



Conservation and Management of Coral Reefs, South-Eastern India:
SDMRI's strategies, actions and contributions since 2000



37th International Coral Reef Initiative (ICRI) General Meeting
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By

Suganthi Devadason Marine Research Institute
44-Beach Road, Tuticorin - 628 001
Tamil Nadu, India

<http://www.sdmri.in>



Established in April 1998, Suganthi Devadason Marine Research Institute (SDMRI) is the first institution in the non-Governmental sector in India to offer Research and Higher Education in the discipline of Marine Science.

Ph.D. program in Marine Science, since 2000 (affiliated to Manonmaniam Sundaranar University, Govt. of Tamil Nadu)

SCUBA diving - PADI Open Water and Advanced Open Water courses, since 2010

Objectives

- i) to identify and fulfill the research needs of marine and coastal ecosystems in India;
- i) to promote higher education in marine science;
- i) to encourage and enhance societal involvement in marine resource conservation; and
- i) to assist the coastal communities in improving their social conditions and alleviating their economic hardships.



Broad Research Areas

Conservation and Management

Integrated Environmental Impact Assessment and Monitoring

Coastal Pollution - Marine litter and microplastics

Marine Geology

Resource utilization and value addition

Awareness creation and capacity building



Research on Coral Reef Ecosystem

Survey and assessment

Monitoring

Rehabilitation

Climate change impacts

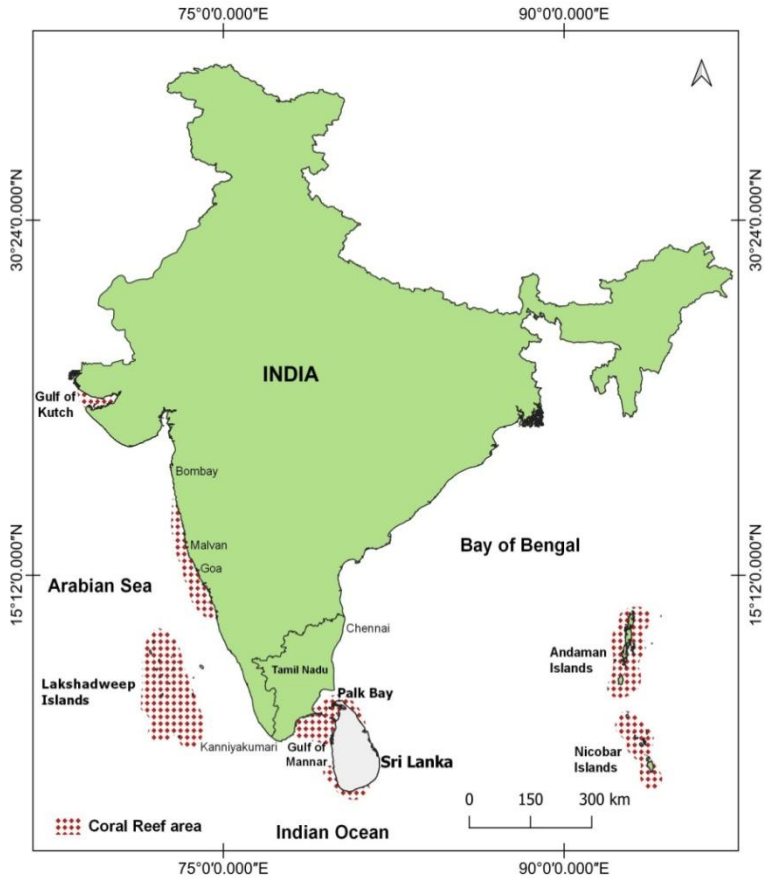
Coral diseases

Reef fishes

Reproduction

Threats - bleaching, bio-invasion, algal bloom, pollution, ghost nets etc.



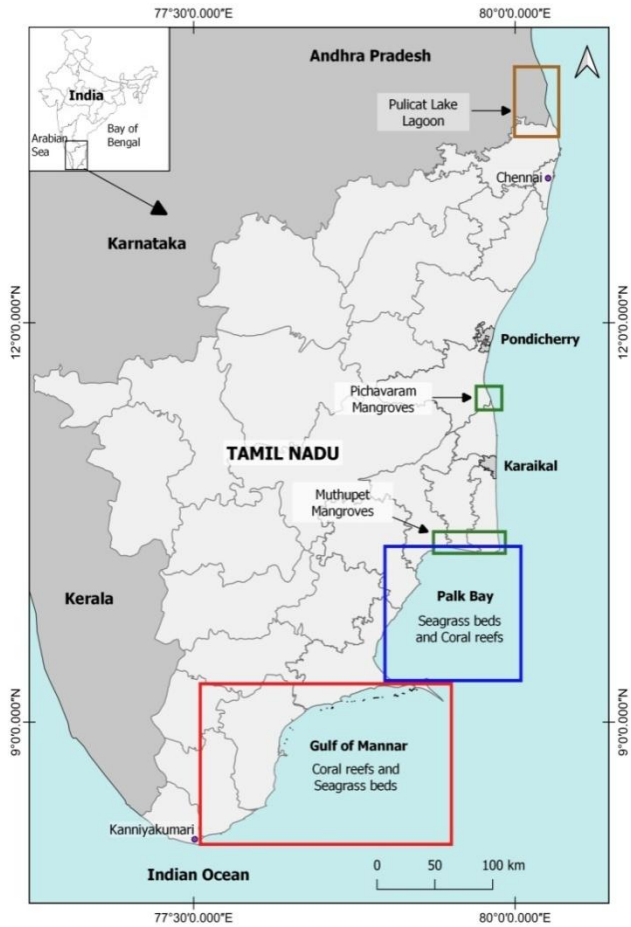


Coral reefs in India

Major coral reef ecosystems are 1) **Gulf of Mannar**, 2) Gulf of Kachchh, 3) Andaman and Nicobar Islands and 4) Lakshadweep Islands

Reef area - 2383.87 sq.km (Source: Compiled from Space Application Centre, 2010)





Tamil Nadu

Coastal length - 1076 km

Coastal Zones - Coromandel Coast, Palk Bay, Gulf of Mannar and West Coast

14 coastal districts

➤800,000 active fishermen

Key coastal habitats - coral reefs, seagrass beds, mangroves, lagoon, estuaries etc.



Gulf of Mannar

Marine National Park, declared in 1986 (21 islands and the surrounding shallow coastal waters, covering an area of 560 sq.km between Rameswaram and Tuticorin)

Biosphere Reserve, declared in 1989 (Between Rameswaram and Kanyakumari, covering 10,500 sq.km)

UNESCO Recognition under MAB, 2002

Ramsar site, 2022

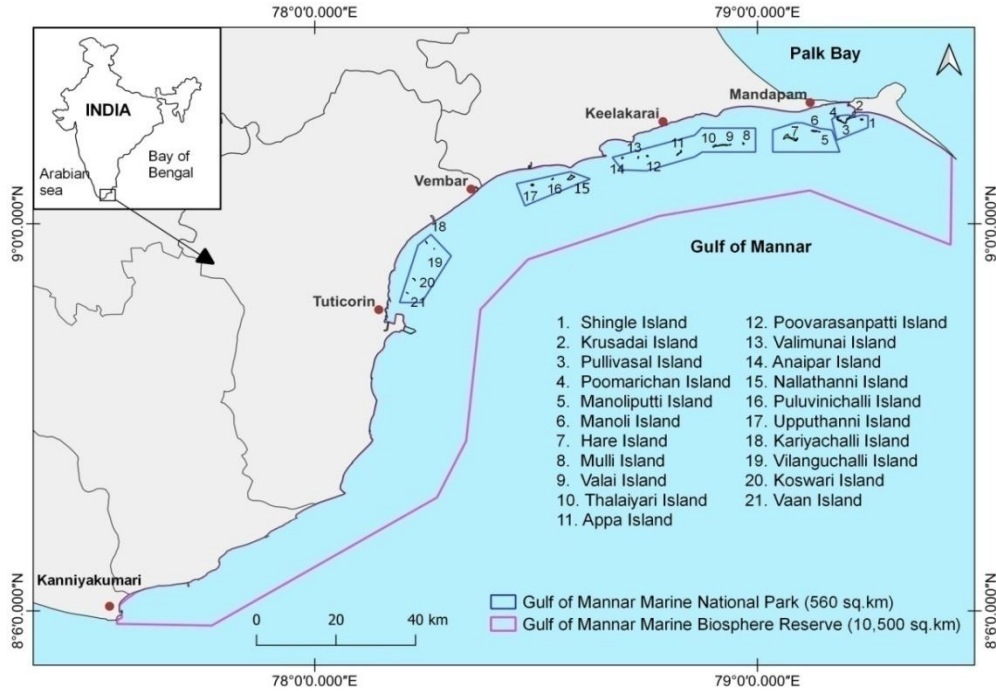
Recorded species - **4,223** (flora - 473 and fauna - 3750)

Key coastal habitats - coral reefs, seagrass beds, and mangroves.

Coral reef area - **6628 hectares**

Coral species - **132** (Common genera - *Acropora*, *Montipora*, *Porites*)

In Marine National Park, **reefs occur around a chain of 21 islands**

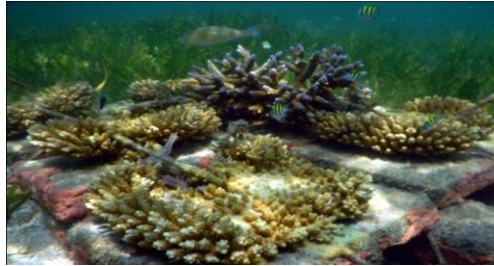


SDMRI - Important Research Contributions

- ✓ Comprehensive baseline and regular monitoring, since 2003
- ✓ Coral rehabilitation , since 2002
- ✓ Seagrass rehabilitation, since 2008
- ✓ Artificial reefs for biodiversity enhancement – since 2003
- ✓ Climate change impacts on coral reefs, since 2005
- ✓ Protection and conservation of coral reefs from ghost nets and bio-invasion, since 2008
- ✓ Protection of fast eroding islands in Marine National Park, Gulf of Mannar, since 2015
- ✓ Integrated environmental impact assessment, since 2003
- ✓ Coral health issues, since 2012
- ✓ Marine litter and microplastics, since 2017
- ✓ Algal blooms, since 2018
- ✓ Offshore reef survey and assessment (upto 40 m), since 2019



Coral rehabilitation





Artificial Reefs (ARs)

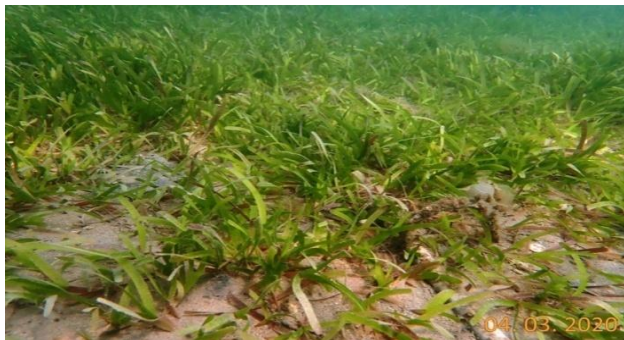
- ✓ fisheries enhancement;
- ✓ Island restoration;
- ✓ coastal conservation;
- ✓ Biodiversity enhancement; and Tourism



Enhancement of Biodiversity (Coral Recruits on AR)



Seagrass rehabilitation



Few recent research articles

Edward, J.K.P., Mathews, G., Diraviya Raj, K., Laju, R.L., Bharath, M.S., Kumar, P.D., Arasamuthu, A., Grimsditch, G. (2019) Marine debris — An emerging threat to the reef areas of Gulf of Mannar, India. **Marine Pollution Bulletin**, <https://doi.org/10.1016/j.marpolbul.2019.110793>.

Diraviya Raj, K., Mathews, G., Obura, D.O., Laju, R.L., Bharath, M.S., Kumar, P.D., Arasamuthu, A., Kumar, T.K.A. and Edward, J.K.P. (2020) Low oxygen levels caused by *Noctiluca scintillans* bloom kills corals in Gulf of Mannar, India. **Scientific Reports**, 10, 22133. <https://doi.org/10.1038/s41598-020-79152-x>

Diraviya Raj, K., Aeby, G.S., Mathews, G., Williams, G.J., Caldwell, J., Laju, R.L., Selva, M.S., Kumar, P.D., Arasamuthu, A., Asir, N.G.G., Wedding, L., Davies, A.J., Moritsch, M. and Patterson Edward, J.K. (2021) Coral reef resilience differs among islands within the Gulf of Mannar, southeast India following successive coral bleaching events. **Coral Reefs**, <https://doi.org/10.1007/s00338-021-02102-0>

Edward, J.K.P, M. Jayanthi, H. Malleshappa, K. Immaculate Jeyasanta, R.L. Laju, Jamila Patterson, K. Diraviya Raj, G. Mathews, A.S. Marimuthu and Gabriel Grimsditch (2021). COVID-19 lockdown improved the health of coastal environment and enhanced the population of reef-fish, **Marine Pollution Bulletin**, <https://doi.org/10.1016/j.marpolbul.2021.112124>.

Emmett J.S., Diraviya Raj, K., Mathews, G. and Laju, R.L. (2021) Opportunistic spongivore fishes in a reef of Gulf of Mannar, India. **Environmental Biology of Fishes**, <https://doi.org/10.1007/s10641-021-01150-3>

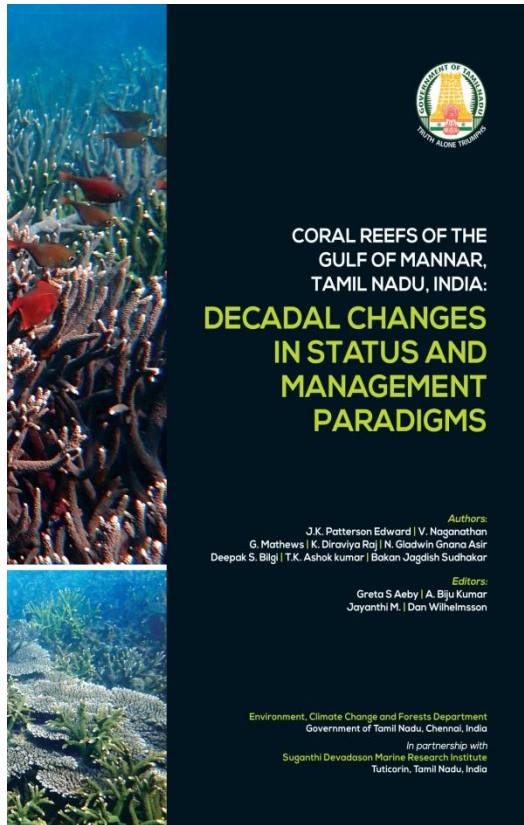
Jamila Patterson, K. Immaculate Jeyasanta, R.L. Laju, Andy M. Booth, Narmatha Sathish and J.K. Patterson Edward (2022). Microplastic in the coral reef environments of the Gulf of Mannar, India – Characteristics, distributions, sources and ecological risks. **Environmental Pollution**, 298 (2022) 118848 <https://doi.org/10.1016/j.envpol.2022.118848>

Mahalakshmi B., Angelo Polisenio, Alvaro Altuna and J. K. Patterson Edward (2023). Description of a new species in the genus *Sarcothelia* Verrill, 1928 (Alcyonacea: Xeniidae) from reefs of Gulf of Mannar, South-eastern India. **Marine Biodiversity** (2023) 53:62, <https://doi.org/10.1007/s12526-023-01362-z>

Arasamuthu, A., Laju, R.L., Raj, K.D., Kumar, T.K.A., Leewis, R.J. & Edward, J.K.P. (2023). Invasive red alga *Kappaphycus alvarezii* on the reefs of the Gulf of Mannar, India—a persistent threat to the corals. **BioInvasions Records**, 12(1): 151-166. <https://doi.org/10.3391/bir.2023.12.1.13>



Recent publication (result of the compilation and analysis of long-term data collected systematically for a period of about two decades (2003-21) with a comprehensive baseline and regular annual monitoring) Published by Environment, Climate Change and Forests Department , Government of Tamil Nadu *in partnership* with SDMRI



Patterson Edward, J.K., Naganathan, V., Mathews, G., Diraviya Raj, K., Gladwin Gnana Asir, N., Deepak S. Bilgi, Ashok Kumar, T.K. & Bakan Jagdish Sudhakar, 2023. Coral reefs of the Gulf of Mannar, Tamil Nadu, India: Decadal changes in status and management paradigms (Greta S. Aebly, Biju Kumar A., Jayanthi M., and Dan Wilhelmsson Eds.). Environment, Climate Change and Forests Department (ECCFD), GoTN in partnership with Suganthi Devadason Marine Research Institute, Tuticorin, India, 356pp.



Acknowledgements



सत्यमेव जयते

Government of India





Thanks