYABAMA INSTITUTE OF

2030. Prioritizing the prevention of pollutants from their sources, using bans and incentives, outreach and education, and replacement technologies, is one of the most important steps adapted by Sathyabama to shift towards a more sustainable future. By addressing the source of pollution, Sathyabama University plans to diminish the harm of each pollution at present and in future that causes damage to the local water bodies, land run offs, oceans and organisms within. For pollutants that are not currently feasible to reduce at the source, Sathyabama University plans to collect those pollutants before they reach the ocean and be supposed to be prioritized in action in our research policy. Actions at the sink should target areas where the maximum effort per quantity of pollution can be recovered from the ocean. Thus Sathyabama team prompts clean-up responses to large pollution events such as oil spills or flooding events and targets clean-ups at beaches and coastal waters with large accumulations of plastic pollution.

These precedence actions are not the faultless solution, but they are huge examples of what can be and is possibly made to deal with marine pollution. Each act is at threat of fading to change to a cleaner ocean without the support from governments, industries, and individuals across the complete system. Governments and individuals need to drive for legislation that is compulsory and carry sustainable practices and products. Effectual methods for policing also require to be recognized in partnership with the necessary legislation. Regardless of which zones are addressed, Sathyabama University actions on sea and coastal countries must be guided by indigenous knowledge and science. Sathyabama University is acquainted with the foremost worldwide disruptions which have occurred in 2020, particularly the COVID-19 pandemic and lockdown measures.

19/8/22

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

The futures presented here were developed prior to this outbreak and therefore do not consider the effects of this situation on global pollution trends. In many ways, this situation allows us to consider a 'reset' in global trajectory. Thus Sathyabama University's sustainable future scenario may be considered a very genuine target to accomplish in the coming decade.

3 ACTION MEASURES TOWARDS LAND BASED POLLUTION AT UNIVERSITY

Sathyabama University works with governments, businesses, other institutes and universities and civil society groups nationally and globally to promote the protection and sustainable management of our precious marine and coastal environments. By doing this Sathyabama University supports the achievement of the 2030 Sustainable Development Agenda, particularly Goal 14, Life below Water. Through Sathyabama University research team, we identified that the municipal, industrial and agricultural wastes and run-off account for as much as 80 percent of all marine pollution. Sewage and wastewater, persistent organic pollutants (including pesticides), heavy metals, oils, nutrients and sediments - whether brought by rivers or discharged directly into coastal waters - take a severe toll on human health and well-being as well as on coastal ecosystems.

The result is more carcinogens in seafood, more closed beaches, more red tides, and more beached carcasses of seabirds, fish and even marine mammals. Thus Sathyabama University executes a mitigating action plan to address this local marine pollution with the Center for Ocean Research with the support of MoES-Earth Science Technology Cell. Apart from that Sathyabama University's NSS team and Eco-Club is volunteering in beach clean ups every now and then.

19/8/22

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

4 FRAMEWORK OF SATHYABAMA POLICY TO ADDRESS MARINE POLLUTION

The framework of Sathyabama policy on preventing and reducing marine pollution is designed for the protection of the marine environment from land-based activities based on the global intergovernmental mechanism directly addressing the connectivity between terrestrial, freshwater, coastal, and marine ecosystems. Our policy is also designed to address the accelerating degradation of India's large ocean and coastal areas and aims to be a source of conceptual and practical guidance to be drawn upon by national and regional authorities for implementing sustained action to prevent, reduce, control, and eliminate marine degradation from land-based activities. Thus Sathyabama University focuses on three main source categories of land-based pollution, namely marine litter, nutrient, and wastewater pollution.

4.1 Marine Litter

The uninterrupted expansion in the amount of solid waste that ends up in the environment and the time-consuming rate of degradation of most items once in the ocean are together, leading to a gradual increase in marine litter found at sea, on the seafloor, and coastal shores. It has become an economic, environmental, human health, and aesthetic problem posing a complex and multi-dimensional challenge. In the global context, marine litter – especially marine plastic - has become a priority area. More than 335 million tonnes of plastic were produced globally, of which only a very small percentage is recycled. It is estimated that an average of 8 million tonnes of plastic finds its way into the world's oceans each year, costing a minimum of USD 8 billion per year in environmental damage to marine ecosystems.

19/8/22

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

This includes financial losses incurred by fisheries and tourism as well as time spent cleaning up beaches. The most significant downstream impact is on marine ecosystems. Once in the ocean, plastic does not go away: it fragments, eventually breaking down into small pieces known as microplastics, which may contain or absorb chemicals such as persistent organic pollutants that may be transferred into the food chain upon ingestion by marine organisms. Transported by ocean currents, few places around the globe have not been infested by this material.

The situation is likely to get worse unless there is improved management of solid waste and other land and marine-based sources and activities, including prevention, reduction, and control. Projections over the next 10 years show an increase in 40% of plastic production. Upstream action about production reduction and redesign of products is essential, which must be guided by life cycle analyses for targeted interventions.

4.2 Nutrients

There are growing concerns that the levels of reactive forms of nitrogen and phosphorus, collectively termed 'nutrients,' from excessive fertilizer and livestock waste runoff, wastewater and industrial emissions that leak to the environment are beyond the regenerative capacity of the earth's ecosystems, notably freshwater ecosystems and the marine environment. This means that these ecosystems may no longer be able to absorb these nutrients without a severe, detrimental effect on ecosystem functioning and resilience. Phosphorus transport from agricultural land via rivers and the release of phosphorus-rich animal and human wastewater into the environment have degraded lakes, rivers, reservoirs, and coastal waters, causing considerable damages. In the case of nitrogen, a substantial amount of nitrogen entering agricultural soils, both by

13/8/22

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

fertilization and biological fixation, is lost through surface run-off, leaching into groundwater and emissions in the atmosphere.

Nitrogen-based fertilizers are also the source of gaseous reactive nitrogen emissions. Globally, synthetic fertilizer and crops account for 12% of total ammonia emission, and FAO predictions indicate that global nitrous oxide (N2O) emissions from fertilizers will increase to between 35 and 60% by 2030. One of the main impacts of nutrients is eutrophication, causing excessive plant growth and resulting in a depletion of oxygen in the water.

4.3 Wastewater

Wastewater is commonly defined as a combination of domestic effluents such as blackwater – excreta, urine, and faecal sludge – and greywater – kitchen and bathing wastewater, as well as water from commercial establishments and institutions including hospitals. Industrial effluents, stormwater, and other urban run-offs, as well as agricultural, horticultural, and aquaculture effluents, are also considered wastewater.

Wastewater is almost entirely composed of water (99 percent) and suspended, colloidal, and dissolved solids (1 percent). Untreated wastewater usually contains a large volume of waterborne pathogens that are harmful to human health and the environment. It also contains different nutrients including phosphorus, nitrogen, and potassium: while a certain amount of nutrients is helpful for the growth of aquatic plants, an excessive amount could favor algae bloom and the decay, thus paving the way for the birth of "dead zones" and lead to the depletion of oxygen in watercourses, with consequent negative effects for the environment. Also, an excess of nitrogen may have detrimental consequences on human health, especially in low and middle-income countries,

where rural communities rely on local water bodies for drinking purposes. The excess of nitrate, the soluble form of nitrogen, found in high concentration in drinking water may cause various diseases, including infant methemoglobinemia.

5 OTHER MAIN REASONS TO ADDRESS LAND-BASED POLLUTION

5.1 Microplastics

Recent studies also acknowledge the increasing amount of emerging pollutants present in wastewater, including pharmaceuticals, personal care products, additives, and pesticides, and recognize the harm that these chemicals have on human health. Another major trend occurring is the increasing amount of microplastics found in wastewater that is subsequently released in the aquatic ecosystems.

Wastewater is an important factor in the distribution of microplastics: between 80 percent and 90 percent of the plastic particles contained in wastewater, persist in the sludge. Therefore, microplastics can be found in the sludge used as fertilizers, as well as in the aquatic ecosystems after wastewater is discharged into the environment.

5.2 Coral reefs

Coral reefs are particularly vulnerable to wastewater and nutrient pollution, which consequently threatens the health and well-being of hundreds of millions of people who depend on coral reef ecosystem services for nutrition, livelihoods, and a safe living environment. With the influences of ocean

13/8/22

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

warming and coral bleaching impacts, wastewater pollution constitutes a significant threat that must be addressed with urgency.

5.3 Waste water - Reuse

As only 3 percent of all the water on our planet is freshwater and just one percent is available for drinking purposes, it is paramount to maximize the use of wastewater and low-quality waters, particularly in water scarcity-prone areas. Wastewater is conventionally seen as a liability instead of a renewable resource in the hydrological cycle. However, once it is used, it can be reused again. If properly managed, wastewater can also help address other challenges, including water scarcity, groundwater recharge, biogas production, and the creation of green jobs. Managing sanitation and wastewater sustainably allows us to minimize the depletion of water resources, avoid environmental degradation, and protect human health.

6 2030 - SATHYABAMA POLICY ON PREVENTING AND REDUCING MARINE POLLUTION MANDATES

- **To address land-based pollution**

  Sathyabama University protects the marine environment from the harmful effects of human activities on land through education, innovation, research and awareness campaigns

- **To work with regional seas**

  Sathyabama University encourage national and international researchers to work together to protect and sustainably manage their marine and coastal environments

13/8/22

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

- **To protect coral reefs**

  Sathyabama University works to protect the Indian coral reefs and marine parks from the effects of climate change and other human activity through research and awareness campaigns

- **To promote marine protected areas**

  Sathyabama University supports and educates the students and local population about the protected areas to conserve, manage and to utilize marine resources sustainably

- **To fight and work for clean ocean**

  Sathyabama University supports coastal cleanup campaigns and works with society to highlight the problem of marine litter and tackle it decisively

19/8/22

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY