Future Agriculture e-magazine

E-ISSN: 3048-4553 (Online) https://futureagriculture.co.in/

Article Id: FA-14 **ISSUE- October, 2025 | Issue-2 pp. 38-42**

Saving the Dugong: Protecting our gentle Marine mammal

Rajan Dinesh

Ph.D. Scholar, ICAR - Central Institute of Fisheries Education, Mumbai – 400061

Corresponding Author Email: *dineshcife1210@gmail.com*

Abstract

The dugong, a vulnerable marine mammal, plays a vital role in maintaining healthy seagrass ecosystems. Threatened by habitat loss, pollution, fishing activities, and poaching, its population continues to decline. Conservation efforts, legal protection, habitat restoration, and community engagement are crucial for its survival. Public awareness and sustainable practices can make a significant impact in preserving this species for future generations.

Keywords: *Dugong, Seagrass, Conservation, Marine Ecosystem, Habitat Loss.*

Received Date: *25/10/2025* ***Revised Date:*** *03/11/2025* ***Accepted Date:10****/11/2025*

1. Introduction

The dugong

The dugong (*Dugong dugon*) is a large, slow-swimming marine mammal known for its gentle nature and plant-based diet, earning it the nickname "sea cow." It is the only living species in the Dugongidae family and one of the few herbivorous marine mammals. Dugongs typically grow up to 3 meters in length and weigh over 400 kilograms. With a lifespan of up to 70 years, they reproduce slowly females give birth to a single calf once every 3 to 7 years, making population recovery difficult after decline. Dugongs are distributed across the coastal waters of more than 40 countries in the Indo-Pacific region, particularly in warm, shallow seas rich in seagrass.

Importance of dugongs to marine ecosystems

Dugongs play a vital role in maintaining healthy marine ecosystems through their grazing habits. Their primary food source is seagrass, which they feed on by uprooting entire plants, stimulating new growth and maintaining the biodiversity of seagrass beds. These meadows are essential breeding and feeding grounds for many marine species such as fish, crustaceans, and sea turtles. Dugong grazing prevents the overgrowth of algae, maintains water clarity, and promotes nutrient cycling. Healthy seagrass beds also act as powerful carbon sinks, storing up to 83,000 metric tons of carbon per square kilometer, which contributes to climate regulation. A decline in dugong numbers often leads to seagrass degradation, resulting in reduced marine biodiversity and weaker coastal resilience.

2. The Dugong: A Gentle Marine Mammal

Physical characteristics and behavior

The dugong is a robust marine mammal with a fusiform body, paddle-like forelimbs, and a fluked tail similar to that of a dolphin. Adults typically measure between 2.5 to 3.3 meters in length and weigh 250 to 500 kilograms. Their thick, smooth skin is grayish-brown, and they possess downward-facing snouts adapted for grazing on the seafloor. Dugongs are known for their calm and shy demeanor, often traveling alone or in small groups. They are slow swimmers, reaching speeds of up to 10 km/h, and can hold their breath for up to 6 minutes while foraging. Vocal communication involves chirps and whistles, particularly between mothers and calves.

Natural habitat and geographical distribution

Dugongs inhabit shallow coastal waters, bays, lagoons, and estuaries with abundant seagrass meadows. Their range spans more than 40 countries, including regions in the Red Sea, the western Pacific Ocean, and the eastern coast of Africa. Large populations are found around northern Australia and the Arabian Gulf. They prefer water depths less than 10 meters but can dive to over 30 meters when feeding. Their movement is closely tied to seagrass availability, salinity, and water temperature.

Role in the marine environment (e.g., seagrass health)

Dugongs are essential ecosystem engineers in seagrass habitats. Their grazing behavior stimulates seagrass growth by trimming the plants and allowing light to penetrate, which encourages photosynthesis and nutrient cycling. A single dugong can consume up to 40 kilograms of seagrass daily. This process reduces sediment build-up and supports biodiversity by maintaining suitable habitats for fish, invertebrates, and turtles. Healthy seagrass beds also act as carbon sinks, storing up to 18% of the ocean's carbon despite covering less than 0.2% of the seafloor. Dugong presence is often an indicator of a thriving coastal ecosystem.

Seagrass

3. Threats to Dugong Survival

Habitat destruction (coastal development, seagrass degradation)

Rapid coastal development has led to large-scale destruction of seagrass meadows, the primary food source for dugongs. Construction of ports, tourism facilities, and urban infrastructure causes habitat fragmentation and increased sedimentation, which smothers seagrass beds. Studies show that over 29% of global seagrass meadows have already disappeared, with a loss rate of 1.5% annually. Dredging and land reclamation reduce water clarity, impacting seagrass photosynthesis and reducing suitable feeding grounds for dugongs.

Human-related dangers (fishing nets, boat collisions)

Dugongs often fall victim to bycatch,

getting entangled in gillnets and trawl nets used for commercial and artisanal fishing. Accidental captures are among the leading causes of dugong mortality. A single gillnet incident can lead to the death of multiple dugongs due to their need to surface frequently for air. Fast-moving boats in shallow waters also pose a severe threat; collisions can cause blunt force trauma or death. Areas with high boat traffic report increased dugong injuries and strandings.

Pollution and climate change

Marine pollution, particularly from plastic debris, oil spills, and agricultural runoff, damages seagrass ecosystems and introduces toxins into the food chain. Eutrophication caused by excessive nutrients leads to algal blooms, which block sunlight and suffocate seagrass beds. Rising sea temperatures and ocean acidification due to climate change further threaten seagrass growth and distribution. According to the IPCC, warming oceans could result in a 90% decline in tropical seagrass cover by 2100, severely impacting dugong survival.

Illegal hunting and poaching

Despite being legally protected under several international agreements, dugongs are still hunted in some regions for their meat, oil, and bones. Traditional practices and black-market demand contribute to poaching, especially in remote coastal communities. Dugong meat can fetch high prices, encouraging illegal captures. Lack of enforcement and limited patrolling in marine protected areas makes these populations vulnerable to exploitation.

Table: Threats to Dugong Survival

Threat Category	Description	Impact on Dugongs
Habitat Destruction	Caused by coastal development, dredging, and sedimentation.	Loss of seagrass meadows reduces food sources and safe habitats.
Fishing Activities	Bycatch in gillnets and trawl nets, accidental entanglement.	Major cause of injury and death; dugongs cannot surface for air once trapped.
Boat Collisions	Increasing marine traffic in shallow waters.	Leads to severe injuries or fatalities from blunt trauma.
Pollution	Runoff, oil spills, plastic waste, and heavy metals in water.	Degrades seagrass beds and introduces toxins into dugong food chains.
Climate Change	Rising sea temperatures and ocean acidification.	Reduces seagrass distribution and quality; alters dugong migration and feeding areas.
Illegal Hunting and Poaching	Driven by demand for meat, oil, and traditional use.	Directly reduces populations, especially in regions with weak enforcement.

4. What We Can Do to Help

Supporting conservation organizations

Conservation groups such as the Dugong and Seagrass Conservation Project, WWF, and the Marine Mammal Center play a crucial role in research, habitat protection, and policy advocacy. Donations and volunteer efforts support field surveys, satellite tracking, and seagrass restoration. Over 3,000 dugong-related conservation actions have been documented through international NGO partnerships across the Indo-Pacific region.

Advocating for marine protection policies

Public pressure on governments to enforce stricter marine regulations can lead to stronger dugong protection laws. Supporting the creation of no-fishing zones and the enforcement of speed limits in shallow waters helps reduce bycatch and boat strikes. Areas with active marine policies show up to 40% fewer dugong strandings and deaths compared to unregulated zones.

Reducing pollution and sustainable tourism

Using eco-friendly products, minimizing plastic waste, and supporting clean coastal initiatives directly improve dugong habitats. Over 8 million tons of plastic enter oceans annually, threatening marine life. Sustainable tourism practices, such as regulated dugong-watching tours and waste-free travel, contribute to habitat conservation. Locations with eco-tourism guidelines report increased dugong sightings and reduced stress behaviors in marine wildlife.

Raising awareness through education and media

Media campaigns, documentaries, and school programs have significantly improved public knowledge of dugong conservation. Awareness projects like the "Dugong Diaries" and "Seagrass Watch" have reached millions, especially in coastal communities.

Education-based conservation has led to a 25% rise in local participation in dugong protection initiatives, demonstrating the power of informed communities in saving endangered species.

Conclusion

Protecting dugongs is vital for marine biodiversity and ecosystem health. Urgent conservation, community action, and global awareness are essential to ensure the survival of this gentle marine mammal.

References

Amri, A. Y., Sim, J. O. L., Moi, P. S., Hussin, A. H., Rosman, F. R., & Fauzi, R. (2005). Dugongs In Peril: The Conservation and Protection of Dugongs in Johor, Malaysia.

Andriansyah, M. (2023). Marine Conservation Analysis Of Dugong Life Habitat Ecosystem: Marine Conservation Analysis Of Dugong Life Habitat Ecosystem. *Journal of Oceanography and Aquatic Science*, *1*(2), 37-41.

Boyd, I. L., Bowen, W. D., & Iverson, S. J. (Eds.). (2010). *Marine mammal ecology and conservation: a handbook of techniques*. Oxford University Press.

Dudhat, S., Pande, A., Nair, A., Mondal, I., Srinivasan, M., & Sivakumar, K. (2022). Spatio-temporal analysis identifies marine mammal stranding hotspots along the Indian coastline. *Scientific Reports*, *12*(1), 4128.

Gales, N., Woods, R., & Vogelnest, L. (2008). Marine mammal strandings and the role of the veterinarian. *Medicine of*

Australian Mammals; Vogelnest, L., Woods, R., Eds.

Hines, E., Adulyanukosol, K., Poochaviranon, S., Somany, P., Ath, L. S., Cox, N., ... & Solanki, P. (2012). Dugongs in Asia. *Sirenian Conservation. University Press of Gainesville, Florida, USA*, 58-76.

Islam, M. Z. (2024). Ocean wildlife and megafauna protection. In *The Blue Book: Smart sustainable coastal cities and blue growth strategies for marine and maritime environments* (pp. 15-33). Cham: Springer International Publishing.

Jefferson, T. A., Webber, M. A., & Pitman, R. L. (2011). *Marine mammals of the world: a comprehensive guide to their identification*. Elsevier.

Kuppusamy, S. (2022). Conservation Perspectives of Dugongs and Sea Turtles in Andaman and Nicobar Islands. In *Faunal Ecology and Conservation of the Great Nicobar Biosphere Reserve* (pp. 357-373). Singapore: Springer Nature Singapore.

Marsh, H., O'Shea, T. J., & Reynolds, J. E. (2011). *Ecology and conservation of the Sirenia: dugongs and manatees* (No. 18). Cambridge University Press.

Moore, A. M., Ambo-Rappe, R., & Ali, Y. (2017). "The lost princess (putri duyung)" of the small islands: Dugongs around Sulawesi in the anthropocene. *Frontiers in Marine Science*, *4*, 284.

Woods, R., Ladds, P., & Blyde, D. (2008). 19. Dugongs. In *Medicine of Australian Mammals* (pp. 615-629). CSIRO Publishing.