SUPREME AUDIT INSTITUTION OF INDIA
लोकहितार्थ सत्यनिष्ठा
Dedicated to Truth in Public Interest

# GREEN FILES VOLUME-45

January to March 2023

# THEME: BLUE ECONOMY

*Green Files is iCED's quarterly newsletter, featuring glimpses of recent environmental news, events, emerging trends, innovations, initiatives and efforts, of different organisations including the Supreme Audit Institution (SAI) of India. As in every issue we attempt to highlight both the local, and the global, with a special emphasis on environmental issues of SAI India under the aegis of the Comptroller and Auditor General(C&AG) of India. This issue is a special issue focussed on the theme of the "**Blue Economy**" in tandem with the SAI20's focus on this topical area. In keeping with the C&AG of India's vision of harnessing SAI India's decade long experience in conducting environmental audits, iCED is now evolving as a "Centre of Excellence" on the Audit of the Blue Economy.*

*Recently, the First G20 Environment and Climate Sustainability Working Group (ECSWG) meeting which was held in Bengaluru from 9-11 February, 2023, was led by the Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India. In this context, an article on "The First G20 Environment and Climate Sustainability Working Group (ECSWG) Meet" is included. This article highlights the interest and commitment of all G20 nations to constructively work towards the objective of the three priority areas of Arresting Land Degradation, Accelerating Ecosystem Restoration and Enriching Biodiversity; Promoting a Sustainable and Climate Resilient Blue Economy and Encouraging Resource Efficiency and Circular Economy.*

*This edition has highlighted multiple sectors and perspectives in auditing the Blue Economy in India. There are articles titled "Marine Litter in Mumbai and the strategies to reduce it" and "Conservation of Pichavaram Mangroves, the 2nd largest mangrove forest in Coastal Tamil Nadu" to highlight the criticality of reducing marine pollution and conserving Mangroves. We continue some of our earlier features such as a State-Centric article. In this issue we focus on the State of Tamil Nadu with a reference to National Policy on Marine Fisheries (NPMF) 2017, which provides guidance for promoting the 'Blue Growth Initiative', which can help audit planning to map plausible areas for environmental audit.*

*This edition also includes an article on "New Lights in the High Seas- Inking of the "High Seas Treaty, 2023" and "Deep Sea Mining Explorations" which highlights protection of marine biodiversity in the areas outside the national jurisdictions.*

*Snapshots of recent environmental news, key events, and some print media environmental news items and emerging trends are presented in this volume. It is hoped these will act as a corpus of information for environment audits.*

*The newsletter further covers a gist of the trainings/workshops/other activities at iCED and recent happenings in SAI India and INTOSAI WGEA community during the period January- March 2023. To increase environmental awareness among readers, we have continued to feature a Cross Word and some interesting environmental terminologies.*

*As has been the trend in previous editions, we have also showcased selected Audit Reports relating to Blue Economy sectors of both a national and international nature. The audit report on "Cooperative Audit: Are Adequate Mechanisms in place for the designation and effective management of Marine Protected Areas (MPAs) within the Mediterranean Sea?" highlights important findings and conclusions on seven individual national audit reports, which were presented to the respective Parliaments by the Supreme Audit Institutions (SAIs) of Albania, Cyprus, France, Greece, Malta, Portugal and Slovenia during 2018 and 2019.*

*Performance Audit report on Conservation of Coastal Eco-systems (Report no 4 of 2022) of C&AG of India highlights key findings and recommendations pertaining to the evaluation of the effectiveness of the government's policies and programmes for coastal ecosystem conservation.*

*A list of References is included in this newsletter to provide detailed reading material on featured themes. Recently, we have uploaded some useful reference material and case studies on Environmental issues conducted by iCED, Jaipur on iCED web-site. The links to these articles are available in the "Research" section under the title "Occasional Research Paper Series". The iCED website also has links to all iCED research publications, to act as a repository of knowledge and documentation in an ever-evolving and as complexly inter- connected a domain as environment audit and sustainable development issues.*

*On behalf of the entire team of "Green Files" at iCED, we strive to showcase various environmental issues and look forward to your suggestions to make Green Files as informative and user friendly as possible. Your contributions within the broad scope of the newsletter will be highly appreciated, including any feedback you may like to share on the featured articles.*

**SAYANTANI JAFA**

**ADAI and Director General,**
**iCED, Jaipur**

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## SAI INDIA/iCED NEWS

*By: Kailash Bajya, AAO*

### C&AG of India and SAI India's Engagements/Activities/MOU's during January to March, 2023.

1**. The SAI20 Senior Official Meeting (SOM) held at Guwahati, Assam from 13-14 March 2023:-** The first Senior Officials Meeting the Supreme Audit Institutions-20 (SAI20) Engagement Group under India's G20 Presidency was organized in Guwahati (Ministry of Finance, 2023).

*C&AG of India*

Shri Girish Chandra Murmu, the Comptroller and Auditor General (C&AG) of India, chaired the meeting, leading the deliberations. 39 National and International delegates from G20 member SAIs, Guest SAIs, and WB as invited organizations participated in the event (SAO20 Organization, 2023).

In his opening address, the C&AG of India emphasized that the SAI20 Senior Officials Meeting 2023 is a symbol of global cooperation and collective efforts of the Supreme Audit Institutions of the member G20 countries to ensure inclusive development and well-being of all.

The C&AG of India, Shri Girish Chandra Murmu highlighted that the SAI20's priority areas, "Blue Economy" and "Responsible Artificial Intelligence," represent new-age opportunities and concerns that underline the need for genuine cooperation.

He stressed that Blue Economy and Artificial Intelligence were both emerging areas and therefore, Supreme Audit Institutions could not afford to ignore these prominent sectors.

**SAI India's International Centre for Environment Audit and Sustainable Development (iCED), which serves as global training facility, is being established as a Centre of Excellence for the Blue Economy.**


*C&AG of India*
*Image credit: (Millinnium post, 2023)*

The C&AG of India Shri. Girish Chandra Murmu also informed that SAI India's International Centre for Environment Audit and Sustainable Development (iCED), which serves as global training facility, is being established as a Centre of Excellence for the Blue Economy (Ministry of Finance, 2023). The Comptroller and Auditor General of India, Shri Girish Chandra Murmu in his valedictory address as chair for the first Supreme Audit Institutions 20 (SAI20) appreciated the wealth of knowledge gained during the deliberations on the priority areas of Blue Economy and Responsible Artificial Intelligence (All India Radio News, 2023).

Ms. Parveen Mehta, Dy. Comptroller and Auditor General thanked all the International and National delegates for constructive and rewarding discussions as also for their active involvement in all the programs in the SAI20 Senior Official Meeting thereby making the event successful and setting the stage for the SAI20 summit in June, 2023.

**2. SAI20 Engagement Group seminar on "Blue Economy" hosted by the C&AG of India - 27 Feb 2023 at the C&AG office, New Delhi:-**

The Comptroller & Auditor General of India hosted a seminar on the challenges and opportunities in the Blue Economy on 27th February 2023 at the C&AG Office. The seminarwas held in the run-up to the Engagement Group Meet of SAI20 Nations in March 2023, organized as part of the G20 presidency of India (C&AG of India, 2023). Highlighting the importance of the Blue Economy, Shri Girish Chandra Murmu, C&AG


*Seminar on Blue Economy, February 2023*
*Image credit: (SAO20 Organization, 2023)*

of India, stated that the Blue Economy economic system promotes the sustainable use of marine and freshwater resources while conserving their environments.

Shri Girish Chandra Murmu emphasized that the Blue Economy while being intrinsically linked to the Sustainable Development Goal (SDG) 14 - which focuses on conserving and using oceans, seas, and marine resources for sustainable development -- shall also be viewed from a holistic perspective of SDG 13 - Climate Action; SDG 6 - Clean Water; SDG 7- Clean and Renewable Energy.

“The Blue Economy occupies a vital position in India’s economic growth. It could well be the next multiplier of GDP and well-being, provided sustainability and socio-economic welfare are kept at the centre-stage,” said Shri Girish Chandra Murmu.

Shri Girish Chandra Murmu also highlighted that while there were audit criteria and framework for auditing sub-sectors, such as, marine fisheries, coastal eco-system, aquaculture, coastal and marine tourism, bio-technology from marine resources and extraction of sea-bed mineral resources, integrating them into a single auditing framework would be key to all Supreme Audit Institutions, including the SAI20 Engagement group.

Shri Girish Chandra Murmu emphasized that SAIs could strive to scale up their efforts, develop study papers on the condition of the Blue Economy and make recommendations on how the governments could direct their efforts and policies for sustainable development of the Blue Economy of their nations.

Ambassador Rajiv Bhatia, Chair of FICCI’s Task Force on Blue Economy, Mr. Tapas Paul, Lead Environmental Specialist at World Bank, Dr. Purvaja Ramachandran, Director, National Centre for Sustainable Coastal Management, Dr. P Krishnan, Director, Bay of Bengal Project, Prof. S.K Mohanty, Research and Information System for Developing countries and Mr. Avinash Mishra, Advisor, NITI Aayog were the speakers for the event. The G20 Secretariat and other G20 working/engagement groups also attended that seminar.

### 3. 6th Meeting of Heads of SAIs of Shanghai Cooperation Organization (SCO) (6th -7th February 2023) (C&AG of India, 2023)

India currently holds the Shanghai Cooperation Organization (SCO) presidency, which annually rotates among member countries. India's 2023 theme is 'Towards a SECURE SCO''. Shri Girish Chandra Murmu, the Comptroller and Auditor General of India hosted the 6th SCO SAI Leader's Meeting, which started on 6th February 2023 in Lucknow.

Shri. Girish Chandra Murmu, C&AG of India led the discussion on Integrating emerging technologies in audit with a focus on Artificial Intelligence and Cyber-security in the meeting with about 30 delegates from the 8 SCO SAIs of India, Kazakhstan, China, Kyrgyzstan, Pakistan, Russia, Tajikistan and Uzbekistan and SCO Secretariat.

***MoUs signed with Tajikistan, Kazakhstan to strengthen cooperation, and exchange of expertise in field of auditing.*** *Image Credit: - (ANI, 2023)*

### 4. MOUs with SAI Tajikistan and SAI Kazakhstan, on 6th February 2023 (ANI, 2023)

The C&AG of India Signed MOUs (CAG of India, 2023) with SAI Tajikistan and SAI Kazakhstan, on 6th February 2023 on the sidelines of the Shanghai Cooperation Organization Supreme Audit Institutions (SCO SAI) Leaders' meeting in Lucknow (C&AG of India, 2023). The agreements were made with the aim of strengthening cooperation and exchange of expertise between the two nations in the field of auditing.

The MoU with SAI Tajikistan was signed with Mr Karakhon Chillazoda, Chairman, Accounts Chamber of the Republic of Tajikistan and the MoU with Kazakhstan was signed with the Chairperson of the Supreme Audit Chamber of the Republic of Kazakhstan, Ms. Natalya Godunova.

## Overview- Training Programmes

During the period January-March 2023, iCED has conducted 01 International Training Programme on "Audit of Extractive Industries" (INTOSAI WGEI), 01 International Workshop on "Climate Change Mitigation and Adaptation Strategies including Green Finance" (INTOSAI

WGEA), 01 e-ITEC Training Programme on "Environment Audit" and 03 National Training Programmes at iCED Jaipur. Details of the Training Programmes/Workshops conducted during the period from January to March 2023 are summarized below.

**International Training Programme on "Audit of Extractive Industries" (INTOSAI WGEI)**

*Presentation by the participants*

*3rd International training programme on "Audit of Extractive Industries"*

International Centre for Environment Audit & Sustainable Development (iCED), as the Global Training Facility (GTF) of INTOSAI Working Group on Audit of Extractive Industries (WGEI), organized the 3rd International Training Programme on "Audit of Extractive Industries" from 27th February to 11th March 2023 at its campus in Jaipur. A total of 14 participants representing 08 SAIs (including SAI India) attended the program in person, while 08 participants from SAI Uganda participated virtually in some part of this programme.

The session on Group assignment was chaired by Ms. Sayantani Jafa, ADAI & DG, iCED and Dr. Nanda Dulal Das, Director (Training & Research), iCED (SAI INDIA) & Mr Robert Muhumuza (SAI Uganda and facilitator from INTOSAI WGEI) moderated the presentations given by all the four groups during the pre-valedictory session.

## Valediction of the 3rd International Training Programme

Ms. Sayantani Jafa, ADAI and DG, iCED graced the valedictory session. Further, she distributed participation certificates and mementos to all the participants. She congratulated the participants and thanked all the SAIs for nominating participants and faculties for this programme.

Dr. Nanda Dulal Das, Director (Training & Research), iCED in the valedictory session of the training programme thanked on behalf of iCED, Jaipur the Comptroller and Auditor General of India, Shri Girish Chandra Murmu, the Chair of INTOSAI WGEI, Mr John F. S. Muwanga and the ADAI & DG (iCED) for supporting this endeavour.

## Striving for Excellence- Feedback from our ITP participants

*"The Training Centre is good. The method of teaching is good and the faculties communicated the information to the participants in a very easy manner. It was a very interesting training programme which covered all aspects and added new knowledge to me".*

Mr. Balal Elkhair Mustafa Mohamed, Participant from SAI Sudan

Mr. Muhammad Adel Abdulhakeem Muhammad, Participant from SAI Egypt

*"Thanks to the iCED team, from the top Director to the security man at the gate".*

*"Well managed, all through. The sessions were well designed with an appropriate selection of faculties to invigorate insights into areas where the environment coexists and plays an important role during our regular audits".*

Mr. Omnkar
Participant from SAI India

*"The Training Programme was exceptional and the faculties were very good and with a wealth of experience delivered the lectures. The Training has opened my understanding of the Extractive Industries sector and the knowledge learnt will go a long way in my audit work. The local excursion was on point especially the Light & Sound Show, at Amer Fort, Jaipur. The study on campus was very good. The staff were very hospitable and responded to our needs promptly. Keep up the Good Work".*

**Mr. Abdirahim Ali Maalim,**
**Participant from SAI Kenya**

**Mr. Robert Muhumuza,**
**Faculty from SAI Uganda**

*"I have enjoyed my stay at iCED. The sessions were very informative and relatable. There are so many sessions for me to take with me when I go back home (SAI Uganda), especially in the areas of Audits to which we have not given much attention. I appreciate the programme and organization including the excursions. This breaks the monotony and enhances the participant experience in India"*

*"The sessions are excellent. The sessions are very relevant to my field of auditing in SAI Nigeria. The excursions are wonderful and historic experiences for a lifetime, especially The Amer Fort. Stay at iCED is very good and it was convenient. The course schedule is okay and the day timings are well utilized. The continental meal provided at iCED was good. The duration of the programme is okay".*

**Ms. Hassana Adamu Fika**
**Participant from SAI Nigeria**

*"I would like to take this opportunity to thank iCED for the wonderful organisation and very informative and useful training programme. It's my pleasure to attend this training program. It added value to my knowledge and expand my career experience by sharing the knowledge among the participants. iCED is a very clean and nice place for me. I wish iCED continue to maintain the same performance and I wish to attend and meet all my friends and participants in the next training programmes. Thanks again for all your support and assistance".*

**Mr. Ahmad Mohammed A S AL- Abdulla**
**Participant from SAI Qatar**

## International Workshop on "Climate Change Mitigation and Adaptation Strategies including Green Finance" (INTOSAI WGEA)

*International Workshop on "Climate Change Mitigation and Adaptation Strategies including Green Finance" (13th to 17th February 2023)*

International Centre for Environment Audit & Sustainable Development (iCED), as the Global Training Facility (GTF) of INTOSAI Working Group on Environmental Auditing (WGEA) organized International Workshop on "Climate Change Mitigation and Adaptation Strategies including Green Finance" from 13th to 17th February 2023 at its campus in Jaipur. A total of 16 participants from 11 SAIs participated in this workshop.

Ms Sayantani Jafa, (ADAI & DG, iCED) while commencing the workshop, briefed the participants about the role of iCED in the SAI India and the training programmes conducted at iCED so far. She also stated that

achieving carbon neutrality by the mid-21st century is essential in order to limit global warming to 1.5 degrees Celsius, which the Intergovernmental Panel on Climate Change (IPCC) suggests as safe.

**Valediction of the International Workshop-** Ms. Sayantani Jafa, ADAI and DG, iCED graced the valedictory session of the International Workshop. Ms Jafa congratulated all the participants for successfully achieving the goals of this workshop.

*Presentation of Certificates to the participants.*

She expressed her gratitude to INTOSAI WGEA Finland for their support in this endeavour and thanked European Court of Auditors (ECA) and BPK Indonesia for nominating the resource persons for sharing their experiences with participants.

*Ms Sayantani Jafa, ADAI & Director General, iCED addressing the participants during valediction.*

**Feedback from our Workshop participants**

Mr Rafael Lopes Torres, Participant, SAI Brazil

The stay at campus was excellent. The campus is very pleasant, the accommodation was comfortable and the staff is very attentive.

The campus is very welcoming and it has been a very good stay. The staff have been friendly and helpful, thank you. The local excursions were interesting and appreciated. It was especially appreciated that the organises were flexible and open to making changes to the excursions hosted on the participants' interests. The support and guidance from the staff while on the excursions were very appreciated. The leaving experience was also positive. The best sessions were those that look at the topic from an audit perspective and asked the participants to work in groups. Over all I thank SAI India for hosting and providing the opportunity to attend on an Important topic

Ms Corinne Horton, Participant, SAI Australia

**E-ITEC Course**: -

International Centre for Environment Audit and Sustainable Development (iCED), Jaipur conducted Indian Technical & Economic cooperation programme (ITEC) on "Environment Audit" from 6th to 10th March 2023. A total 38 participants from 17 countries across the globe, participated

in the programme through virtual mode. During the inaugural session of the training programme, on 6th June 2023, Dr Nanda Dulal Das, Director (Training & Research), iCED welcomed ADAI & DG, iCED, Ms. Sayantani Jafa, the participants and the guest faculty.

Ms Sayantani Jafa, ADAI & DG, iCED welcomed all the participants and also thanked the Ministry of External Affairs for sponsoring the programme. The programme saw an active interaction between faculties and participants, cutting across the boundaries of space and time zones. During the valedictory session on 10th March 2023. She also mentioned that sharing of experiences and perspectives during the training program would suitably equip the participants to take the learning process forward. She also encouraged the participants to share with iCED the results of works undertaken by the participants, if any, in their respective countries.

## National Training Programme on "Environmental Issues in Sustainable Cities, Government Establishment and Public Sector Enterprises including Indian Railways with focus on SDGs"

International Centre for Environment Audit & Sustainable Development (iCED), organized National Training Programme on "**Environmental Issues in Sustainable Cities, Govt. Establishment and PSEs including Indian Railways with focus on SDGs"** from 16th to 20th January, 2023 at its own campus. A total of 10 participants including 04 IA&AS officers from 6 field offices participated in the training programme.

*Group Photo during National Training Programme on "Environmental Issues in Sustainable Cities, Govt. Establishment and PSEs including Indian Railways with focus on SDGs*

## National Training Programme on "Audit of Air Pollution and Waste Management"

*Group Photo during National Training Programme on "Audit of Air Pollution and Waste Management"*

International Centre for Environment Audit & Sustainable Development (iCED), organized National Training Programme on "**Audit of Air Pollution and Waste Management**" from 30th January 2023 to 3rd February, 2023 at its own campus. A total of 10 participants including 04 IA&AS Officers, from 6 field offices participated in the training programme.

**Valediction of the Training Programme**- Ms**.** Sayantani Jafa, Additional Deputy Comptroller and Auditor General & Director General, iCED during the valedictory session of the National Training Programme, emphasized upon the importance of trainings related to Environmental Issues such as air pollution and waste management, to build cutting edge capacity in audit teams collective expertise.

## National Training Programme on "Audit of Biodiversity Issues"

International Centre for Environment Audit & Sustainable Development (iCED), organized National Training Programme on "**Audit of Biodiversity issues"** from 20th March to 24th March, 2023 in onsite mode at its own campus. A total of 19 participants including 06 IA&AS Officers, from 7 field offices participated in the training programme.

Ms Sayantani Jafa, Additional Deputy Comptroller and Auditor General & Director General, iCED inaugurated the training programme.

*Group Photo during National Training Programme on "Audit of Biodiversity issues"*

**Valediction of the Training Programme-**

Mr Deen Dayal Verma, Director (Administration) graced the valedictory session of the National Training Programme. He emphasized upon the importance of trainings related to Environmental Issues. Mr Verma said that it is hoped that the sharing of experiences and perspectives during the training would suitably equip the participants to take the learning process forward.

**iCED enhances its own preparedness in evolving as a Centre of Excellence in the Audit of the Blue Economy by taking a key initiative in holding In-house capacity Building Programme on "Blue Economy and Climate Change Issues' from 24th February to 28th February, 2023 and 18th March to 30th March, 2023 at iCED Jaipur**

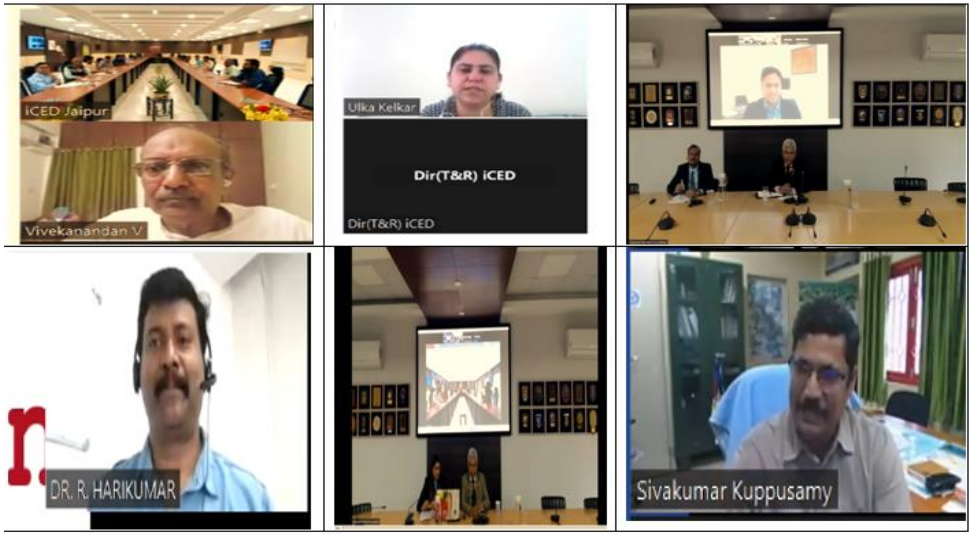

*Shri. Neelesh Kumar Sah, Joint Secretary MoEF&CC, New Delhi delivering session during In-house Capacity Building Programme.*

International Centre for Environment Audit & Sustainable Development (iCED), took an initiative in organizing the In-house Capacity Building Programme on "**Blue Economy and Climate Change Issues".** Twenty two (22) such sessions were organized in two phases, first was held from the 24th to the 28th of February, 2023 (3 Sessions), and the second from the 18th to the 30th of March, 2023 (19 Sessions), while one session was held offline. A total of 30 participants (iCED staff) including 02 Group Officers (Director Admin and Director T&R) participated in the training programme via online/offline mode. During these thirteen days' training programme, fourteen (14) leading experts & key speakers included from other organizations were invited to deliver the sessions on various aspects of Blue Economy and Climate Change issue. Shri. Neelesh Kumar Sah, Joint Secretary MoEF&CC, New Delhi delivered session on the topic "India's Climate action plan such as NAPCC, SAPCC etc. with a reference to International initiatives and Climate Change indicators and India's NDCs, LT-LEDs, etc". Other Key speakers included Senior

officials, advisors and researchers from Ministry of Environment, Forest and Climate Change, NITI Aayog, Ministry of Earth Sciences, TERI, National Maritime Foundation, WRI India and Pondicherry University, among others.

A series of informative sessions were conducted, addressing a diverse range of topics related to the Blue Economy and climate change. Participants were engaged in discussions covering key areas such as climate change initiatives at both national and global levels, the importance of climate finance, sustainable practices in marine fisheries and aquaculture, and the significance of marine biodiversity in India.

Emphasis was also placed on India's commitment towards achieving Net Zero emissions, highlighting the country's proactive stance in combating climate change. The detrimental effects of marine pollution were thoroughly examined, underscoring the urgent need for conservation measures, including the establishment and preservation of marine protected areas.




*Ongoing Sessions during In house Capacity Building Programme*

Moreover, sustainable marine tourism and the trade of marine fisheries were explored, shedding light on responsible practices within these sectors. The role of data and Ocean Information Systems in promoting a thriving blue economy was a recurring theme, highlighting the significance of accurate information and data-driven decision-making.

Overall, the sessions provided a comprehensive and insightful overview of the interconnectedness between the Blue Economy and climate change, urging participants to recognize the importance of sustainable practices and conservation efforts in fostering a prosperous and resilient marine ecosystem.

**Feedback**:- Feedback on course designing, time required, content, knowledge and its delivery by the Expert facilities was also collected from the participants. Feedback ranged from 9.5 to 10 out of 10, which is very encouraging.

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## INTOSAI WGEA NEWS

***By Pawan Kumar Meena , AAO***

### 1. INTOSAI WGEA welcome 2023 with a new Work Plan

The year 2022 was a significant one, particularly because the Working Group met during the first hybrid Assembly in cooperation with the Maldives Auditor General Office. The INTOSAI WGEA now consists of 83 members. Under the second term of SAI Finland's INTOSAI WGEA Chairmanship, in 2023, INTOSAI Secretariat has kicked off the new **Work Plan** with two thematic hubs:

1) Climate and biodiversity and

2) Green economy.

The work will be supported by a Steering Committee, where three new members have joined: SAIs of Egypt, the Maldives and the UK (INTOSAI WGEA Secretariat, 2023).

### 2. 19th Steering Committee meeting welcome new projects under the 2023-25 Work Plan


The 19th INTOSAI WGEA Steering Committee meeting took place in Rabat, Morocco from 13-16 March, 2023. It was the first face to face meeting under the work plan for 2023-2025. It had brought together participants from 20 different member SAIs with the aim to kick off the projects under the new work plan. The meeting was hosted by the Court of Accounts of the Kingdom of Morocco. The meeting included an official business meeting to discuss and make decisions i.e.

on the upcoming INTOSAI WGEA meetings, a pilot on Twinning/Mentoring project for member SAIs and the plans concerning the 2023 UN Climate Change Conference (UNFCCC COP 28) (INTOSAI WGEA, 2023). Previous meetings summary can be seen on INTOSAI WGEA website. SAI India had also actively participated in the meeting.

**Introducing audits on water topics in celebration of the United Nations 2023 Water Conference.** (INTOSAI WGEA, 2023)

The United Nations 2023 Water Conference was held from 22-24 March, 2023 (World Bank, 2023). Many Supreme Audit Institutions have audited water topics and one can find them in the audit database: Audit by Issue (wgea.org).

Recent WGEA publications addressing water topics are as under:-

- INTOSAI WGEA Seminar Summary on Raising Resilience (2022)
- Research Project on Wastewater.
- Auditing government efforts to adapt to climate change and ocean acidification in the marine environment.

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## ENVIRONMENTAL NEWS /SNAPSHOTS/PERSONS/PROJECTS IN NEWS

***By: Lokesh Kumar Meena , AAO***

### 1. Climate Change 2023: Synthesis Report

Climate Change 2023: Synthesis Report (UNEP, 2023) is the culmination of years of effort by hundreds of scientists during the Intergovernmental Panel on Climate Change's (IPCC) sixth assessment cycle, which began in 2015 (UNEP, 2023). The Report provides the main scientific input to COP28 and the global stocktaking paradigm at the end of this year, when countries will review progress towards the Paris Agreement goals. The research emphasises that humans have been responsible for all global warming over the last 200 years, which has resulted in a current temperature rise of 1.1°C above pre-industrial levels. It has resulted in more frequent and dangerous weather events, which have brought increasing destruction to people and the environment (UNEP, 2023).


*Dr. Jim Skea delivering his address*
*Image Credit: (MOEFCC, 2023)*

The Report underlines the significant action required across industries and at all levels to limit global temperature rise below 2°C and target to achieve global warming to 1.5°C target by the end of this century. The Report emphasises the crucial need for action that considers climate justice and focuses on climate resilient development (UNEP, 2023).

**2. IPCC Working Group III Report highlights the importance of lifestyle in climate discourse** (MOEFCC, 2023): Dr. Jim Skea, Professor at the Centre for Environment Policy, Imperial College London and currently the Co-chair of Working Group III (WG III) of the Intergovernmental Panel on Climate Change (IPCC) delivered a lecture at Indira Pariyavaran Bhawan, New Delhi. The IPCC Sixth Assessment Report (AR6) was the main

topic of discussion in the lecture, with a focus on lifestyle-related issues. The Ministry of Environment, Forest, and Climate Change, Government of India screened a brief movie about sustainable lifestyles (MOEFCC, 2023). Dr. Jim Skea outlined the IPCC's structure and the six assessment cycle's three special reports and three Working Group reports. The role of methane, financial mechanisms, forest sequestration potential of forests, data quality and needs, adaptation, equity, climate justice, modelling assumptions, methods of preparing GHG inventories, and the role of atmospheric observations were all discussed (MOEFCC, 2023).

3. **From reviving traditional crops to climate-proofing infrastructure: How Indian communities are adapting to climate change** (Weforum, 2023) **(Source:- https://www.weforum.org/agenda/2023/03/from-reviving-traditional-crops-to-building-climate-proof-infrastructure-how-5-indian-communities-are-adapting-to-climate-change/).**

At the global level, India is at the forefront of driving climate change action. One of the most significant declarations during COP26 was the pledge to achieve net-zero emissions by 2070. Under the tagline 'one earth, one family, one future,' India is prioritising energy and climate change mitigation during its G20 presidency till November of this year(Weforum, 2023)

Communities at the grassroots are already exploring ways to cope with increased climate shocks as adaption strategies and financial demands are scaled up. The Faces of Climate Resilience project's documentation of the lived experiences of individuals living in India's most climate-vulnerable regions shows a commitment to take action in response. From Kerala to Rajasthan, individuals and communities are making efforts to ward off the worst effects of global warming and adapt through solutions.

**Here are five such stories from people adapting to vagaries of extreme climactic events:**

**(i) How this Kerala district is re-building life and climate-proofing infrastructure** (Weforum, 2023)**.**

Kerala, in southern India, experienced one of the worst flooding in a century in 2018. Officials and experts stated in the aftermath that the floods in Kerala, which has 44 rivers flowing through it, would not have been as severe if authorities had

gradually released water from at least 30 dams. It was too late, though, for people like Jayachandran aged 49, who constructed a modest home for his family of four while selling fish for a living. This house, located in the hilly region of Cheruthoni in Kerala's

*Jayachandran and his daughters, who had to watch their house swept away during the 2018 Kerala floods, sit in front of their new home in Kerala's Idukki district. Image: Credit : (Weforum, 2023)*

Idukki district, was among those washed away when the government opened the floodgates of the Idukki dam, one of Asia's highest arch dams. The gushing flood submerged the bridge that connected two ends of town, and the main road partially caved in. A proposal to replace the buried 60-year-old bridge was approved, and construction is already underway.

With this case in mind, the project points towards the need to develop a climate-proof infrastructure index for India. Such an index can help identify and map strategies to protect the country's existing and planned infrastructure against climate risks.

**(ii) How a farmer in Maharashtra is adapting to drought?** (Weforum, 2023)

Rajendra Khapre is a farmer in Ahmednagar, Maharashtra, one of India's most drought-prone areas. The 45-year-old owns a tiny plot of land and has been farming in an area with low fertility soil, which requires more fertiliser and water. However, Rajendra and several other farmers are adapting to the challenges. They have implemented watershed management and effective agricultural techniques with the assistance of grassroot level organisations. Water availability also aided him in shifting to more profitable crops such as onion, soybean, pomegranate, and papaya.

**(iii) How a Rajasthan village's floodwater harvesting mitigates drought stress?** (Weforum, 2023)

Shiv Prakash, a 31-year-old farmer in the Jodhpur area of Rajasthan, can easily explain how climate around him has changed since he was a child. The Council on Energy, Environment, and Water (CEEW) analysis shows that since 1970, the frequency and intensity of extreme droughts have tripled in the Jodhpur district. Shiv Prakash's father and a few other villagers established a Village Development Committee (VDC) in order to collaborate with a grass-roots organization- Gramin Vikas Vigyan Samiti (Gravis) to overcome this challenge.

Together, they decided that the flow of water downstream from the hills must be checked and the water stored. They built several structures such as check dams, ponds and rainwater harvesting tanks (Weforum, 2023) . The structures proved to be a game changer for farmers like Shiv Prakash. In addition to slowing the flow of water, they also aid in recharging groundwater substantially (Weforum, 2023)**.**

**iv) How Mumbai's Ambojwadi is responding to climate change ?**(Weforum, 2023)

Kalpana, is one of the 40,000 residents of Ambojwadi, an informal settlement in northern Mumbai that is extremely exposed to the impacts of climate change. Since 2010, the Mumbai district has experienced a threefold increase in extreme floods and a twofold increase in intense cyclones, according to CEEW data (Weforum, 2023). With the help of a Mumbai-based community organisation called YUVA, Kalpana and her neighbours have been surveying the climate-vulnerable places in their settlement in an effort to overcome the imminent disaster.

The first-response team, comprised of community leaders, women, and children, has been working closely with civic government departments to deal with emergencies in the case of severe rain or a cyclone (Weforum, 2023).

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# NEW LIGHTS IN THE HIGH SEAS-INKING OF THE "HIGH SEAS TREATY, 2023" AND DEEP SEA MINING EXPLORATIONS

***By Dr. Nanda Dulal Das, Director (T&R), iCED***

## Introduction

After a series of decade-long negotiations, United Nations' member countries reached a landmark-deal on 4th March, 2023, focusing on protection of marine biodiversity in the areas outside the national jurisdictions (IUCN, 2023). This is the second major treaty signed after the signing of the United Nations Convention on the Law of the Sea (UNCLOS), 1982 and is compared to the landmark "Paris Agreement" on climate change. The area covered under the new treaty is termed as "Areas Beyond National Jurisdiction" (ABNJ) or the "the Area" or High Seas, under the UNCLOS 1982 (UNCLOS, 1982). As per the UNCLOS 1982, ABNJ represents areas comprising the High Seas and Deep Seabed Area, situated beyond 200 nautical miles called the "Exclusive Economic Zone (EEZ)" or

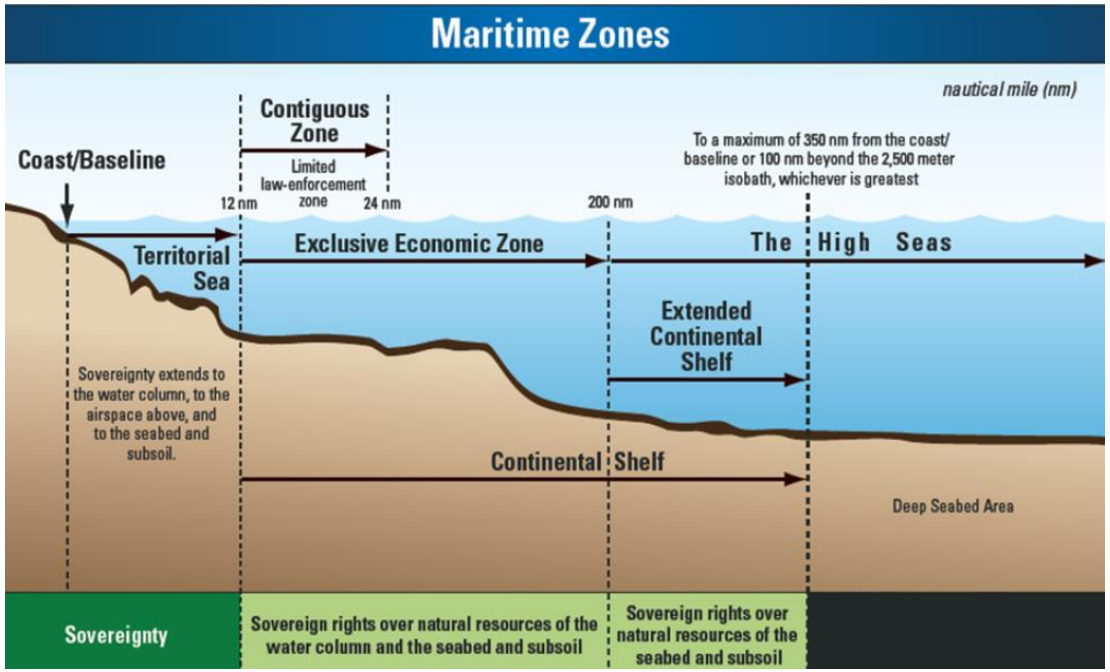


*Image 1 Demarcation of Areas in Ocean*
*Image Credit: (USGS, 2018)*

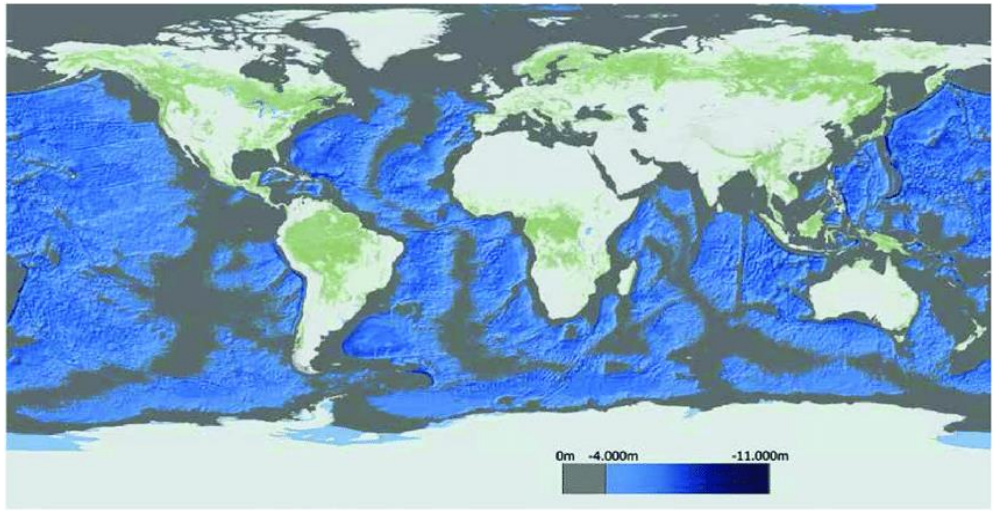


*Image 2: Global map showing global deep-sea areas. Areas with water depths up to 4000m are indicated in grey and areas deeper than 4000m are indicated in blue*

*Image Credit*: *(Nieuwejaar, 2019)*

an approved extended EEZ, where no nation has outright sovereignty (Image1). While the 1982 Law focused on rights and conservation of areas within EEZ, conservation of areas beyond the EEZ is the focus of the new treaty on High Seas, called the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Area Beyond National Jurisdiction or, in short, the High Seas Treaty 2023. This area represents over two-third of the global ocean-body and 95 per cent of the Earth's total habitat by volume (Image 2) (IUCN, 2022).

**Environmental Concerns in the High Seas Area**

The International Union for Conservation of Nature (IUCN) has already raised following concerns regarding criticality and importance of the High Seas (IUCN, 2022):

a) Two-third of fish stocks in the High Seas have been exploited beyond sustainable limits.

b) Bycatch (other desirable or non-desirable catches with the targeted fishes) poses threat to marine biodiversity.

c) Noise and other pollution further threatens animal communication and drives them away from their breeding or feeding grounds.

d) Marine species face severe injuries, even deaths due to entanglement with marine debris.

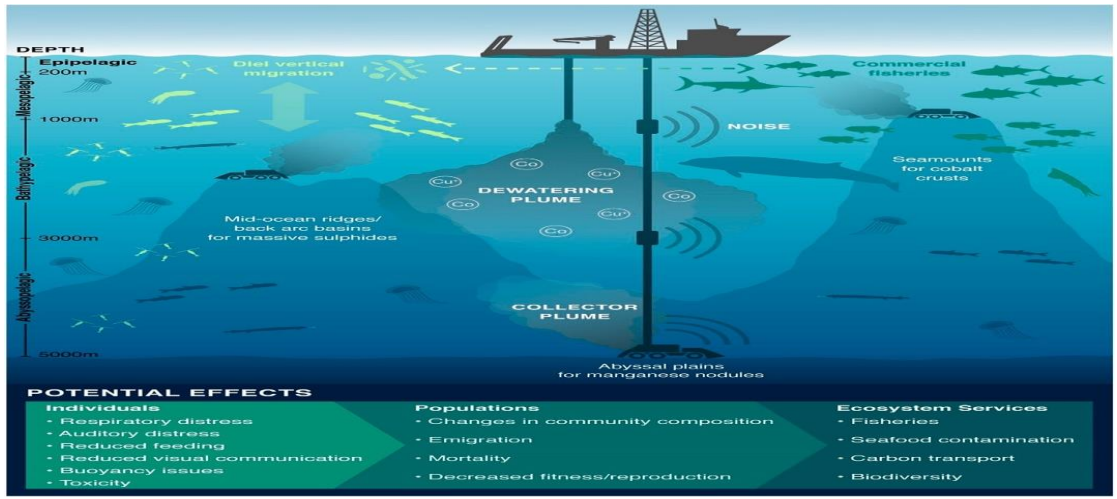


***Image 3 Process and Effects of Deep Sea Mining***
***Image Credit: Amanda Dillon ( (Drazen, 2020).***

e) Deep-sea mining can threaten the marine habitats, water quality in the high seas and cause major distress in the whole ocean eco-system.

f) Increasing temperature, concentration of carbon di-oxide in the oceans further limits the ability of marine species to thrive and grow.

Drazen et.al. (2020) have identified several concerns relating to the operation of different vessels and equipment for deep-sea mining led by private contractors (Drazen, 2020). The impact of deep-sea mining on individual species, deep sea environment and ecosystem services appears highly concerning, unless controlled (Image 3 above).

**General Principles of the High Seas Treaty**

Following major principles and approaches have been laid down in the new Treaty for the member countries to observe (United Nations General Assembly, 2023):

*(a) The polluter-pays principle*

*(b) The principle of the common heritage of humankind and freedom to conduct marine scientific research*

*(c) The principle of equity, and the fair and equitable sharing of benefits*

*(d) Precautionary principle or precautionary approach*

*(e) An ecosystem approach*

*(f) An integrated approach to ocean management*

*(g) An approach that builds ecosystems resilience, including to adverse effects of climate change and ocean acidification, and also maintains and restores ecosystem integrity, including the carbon cycling services that underpin the ocean's role in climate;*

*(h) The use of the best available science and scientific information*

*(i) The use of relevant traditional knowledge of Indigenous Peoples and local communities, where available;*

*(j) The respect, promotion and consideration of their respective obligations, as applicable, relating to the rights of Indigenous Peoples;*

*(k) The non-transfer, directly or indirectly, of damage or hazards from one area to another and the non-transformation of one type of pollution into another, in taking measures to prevent reduce, and control pollution of the marine environment;*

*(l) Full recognition of the special circumstances of small island developing States and of least developed countries;*

*(m) Acknowledgement of the special interests and needs of landlocked developing countries.*

Each principles and approaches have their own context and relevance given the scope for widespread mis-utilisation and overexploitation of the High Seas. The principle of 'polluter-pays' highlights the fact that disposal of waste, including plastics, untreated sewage and ballast water into the high sea would have a price-tag attached to it. Similarly, the waste generated or pollutions, including noise pollution, from deep-sea mining are to be remediated at the expenses of the miners.

**Deep-Sea Mining**

Deep-Sea mining as an economic activity is gaining attention of the world community, owing to the large quantity of untapped resources lying under the seabed. While 1960s saw serious attention being given to mining of Deep Sea minerals, with publication of a book titled "**The Mineral Resources of the Sea**", by the American geologist John L. Mero; concerns were also raised about colonisation of seabed mining by countries having technological knowhow (Lodge, 2017). This saw prolonged negotiations on the need for declaring deep seabed as the "common heritage of mankind", resulting in incorporation of regulations under the UNCLOS 1982 relating to activities in the deep-sea. Activities in the Deep Sea are controlled by the International Seabed Authority (ISA), which was established under the UNCLOS 1982 and the 1994 Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea (ISA, 2023).

Three types of mineral resources are of commercial interest at present times (Lodge, 2017):


*Map 1: Distribution of Minerals in Deep Seabed across the Globe*
*Source: ISA, 2021 (IUCN, 2022)*

a) Poly-Metallic Nodules, as the name suggests, composed of a variety of metals like manganese, iron, copper, nickel, cobalt, lead, zinc, lithium, titanium etc. Therefore, these nodules are of special importance, being the sources of some of the rare earth materials as well. Eastern Pacific region, Central Indian Ocean basin, French Polynesia and Micronesia are some of the important areas where these nodules are found in abundance (Map 1).

b) Polymetallic Sulphides occur mostly along the tectonic plate boundaries and hydro-thermal vents in the active plate boundaries. These minerals typically occurs at a water depth of around 2,000 metres around mid-oceanic ridges.

c) Cobalt crusts are other deposits formed at a water depth between 400 and 7,000 metres in and around seamounts.

Individual countries enter into contracts with the International Sea Bed Authority (ISA) for extraction of minerals from the Deep Sea, after obtaining necessary environmental clearances, for which ISA has made detailed provisions. ISA requires the deep-sea

miners to collect baseline data on the composition and distribution of the deep sea species, and conduct scientific research to understand and manage potential long-term impacts arising out of such mining.

**The High Seas Treaty and Protection of Marine Environment**

In order to ensure that spaces in deep sea areas are not exploited beyond sustainable parameters, the High Seas Treaty focuses on following important areas:

a) 30 by 30: To achieve Sustainable Development Goals (SDG) relating to oceans and the Kunming-Montreal Global Biodiversity Framework by the year 2030, 30 per cent of the land and inland waters, as well as coastal and marine areas would be conserved (United Nations, 2023). This would help develop and conserve ecologically sensitive zones like coral reefs, depleted fishing grounds etc. into Marine Protected Areas (MPAs) so that sensitive habitats are not exploited. The High Seas Treaty has, thus, introduced an 'Area-based Management Tools' (United Nations General Assembly, 2023).
b) The Treaty also requires mandatory completion of environmental impact assessment before any mineral exploration is taken up (Parkes, 2023).
c) Equitable sharing of knowledge, technologies and benefits arising out from the use of marine genetic resources is another area of focus of the Treaty.

**Conclusion**

There remains huge gap in scientific knowledge and understanding, which makes standardisation of environmental impact assessment in the deep sea highly difficult (Miller Kathryn A., Thompson Kirsten F., Johnston Paul, Santillo David, 2018). This

would require benchmarking on the part of ISA to analyse impact of upcoming mineral exploration projects in the deep sea area. Once the Treaty is ratified by the UN member nations and operationalized, the operational aspects would become visible. Nonetheless, an unprecedented beginning has been made!

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# PROSPECTUS TO COLORING THE ECONOMY BLUE

***By: Mary Sulakshana G, AAO O/o PAG (Audit), Andhra Pradesh***

*A school of Travally Fish in Soloman Islands*
*Image Credit: : (Africa Renewal, 2020)*

## Introduction

Life in the oceans began 3.1 billion to 3.4 billion years ago and land dwellers appeared approximately 400 million years ago (MarineBio, 2021). The interconnected water bodies of oceans and seas comprise the most important life supporting system on earth and host huge reservoirs of biodiversity. This vast blue expanse of the largest ecosystem in the world has been historically and geographically significant for food security and a thriving human population.

40 per cent of the world's population live near coastal areas, more than 3 billion people utilize the oceans for their livelihood, and 80 per cent of world trade is achieved using the seas (United Nations, 2022) .

## 2. The Critical Hit and its Impact

The industrial revolution of the 18th and 19th centuries led to rapid industrialization and the introduction of technology that were detrimental to the environment and biological resources. Climate change occurs naturally over long periods of time resulting in changes

in weather patterns and temperatures across the world. However, the consistent up gradation of pollutants discharged into air, water and land accelerated climate change and resulted in global warming, the biggest threat to human lives and to earth's sustenance as a whole.

According to the World Meteorological Organization's (WMO) report from November 2013, Carbon dioxide accounts for 80 per cent of global warming since 1990. Period between 1990 and 2012 witnessed a 25 per cent increase in radiative forcing because of carbon dioxide ($CO_2$) (AirClim, 2013). This $CO_2$ was a part of the emissions from extensive use of fossil fuels that resulted in excess amount, over and above the buffer levels which can be neutralized by nature, in the form of respiration by the forests of the world both terrestrial and aquatic.

Oceans, seas, and coastal ecosystems are the largest naturally occurring "carbon sinks". Increase in $CO_2$ levels brought forth the evil twin of climate change- ocean acidification, the phenomenon of increased absorption of $CO_2$ in oceans which cannot be neutralized by the minerals dissolved and carried in the rivers (Ocean Acidification, 2018). Air pollution is responsible for 33 per cent of the toxic contaminants that end up in oceans and coastal waters, of which $CO_2$ is the major pollutant (MarineBio, n.d.) .

This caused an unprecedented increase in ocean acidification thus decreasing the capacity of oceans to moderate the impact of climate change. About 44 per cent of the toxic contaminants originate from runoff via rivers and streams (marinebio, n.d.). A disastrous increase in plastic pollution is causing eutrophication, thus choking the marine life, altering the temperature and subsequently weather along with reduction in seafood production. This will impact both food and livelihoods of almost half a billion people who depend at least partially on small-scale fisheries, which account for 90 per cent of employment in fisheries worldwide (United Nations, 2022)

## 3. Realizing Blue Economy

In the midst of on-going efforts to tackle climate change and global warming, the significance of marine ecosystems is recognized and deemed to be of utmost importance for sustainable development. The idea of 'Blue Economy' was first articulated by Gunter Pauli in 2010 and later discussed at the United Nations Conference on Sustainable Development, Rio + 20 in 2012 (ORF, 2019). The UN through SDG 14 aims to "Conserve and sustainably use the oceans, seas and marine resources for sustainable development."

The World Bank defines Blue Economy as the "sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystem" (The World Bank, 2017). Blue economy is a shift from the old, "brown" business-as-usual development model where oceans are perceived as a means of free resource extraction and waste dumping (ORF, 2019). So far, the concept of blue economy is still subject to multiple interpretations because of the coverage of activities, geographical locations, and sectors.

## 4. Blue Economy and what it means to India

India has a 7,517 km coastline, discussions around a Blue Economy are particularly relevant. Blue Economy for Indian context includes "the entire system of ocean resources and manmade economic infrastructure in marine, maritime and onshore coastal zones within India's legal jurisdiction, which aid in the production of goods and services and have clear linkages with economic growth, environmental sustainability and national security" as given by NITI Aayog (The Print, 2023).

The marine ecosystems around the coastlines in India are extremely important for food security of the coastal cities, shipping, and petroleum industry and have great potential for renewable energy like tidal energy. A hub of biodiversity, the coastline is lined with mangroves and coral reefs and is home to numerous species of flora and fauna that are vulnerable and endangered. There is a need to

develop pragmatic approach to utilize these resources by catering to the needs of the ever-growing population while ensuring that these resources are not indiscriminately exploited. This calls for sustainable development of techniques and methodologies to tackle the challenges of conservation of marine resources in the face of providing for the human needs.

**5. Challenges to Blue Economy in India-Role of Audit**

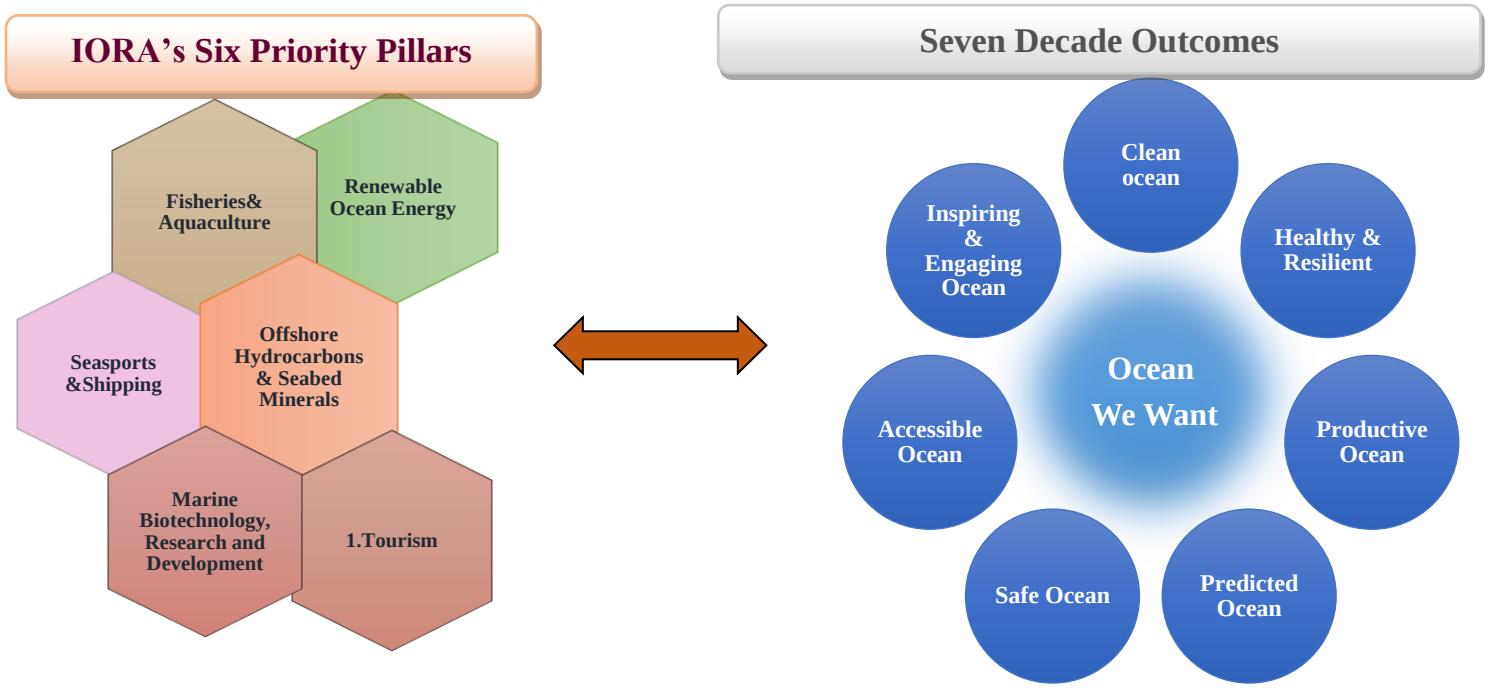
Over exploitation, unplanned and unregulated development in the narrow coastal interface combined with marine pollution, unsustainable extraction of marine resources such as overfishing leads to destruction of marine and coastal habitats. There have been many accidents in the industries located in and around coastal areas which are due to non-adherence to the rules and regulations laid by the Government. One such incident is a fire accident (OmManorama, 2023) in Brahmapuram waste plant on 2nd March 2023 , which resulted in smoke fumes. The waste plant engulfed parts of the port city with many citizens experiencing breathing problems. Even the local administration had issued advisories to locals to remain indoors and use masks whenever they step out (Sanjib Kr Baruah, 2023). The contaminants affected not just the human population on land but also the marine ecosystem as they spread out to the coast and ended up in the coastal waters.

This is where Audit can step in to ensure that such unplanned and unregulated developments in the coastal areas are brought to the attention of general public and Governments alike. It is the responsibility of Audit to present these issues with proper evidence to ensure that the livelihoods of the people living in these areas are not adversely affected, as well as the importance of conserving marine ecosystems for maintaining the necessary balance in nature to avoid disasters.

**6. The Way Forward**

India is a part of many international treatises focusing on exploring Blue Economy to make sure that the marine resources are essentially utilized along with taking up the responsibility of protecting them. One such treatise is the Indian Ocean Rim Association (IORA). The

IORA Secretariat has identified the following six priority pillars in the blue economy as were recommended by the Council of Ministers' meeting (COMM) and revised by the Secretariat in consultation with Member States (Indian Ocean Rim Associations, 2017). These six priority pillars can be explored keeping in mind the 7 Decade Outcomes (United Nations Decade, 2021) given by UN's Decade of Ocean Science for Sustainable Development 2021-30 and strive to achieve the optimum balance between the development of activities related to marine resources and keeping our resources safe.



In the process of achieving this balance, Audit would be at the forefront to guide and gauge the measures undertaken by the implementing agencies. (Indian Ocean Rim Associations, 2017).

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# EMERGING ROLE OF BLUE FINANCE: A TRANSITION TO ECONOMIC GROWTH ALIGNED WITH BLUE ECONOMY

***By: Rohan Sharma, AAO***

## Introduction

Blue Finance is investment dedicated to finance or refinance activities that contribute to oceans protection and/or improved water management. Blue Finance is an emerging area in Climate Finance with increased interest from investors, financial institutions, and issuers globally. It offers tremendous opportunities and helps address pressing challenges by contributing to economic growth, improved livelihood, and the health of marine ecosystems (IFC (World Bank Group), 2022). Despite the presence of the UN Convention on the Law of the Sea, progress in Blue Finance has been significantly slower than in green finance, because identifying ocean resources and accountability requires far more capability and scientific instruments (Yoshioka, 2020).

**Blue Bond** - The Blue Bond is a debt instrument issued by governments, development banks or others to raise capital from impact investors to finance marine and ocean-based projects that have positive environmental, economic and climate benefits. (World Bank, 2023)

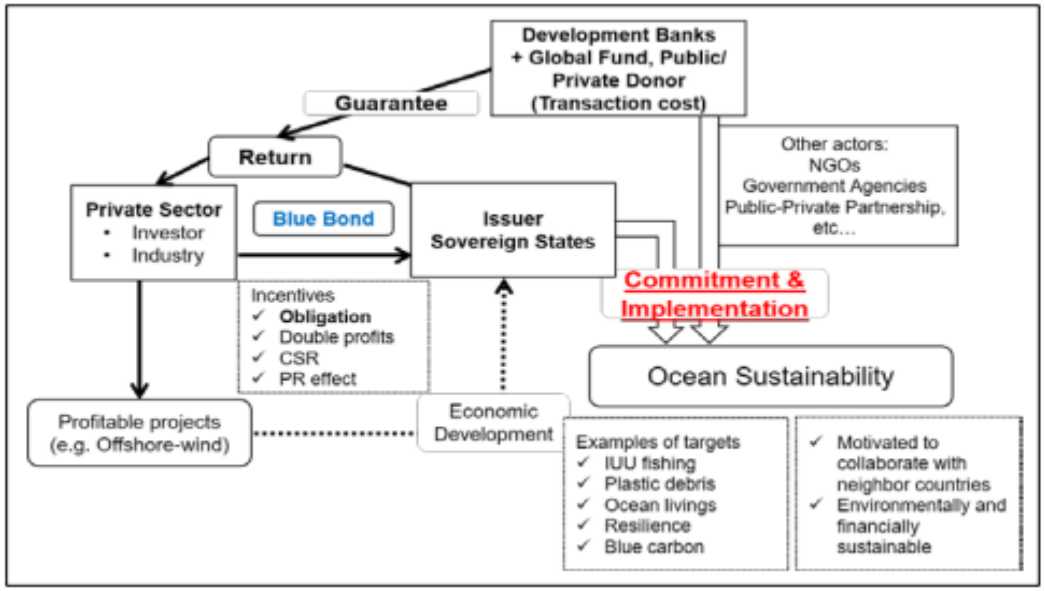
World's first sovereign "**Blue Bond**" was issued in October 2018 by the Republic of Seychelles (with a maturity of 10 years and coupons of 6.5 per cent). An amount of $15 million was raised from international investors, with the aim of financing the expansion of marine protected areas, governance of priority fisheries, and the development of the Blue Economy.

Currently the ocean economy is valued at $1.5 trillion and projected to double to $3 trillion and support 40 million jobs by 2030. The ocean economy covers a wide range of industries – including shipping, fishing, oil and gas extraction, mining, and tourism. Individual

companies within each industry sector, may apply different practices to their operations, leading to other economic impacts as well as environmental problems. This makes it important to distinguish between ocean economy sectors for financing purposes and to incentivise long-term ocean health practises (OECD, 2020).

**Blue Finance Framework:**

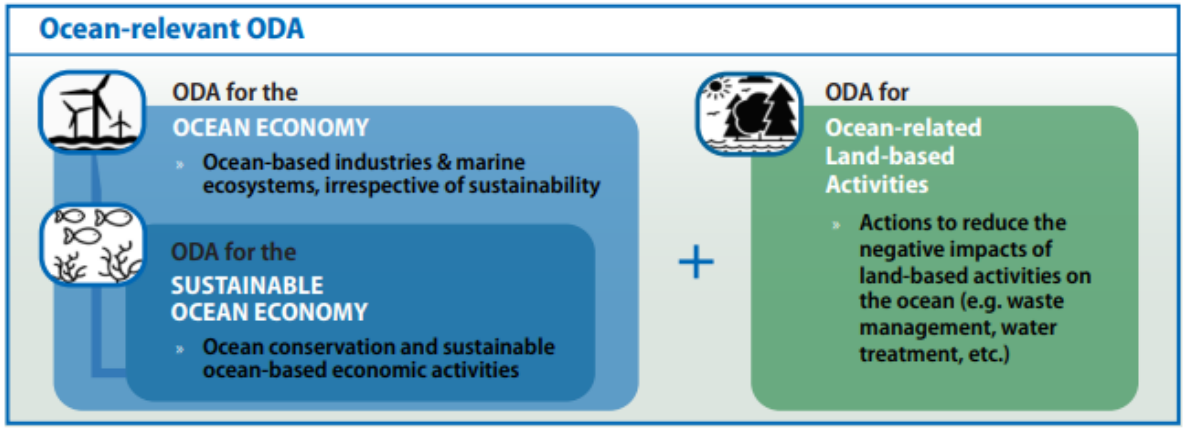
The framework is about the conceptual mechanism of the regulatory-driven Blue bonds. The private sector is committed to purchase the Blue Bonds under the proposed mechanism in order fulfil their legal obligations. By doing so, states can ensure that profitable ocean-related projects will boost economic growth and double the profits of ocean developers on returns from Blue Bond and related initiatives. (Yoshioka, 2020)




*Blue Finance Mechanism*
*Image Credit: . (Yoshioka, 2020)*

**Blue Economy Finance sectors:**

SDG14 financing is largely divided into three finance types: public, philanthropic and private. From 2010 to 2019, Official Development Assistance for the ocean economy was valued at $27.14 billion, of which approximately 51 per cent was sustainable. It is critical to quantify and monitor development finance to obtain a clear picture of current progress towards ocean sustainability. The




*OECD's key indicators for tracking ocean-relevant ODA*
*Image Credit: (OECD, 2020)*

Organisation for Economic Co-operation and Development (OECD) work in this area quantifies private finance mobilised through official development initiative. Over the same period, bilateral providers of ODA contributed a total of $19.23 billion, with approximately 45 per cent of such investments considered sustainable. Whereas multilateral providers gave $7.9 billion, at approximately 68 per cent sustainability.

As we know ODA is one of the major source in respect of developing nations to access the finance, policy evidence, innovations and science to realise sustainable ocean economies. ODA can help tilt finance towards sustainability and indeed it is increasingly being utilized as a catalyst to leverage private finance in ocean conservation and sustainable ocean usage. (OECD, 2020)

In 2020, private finance mobilised by ODA towards ocean related activities amounted to USD 1.1 billion, down from 1.8 billion USD in 2019. This includes USD 314 million in finance for the ocean economy (29 per cent of private finance mobilised in support of the ocean) and USD 777 million in finance for land-based activities that affect the ocean (71 per cent of private finance mobilised in support of the ocean) (OECD, 2022).

**Way forward** Global ocean health improvement is essential to prevent or mitigate future crises. It's time to pay greater attention to Blue Finance's implementation and regulatory features. We should prioritise SDG 14 funding more because it will contribute significantly in attaining the Net Zero target and boosting the sustainable blue economy in the future.

Multilateral Development Banks can foster greater regional cooperation by bringing different sectors together to achieve the policy of marine conservation and sustainable ocean resource management. Since the ocean sectors are risky as compared to the land base activities, we should also support the private investors and encourage them to invest in Blue bonds. (Yoshioka, 2020)

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# PROMOTING SUSTAINABLE MARINE FISHERIES AND BLUE REVOLUTION IN TAMIL NADU THROUGH THE LENS OF NATIONAL POLICY ON MARINE FISHERIES 2017

***By : Maneesh Mangal, AAO***

## Introduction

Tamil Nadu, state has a coastline of about 1076 km, which constitutes about 15 per cent of India's total coastline. It is situated at the South Eastern extremity of the Indian Peninsula bounded on the north by Karnataka and Andhra Pradesh, on the east by Bay of Bengal, on the South by the Indian Ocean and on the West by Kerala. It has one of the longest coastlines in India with 13 coastal districts. The coast is home to varied coastal habitats like mangroves, corals, seaweeds, sea grass beds, salt marshes, mudflats, and sand dunes. (ENVIS Centre, 2023)

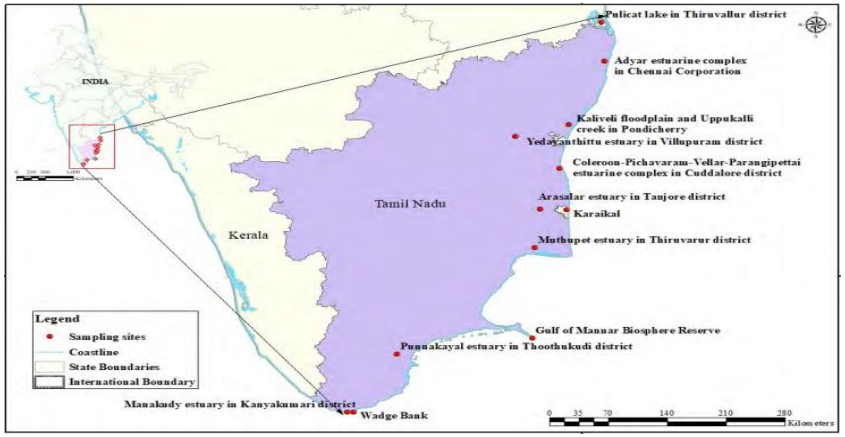


*Figure 1Selected marine and estuarine habitats of Tamil Nadu, India (Canciyal, 2018).*

According to an article published in International Academy of Ecology and Environmental Sciences, in 2018, Tamil Nadu's marine and estuarine waters had a diverse fish fauna, with 1656 species under two classes , 40 orders 191 families and 683 geranra. Fishery status assessment revealed existence of 1029 species worth for capture fishery, 425 species worth for aquarium fishery, 84 species worth for culture fishery, 242 species worth for sport fishery and 60 species worth for bait fishery. Threat status assessment shows that 3.75 per cent of species are threatened, and 50.25 per cent are not threatened, while 46.01 per cent have not yet been assessed (Canciyal, 2018).

**Fisheries Sector in Tamil Nadu – An overview**

Tamil Nadu has 13 coastal district with 608 fishing villages and estimated population of 10.48 lakh dependent of marine fisheries. Tamil Nadu has 9 major fishing harbours which includes Chennai, Thoothukudi, Nagapattinam, Colachel, Chinnamuttom, Mookaiyur, Poompuhar, Muttom (Public Private Partnership) and Thengapattinam. Marine fish production stands 5.21 lakh tons in 2018-19 which support the livelihoods of 10.48 lakh marine fishers and marine products export stands at value of Rs. 5591.49 crores in 2018-19. (D.Jaykumar, 2020). As per the audit report Performance Audit on development, welfare and relief schemes - Marine Fisheries in Tamil Nadu, Maine fisheries sector is an important sector which contributes to the socio economic development of the state.

**Audit Report on Marine Fisheries.** ( C&AG of India, 2019)

***Absence of Comprehensive Fisheries Policy:*** The Audit Report highlighted that The Government of Tamil Nadu (GoTN) had failed to enact a comprehensive fishery policy to tap into the marine fish potential of the state, resulting in high post-harvesting losses and limited fish production. GoTN releases annual Fisheries Policy Notes that lack detailed assessment and a long-term action plan. ( C&AG of India, 2019)

***Lack of Infrastructure Development***: - The report also underlined lack of infrastructure development such as Fish Landing Points (FLPs) in coastal districts under the Tamil Nadu Marine Fisheries Regulation (TNMFR) Act to regulate fishing and strengthen coastal security and delay in construction of Fish Harbors (FHs) in Colachel, Poompuhar, and Thengapattanam due to inadequate planning, resulting in cost overruns and delayed completion.

***Inadequate Planning:*** - Some of the incidences of inadequate planning in creating infrastructure were also pointed out in the Report. Construction of the Fishery Landing Centre (FLC) at Dhanushkodi could not berth the vessel due to shallow waters, as high tide and

low tide observations were not conducted. Similarly, the FLC at Mugandarayarchatram could not be used for vessel berthing due to changes in the approach jetty's length. The Report also brought attention on issues such as non-registration of deep sea fishing vessels and non-utilization of allocated funds for welfare scheme. ( C&AG of India, 2019)

***Gaps in Monitoring***: - Gaps were observed in monitoring the movement of fishing vessels, supply of Distress alert transmitters and creation of facilities in the landing centres.

***Decline in Export Contribution*:-**It was also noticed in audit that the Contribution of the State to the overall export of the marine products in the country declined from 9.76 per cent in 2013-14 to 6.39 per cent in 2017-18. It indicates inadequate efforts in generating better price and enhanced income to the fisherfolk population.

**Areas of Future Audit Focus-**

Audit needs to focus on compliance with applicable laws, regulations and permits related to marine activities formulated while implementing National Policy on Marine Fisheries 2017 in the state. Audit could also evaluate environmental regulations, fishing quotas, licensing requirements, and adherence to maritime safety standards including impact on biodiversity, and efforts to minimize pollution, overfishing, and habitat destruction such as mangroves and sea grass with reference to Wild Life Protection Act, 1972 and Environment Protection Act 1986.

The audits could examine the performance of schemes and funds sanctioned for coastal development projects, coastal line protection, welfare schemes for marine fisheries, economic aspects of blue economy activities and financial performance of fisheries, aquaculture operations, tourism ventures, and other marine-related businesses. One focus area of audit could be the training and skill development of officers and local communities for sustainable development and protection of marine fisheries.

Audit can assess the organizational structures, internal controls, risk management frameworks, and emergency response plans. Audit can also examine the data related to change in the population of marine endangered species.

Further, audit may focus on future policy formulation requirements and adherence (Subsidies and grant provided) with reference to National Policy on Marine Fisheries 2017 in the area of post-harvest processing of marine products, trade, marine environment and pollution, climate change and welfare of fishing communities.

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# THE FIRST G20 ENVIRONMENT AND CLIMATE SUSTAINABILITY WORKING GROUP (ECSWG) MEET

***By: Neha Jakhar, AAO***

The First G20 Environment and Climate Sustainability Working Group (ECSWG) meeting held in Bengaluru, India from 9-11 February 2023 focused on promoting environmental sustainability and climate resilience. The meeting was led by the Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India (G20 2023 India, 2023).

The meeting started with a side event focused on sharing best practises for ecosystem restoration of forest fire and mining affected areas, followed by a visit to the Bannerghatta National Park and Kalkere Arboretum to showcase Karnataka's forest ecosystems, ecosystem restoration and ecotourism models, and wildlife protection. The meeting concluded with all the G20 countries showing commitment to work towards the objective of the three priority areas of Arresting Land Degradation, Accelerating Ecosystem Restoration and Enriching Biodiversity; Promoting a Sustainable and Climate Resilient Blue Economy and Encouraging Resource Efficiency and Circular Economy (G20 2023 India, 2023).

**India's participation and stand:**

As the host country and leader of the First G20 Environment and Climate Sustainability Working Group (ECSWG) meeting, India played a crucial role in the discussions and outcomes of the meeting. It was also mentioned that Indian Presidency would publish the

5th report on actions against marine plastic litter under the G20 Framework for Marine Plastic Litter, in collaboration with Japan (First climate sustainability working group meet concludes in Bengaluru, 2023).

**Key outcomes of the meeting:**

(i) The meeting included the presentation of the inception report of the technical study on 'Accelerating the transition to Sustainable & Climate Resilient Blue Economy' that would cover all G20 countries. This study will cover all G20 countries and provide inputs for the development of high-level principles on 'Sustainable and Climate Resilient Blue Economy. Delegates expressed support for initiatives to promote the sustainable use of maritime resources, to avoid pollution and littering, and to protect and enhance biodiversity (G20 2023 India, 2023).

(ii) The Indian Presidency also announced a coordinated beach cleaning effort on the sidelines of the Ocean 20 dialogue on 21 May, 2023, to emphasize the necessity of action on marine litter and community participation. Secretary, Ministry of State for Environment, Forests and Climate Change, Ms. Leena Nandan highlighted that India intends to address matters of environment and climate change through an action-oriented and consensus driven approach (MOEFCC, 2023).

(iii) The discussions also focused on ways for restoring land-based ecosystems affected by anthropogenic causes and enhancing the Global Biodiversity Framework (G20 2023 India, 2023).

(iv) Discussions took place on the creation of circular economies in many sectors, including steel and biowaste, as well as the role of extended producer responsibility in the development of a circular economy. A G20 industrial coalition for resource efficiency and the circular economy was also tabled. Delegates from many countries participated enthusiastically in the discussions. During this session, Ms Eenam Gambhir, Joint Secretary of the G20 Secretariat, presented the proposed High-

Level Principles on LiFE and the Green Development Pact as potential deliverables, which are being steered by the Development Working Group (G20 2023 India, 2023).

(v) The third and final day began with a seminar on the theme of "Sustainable and Climate Resilient Blue Economy". Dr. M Ravichandran, Secretary, Ministry of Earth Sciences, delivered the introductory comments. Over three meetings and one side event, the Oceans and Blue Economy discussions covered a wide range of themes, including marine trash, protection and enhancement of coastal and marine ecosystems, and marine spatial planning. The subject of marine plastic litter and its adverse consequences was the focus of debate (G20 2023 India, 2023).

(vi) The India Presidency's plan to convene an Ocean 20 dialogue to promote detailed discussion on crucial Blue Economy issues was emphasised. The significance of the LiFE (Lifestyles for the Environment) Principles was emphasised, as behaviour changes to encourage the adoption of sustainable alternatives to single-use plastics, the prevention of littering, etc., will contribute to clean and healthy oceans (G20 2023 India, 2023).

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# WHAT SAYS THE INK OF PRINT MEDIA ABOUT WATER (Our lifeline)

***By: Jayant Sharma, Consultant***

**Introduction: -**

It is a well-known fact that we cannot imagine our life without water. All living things need water for their survival. Be it animals or plants, they require water for their daily metabolic activities. Without water, even plants will become dry and shed their leaves. Since 1993, the United Nations has celebrated World Water Day on March 22 to raise awareness of the value of fresh water. The purpose of the day is to promote the responsible management of freshwater resources. The goal of this article is to weave together some of the groundwater-related news and stories from major national newspapers and to throw light on Rajasthan State's worst groundwater situation (United Nations, n.d.).

**How serious is India's water crisis?**

According to analysis from the Times Group as highlighted in the World Bank Report, all of the nation's water demands are met by groundwater, which also provides 85 per cent of rural water (The World Bank, 2012).

Given the state of its ground and surface water resources (rivers, streams, lakes, marshes, and reservoirs), India may become a water-scarce country over the next 40 years. With 1486 cubic metres (1.5 million litres) of water available per person per year, India is classified as water-stressed. According to Central Ground Water Board (CGWB) figures, indiscriminate groundwater usage has rendered 4 per cent (260) of the total 7,089 assessed units in the country critical by 2022, while 14 per cent (1,006 units) have been classified as over-exploited. The situation was much worse in 2017, when 17 per cent of the units were over-exploited ( NWDA, n.d.).

**Groundwater quality falling**

India is home to 18 per cent of the world's population, but just 4 per cent of that people has access to clean, safe water. About 70 per cent of the country's groundwater is unsafe for drinking and is a major contributor to the nation's high population with recurrent illnesses. Water pollution costs the nation between Rs. 470 and 610 billion annually (We Forum, 2019) . As per the Times group, 25691 habitations were impacted by one or more pollutants in December 2022. 9938 of them exhibited salinity, whereas 13716 had a high (beyond acceptable limit) presence of iron. 760 habitations were affected by arsenic, 655 by fluoride, 515 by nitrate and 107 by heavy metals ( NWDA, n.d.).

Agriculture, the supply of drinking water, industry, and even water-based cultural practises are all at risk from excessive groundwater exploitation. The excessive groundwater abstraction has been greatly influenced by the lack of information regarding the quantity and quality of water ( NWDA, n.d.).

**Water Pollution**

Pollution deteriorates the water quality and the soil quality of the river bed, which has a negative impact on the biota (life forms) in it. The habitat conditions for aquatic and riparian biota (both plants and animals) are threatened by damage caused to rivers. The amount of surface water resources has decreased due to the encroachment of water bodies and the discharge of untreated effluent into rivers and streams ( NWDA, n.d.).

**Scarcity of water in the Rajasthan State – A study**

In terms of access to enough, clean, and safe drinking water, the Rajasthan state's situation is substantially worse. Rajasthan has 5.5 percent share of population in the country, but water resources share is just 1.1 percent (Times of India, 2022).

According to the Groundwater Assessment Report, as on 31 March, 2022, out of 295 blocks and seven urban areas of the State, 219 blocks have been classified in the overexploited category (above 100 per cent), 22 sensitive, 20 semi-sensitive and only 38 are safe. (Times of India, 2023) . 85 per cent agriculture in the state is dependent on ground water while 65 per cent of drinking and industrial water requirements are met through ground water (Times of India, 2022).

Pali, Jodhpur, Jalore and Sirohi are suffering from worst water crises. Jaipur, Tonk and Ajmer are dependent on Bisalpur dam which is filled through rainwater. (Times of India, 2022). As per Times of India news, the district Jaipur reported a 918 million cubic metre groundwater deficit in 2021. (Times of India , 2023). The district's overall trend is declining at an average rate of 0.50 metres per year due to uneven distribution of groundwater, which is gradually driving the water table deeper (Times of India, 2023).

**What is the solution to the water crisis?**

**Initiatives at National Level**

- However, the Indian government has taken steps to conserve groundwater. The National Aquifer Mapping Programme (NAQUIM) aims to identify and characterise groundwater aquifer systems for sustainable management. The map will assist states in developing their respective management strategies by identifying the aquifer availability and potential. Rajasthan has the greatest targeted area for aquifer mapping coverage (3.3 lakh square km).

- The government of India has launched various schemes. Jal Shakti Abhiyan (JSA) in 2019 in the water-stress blocks of 256 districts to harvest monsoon rainfall through artificial recharge structures, watershed management, recharge and reuse structures. Atal Bhujal Yojana is another scheme implemented in certain water-stressed areas of Gujarat, Karnataka, Madhya Pradesh, Rajasthan and Uttar Pradesh etc (nwda, n.d.) .
- One of the cities, adopted the best practices to get rid of water shortage. Indore city, a provision of Rs 746 crore has been made for waterworks. For water recharge, a provision of Rs 20 crore has been made for water recharge whereas an amount of Rs 48 crore has been reserved for rejuvenation and maintenance of different ponds in the city including Bilawali, Pipliyahana, Sirpur, Pipilyapala (FreePressJournal, 2022).

**Conclusion:**

To overcome the situation of water crises, formulating a comprehensive and integrated campaign will be key. This effort should include the following steps: Guide and educate on water conservation, increase water use efficiency, accrue international, public and private funding, rehabilitate polluted water sources, encourage investments and research and development (R&D) and crucially, learn how to practise good water management at the local, national, regional and global scale (Hindustan Times, 2023).

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# CONSERVATION OF PICHAVARAM MANGROVES, THE 2ND LARGEST MANGROVE FOREST IN COASTAL TAMIL NADU

***By: Saurab Sharma, AAO***

## What are Mangroves?

Mangroves are the salt tolerant plant communities found in tropical and sub-tropical intertidal regions of the world. They have inbuilt adaptive characteristics to survive in water-logged areas, high salinity water and tidal surges. Not only they are important drivers for maintaining coastal bio-diversity, but they also act as a natural protection against extreme climate events (Forest Survey of India, 2021)..

*Picturesque view of Pichavaram mangrove forest*
*Photo credit – Tamilnadu Tourism Development Corporation*

## Conservation of Mangroves is crucial

At a global level, mangrove forests store approximately 6.23 (+/- 2.3) gigatonnes of carbon, equivalent to 22.86 gigatonnes of $CO_2$, with 87 per cent of that being soil carbon. The carbon storage capacity of mangroves is estimated to be four times more than other ecosystems. Even 1 per cent loss of remaining global mangroves cover could lead to the loss of 0.23 gigatons of $CO_2$ carbon sink equating to over 520 million barrels of oil (The Global Mangrove Alliance, 2022).

## Overview of Pichavaram mangrove forest

India is blessed to have many mangrove sites across several coastal parts. In Southern India, the Pichavaram mangrove forest is situated in Cuddalore district, Tamil Nadu. The mangrove cover in Cuddalore district is 7.73 sq km. The forest is located between two estuaries, the Vellar estuary in the north and Coleroon river systems. It is the second largest mangrove forest in the world (District Administration of Cuddalore, n.d.).

Pichavaram mangrove forest is a unique ecosystem that consists of dense mangrove forests, estuaries, and backwaters. Around 1100 hectares of area is covered by this forest. It is also joined by the Bay of Bengal, where it's separated by a lengthy sand bank (Cook, Guide to Visiting Pichavaram Mangrove Forest in Tamil Nadu). Moreover, this forest has more than 50 islands of various sizes and around 4,400 big and small canals.

It is also a home to diverse range of flora and fauna, including birds, crabs, fish, and various other species and because of this adverse biodiversity, this forest is a point of tourist attraction for a large number of visitors every year.

**Conservation of Pichavaram mangrove forest**

As impacts of climate change are increasing, the incidence of extreme weather events across the world including in India are apparent in every nook and corner. The mangrove plantation is a useful driver for making the coastal lands more resilient, preventing flooding and land erosion and acts as a buffer for cyclones. Recognising the importance of mangrove forests, the Government of India has launched a new programme Mangrove Initiative for Shoreline Habitats & Tangible Incomes (MISTHI) that will facilitate mangrove plantation along India's coastline and on salt pan lands. The programme will operate through "convergence between MGNREGS, Campa Fund and other sources (Ministry of Finance, 2023).

Similarly, the Government of Tamil Nadu has also planned to map and restore the degraded areas in Pichavaram and to increase mangrove cover by 0.6 square kilometres under Green Tamil Nadu Mission by using the fishbone model (The Hindu, 2023) . The fishbone model is used to allow water to reach mangrove areas by diverting water from existing creeks and channels.

**Challenges and the way forward**

Mangrove forests are considered to be the first line of defence against coastal disasters. Several man-made threats, such as forest cutting for development activities, industrialization and urbanization etc. are the key contributors for polluting the water bodies surrounding the mangrove forest as well climate changes such as coastal erosion and sea level rise. The water bodies surrounding the mangrove forest are getting polluted due to human activities such as industrialization, agriculture, and urbanization. The illegal poaching of fish, crabs, and other wildlife is another major threat to the Pichavaram Mangrove Forest.

In a nutshell, it is apparent that Pichavaram Mangrove Forest is a unique and valuable ecosystem that requires urgent conservation measures to ensure its survival. Sincere efforts should be made towards restoring the mangrove ecosystem and promoting sustainable practices. Awareness campaigns and educational programs should be conducted to educate people about the importance of mangrove ecosystems. As this forest is also a popular tourist destination, suitable measures should be taken to promote sustainable tourism practices that do not harm the ecosystem.

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# PERFORMANCE AUDIT REPORT ON CONSERVATION OF COASTAL ECO-SYSTEMS

***By: Gaurav Jain, Sr.AO***

**Background: -** The audit was conducted against the backdrop of the increasing threats to coastal ecosystems due to anthropogenic activities. The audit aimed to evaluate the effectiveness of the government's policies and programs for coastal ecosystem conservation, the adequacy of financial resources allocated for the purpose, the extent of monitoring and evaluation mechanisms, and the level of coordination among relevant government bodies. India's coastal ecosystems are diverse and complex, encompassing mangroves, coral reefs, salt marshes, and sand dunes, and are under threat from various anthropogenic activities and climate change. The audit aimed to identify areas for improvement in the government's efforts to conserve coastal ecosystems.

**Audit Scope & methodology:**

The audit covered the period from 2015 to 2020 and aimed to evaluate the effectiveness of the government's policies and programs for coastal ecosystem conservation, the adequacy of financial resources allocated for the purpose, the extent of monitoring and evaluation mechanisms, and the level of coordination among relevant government bodies. The audit methodology included a review of relevant laws, policies, and guidelines related to coastal ecosystem conservation, an examination of the inventory of coastal ecosystems, and an analysis of the conservation measures taken for mangroves, coral reefs, and other coastal ecosystems. The audit also assessed the financial allocation and utilization for coastal ecosystem conservation and the monitoring and evaluation mechanisms for coastal ecosystem conservation. It aimed to identify areas for improvement in the government's efforts to conserve coastal ecosystems, including coordination among relevant government bodies and the effectiveness of conservation measures.

**Audit Objective: -**

The Performance Audit was conducted with a view to

- Evaluate effectiveness of government policies and programs for coastal ecosystem conservation
- Assess adequacy of financial resources allocated for coastal ecosystem conservation
- Evaluate monitoring and evaluation mechanisms for coastal ecosystem conservation
- Assess level of coordination among relevant government bodies for coastal ecosystem conservation
- Identify areas for improvement and provide recommendations to ensure sustainable conservation of India's coastal ecosystems

**Audit Criteria: -**

- The audit assessed whether the government was complying with relevant laws, policies, and guidelines related to coastal ecosystem conservation, such as the Coastal Regulation Zone Notification, 2019.
- The audit reviewed the allocation and utilization of funds for coastal ecosystem conservation and assessed the effectiveness of the government's policies and programs for the conservation of mangroves, coral reefs, and other coastal ecosystems.
- The audit also assessed the adequacy of monitoring and evaluation mechanisms for coastal ecosystem conservation and the level of coordination among relevant government bodies, while identifying areas for improvement in the government's efforts to ensure the sustainable conservation of India's coastal ecosystems.

**Major Audit Findings** (C&AG of India, 2022)**:-**

**Inadequate implementation of coastal regulatory laws and guidelines:**

- The audit found that several states did not have a Coastal Zone Management Plan (CZMP) in place, which is a key requirement for the effective implementation of coastal regulatory laws and guidelines. This led to unauthorized construction activities and other violations in the coastal zone.

- The audit also found that there were several instances of non-compliance with the Coastal Regulation Zone (CRZ) Notification, 2019, such as allowing construction activities in the CRZ without obtaining the necessary permissions.

**Inadequate allocation and utilization of funds:**

- The audit found that the allocation of funds for coastal ecosystem conservation was inadequate, with several states reporting low utilization of funds allocated to them.
- The audit also found that there were delays in the release of funds, resulting in delayed or incomplete implementation of government policies and programs.

**Ineffective management of mangroves and coral reefs:**

- The audit found that the management of mangroves and coral reefs was ineffective, with several instances of destruction and degradation due to natural and anthropogenic factors.
- The audit also found that there was a lack of proper mapping and inventory of mangroves and coral reefs, leading to inadequate planning and management.

**Inadequate monitoring and evaluation mechanisms:**

- The audit found that the monitoring and evaluation mechanisms for coastal ecosystem conservation were inadequate, leading to incomplete and unreliable data on the status of coastal ecosystems and the effectiveness of government policies and programs.
- The audit also found that there were gaps in the collection and reporting of data related to coastal ecosystem conservation.

**Limited coordination among government bodies:**

- The audit found that there was limited coordination among the different government bodies involved in coastal ecosystem conservation, resulting in a lack of coherence and synergy in government efforts.
- The audit also found that there were gaps in the sharing of information and expertise among government bodies.

**Lack of public participation and awareness:**

- The audit found that there was a lack of public participation and awareness in coastal ecosystem conservation, leading to a lack of community support for government policies and programs.
- The audit also found that there was a lack of public outreach and awareness programs related to coastal ecosystem conservation.

**Overall inadequate efforts for coastal ecosystem conservation:**

- The audit found that the overall efforts of the government for coastal ecosystem conservation were inadequate, with several gaps and deficiencies in policies, programs, and implementation.
- The audit also found that there was a lack of emphasis on the sustainable conservation of coastal ecosystems, with a focus on short-term goals and outcomes.

**Conclusion:-**

- The Ministry of Environment, Forest & Climate Change needs to take the findings of the audit report seriously and address the gaps and deficiencies identified in a timely and effective manner to ensure the sustainable conservation of coastal ecosystems.
- It is crucial that coastal regulatory laws and guidelines are effectively implemented, and funds are properly allocated and utilized to achieve the desired conservation outcomes.
- The coordination among various government bodies needs to be improved, and public participation and awareness should be promoted to ensure that the conservation efforts are sustainable and beneficial for all stakeholders.
- The government needs to prioritize the conservation of coastal ecosystems, given their importance in protecting the environment, supporting livelihoods, and contributing to the country's economic development. Therefore, it is essential to adopt a long-term perspective and focus on achieving sustainable outcomes, rather than short-term gains.

**Recommendations:-**

- The Ministry of Environment, Forest & Climate Change should take immediate steps to address the gaps and deficiencies identified in the audit report and develop a comprehensive action plan for the conservation of coastal ecosystems.
- The government should ensure effective implementation of coastal regulatory laws and guidelines, including proper allocation and utilization of funds to achieve the desired conservation outcomes.
- There is a need to improve coordination among different government bodies and promote public participation and awareness to ensure the sustainability of conservation efforts.
- The government should prioritize the development of a comprehensive database for the mapping and inventory of mangroves and coral reefs, along with effective management practices, to ensure the conservation of these ecosystems.
- Monitoring and evaluation mechanisms should be developed and implemented to ensure that the effectiveness of government policies and programs can be accurately assessed, and corrective measures can be taken to improve conservation efforts.

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# A SNAPSHOT OF G 20 INITIATIVES TOWARDS BLUE ECONOMY POLICIES

***By: Manoj Kumar, AAO***

With India's assumption of the G20 presidency on 01 December 2022, the Comptroller and Auditor General of India (C&AG of India), i.e., Supreme Audit Institution of India (SAI India) has formally, taken over the chairmanship of Supreme Audit Institutions-20 (SAI20) on 31st January 2023. Especially since all G20 member countries are coastal States and together they account for 45 per cent of the world's coastline (The Hindu, 2023).

**Policies related to Blue Economy by the G20 countries**

- India has identified Marine Litter as a key priority under the broader ambit of Blue Economy. In 2017, the G20 adopted a Marine Litter Action Plan under the German presidency and later, in 2019, under the Japanese presidency an implementation framework on marine litter was adopted (The Hindu, 2023).
- The United Nations Convention on the Law of the Sea (UNCLOS) establishes a comprehensive regime of law and order in the world's oceans and seas ( Ocean and the law of the sea, 2022).
- The "Towards Zero" policy of Denmark and "The Green Shipping Programme" of Norway both aim to find solutions for efficient and sustainable shipping (United Nations, 2022).
- Caribbean region is considering a regional transition. A new project, "**Blue Economy: Caribbean Large Marine Ecosystem Plus (BE-CLME+): Promoting National Blue Economy Priorities through Marine Spatial Planning in the Caribbean Large Marine Ecosystem Plus**", began in March 2020. (United Nations, n.d.)

In a similar domain, the G20 nations have also taken various steps to promote the blue economy, including the adoption of policies aimed at the sustainable use of marine resources, the conservation of marine biodiversity, and the development of marine renewable energy.

- **Argentina:** The Argentine Government is fostering the "Pampa Azul" initiative in the field of scientific research, which is aimed at coordinating all efforts related to the sea, carried out by the public sector, in order to achieve greater knowledge of South Atlantic ecosystems and to enhance the management of their natural resources. Argentina created the National System of Marine Protected Areas, whereby it undertook a commitment to create Protected Marine Areas in 10 per cent of its maritime space (Argentina Ministry of foreign affairs, n.d.)
- **Australia: -** The Environment Protection and Biodiversity Conservation (EPBC) Act provides a legal framework to protect and manage unique plants, animals, habitats, and places. *Sea Installations Act 1987*, ensures that sea installations are operations safety (Australian Government Department of the environment and energy, n.d.) . Waters surrounding Australia's coastlines are protected from waste and pollution dumped at sea by the Environment Protection (Sea Dumping) Act 1981 (Sea Dumping Act). The Environment Protection (Sea Dumping) Act 1981 (Sea Dumping Act) also regulates the placement of artificial reefs in Australian waters (Australian Government Department of climate change, energy, the environment and water, n.d.).
- **Canada:** The *Oceans Act* is Canada's flagship marine protection law that came into force in 1997. *Canada's Oceans Act* created three programs on integrated management, marine protected areas (MPAs) and marine environmental quality. It mandated the Minister of Fisheries, Oceans & the Canadian Coast Guard to develop a national oceans strategy and a national system of marine protected areas (MPAs) (West coast environmental law, n.d.).
- **China:** China has enacted administrative regulation for the purpose of strengthening the administration of using sea areas, safeguarding the ownership of the state to the sea areas and the lawful rights and interests of the holders of the right to use sea

areas and promoting the reasonable development and sustainable utilization of the sea areas (The People's Republic of China Ministry of Ecology and Environment, 2018).

- **Germany: An integrated approach to environmental policy**: Building on the Convention on Biological Diversity's (CBD's) ecosystem approach, the German government pursues an integrated approach to marine conservation and all relevant policy fields are to include aspects relating to marine environmental protection and marine nature conservation. Germany is a member of the two regional cooperation mechanisms, Oslo and Paris Conventions (OSPAR) for the protection of the North-East Atlantic, and Helsinki Commission (HELCOM) for the protection of the Baltic Sea, as well as of the Trilateral Wadden Sea Cooperation (TWSC) (Federal ministry for the environment, nature conservation, nuclear safety and consumer protection, n.d.)
- **Indonesia:** The highlights of growing a blue economy in Indonesia include developing marine fisheries, marine transportation, tourism, energy and material production industries, based on the blue economy concept; further improving and coordinating marine and land economy national policies; developing blue economy demonstration zones; strengthen connections between trade and infrastructure; and promoting the development of technology and human resources (Economic and social affairs United Nations, n.d.).
- **Japan:** Japan has been actively promoting the rule of law at sea, including by contributing to the three organs established by (United Nations Convention on the Law of the Sea) UNCLOS, such as the International Tribunal for the Law of the Sea (ITLOS), the Commission on the Limits of the Continental Shelf (CLCS) and the International Seabed Authority (ISA) (Cabinet Office Japan, n.d.).
- **South Korea:** For the protection of marine ecosystem South Korea has a **Master Plan for Ocean and Fisheries Development (2021~2030) and the Marine Spatial Planning programme, and the 1st Comprehensive Plan for Port Air Quality (2021~2025)** which includes the establishment of a 5-year government action plan (from 2021 to 2025) under the aim to reduce

air pollutants produced at a port, including fine particle (PM2.5), sulfur oxide($SO_2$), nitrogen oxide($NO_2$) and etc. (South Korea Ministry of oceans and fisheries, n.d.).

- **Mexico:** Mexico's National Policy for Seas and Coasts (PNMC), established in 2018, is the legal instrument for the integrated management of Mexico's seas and coasts. Mexico has provisions on the **Coastal Management and Land Use Restrictions, Ocean Pollution, Ecology law, and Regulation for the Prevention and Control of Ocean Pollution** (Summary of Environmental Law in Mexico, n.d.)
- **United Kingdom:** Marine and Coastal Access Act 2009 makes provisions in relation to marine functions and activities; to make provision about migratory and freshwater fish; to make provision for and in connection with the establishment of an English coastal walking route and of rights of access to land near the English coast; to enable the making of Assembly Measures in relation to Welsh coastal routes for recreational journeys and rights of access to land near the Welsh coast; to make further provision in relation to Natural England and the Countryside Council of Wales; to make provision in relation to works which are detrimental to navigation; to amend the Harbours Act 1964; and for connected purposes. (Marine and Coastal Access Act, n.d.)
- **United States:** The Magnuson–Stevens Fishery Conservation and Management Act is the primary law that governs marine fisheries management in United States (U.S.) federal waters. Endangered Species Act, Marine Mammal Protection Act, National Environmental Policy Act are some of the important laws related to ocean ecosystems in the US (NOAA Fisheries, n.d.).
- **European Union**: The Marine Strategy Framework Directive of the European Union provides a comprehensive, holistic approach to the protection of European Seas, acting as the environmental pillar of the wider European Union maritime strategy. The EU Blue Growth strategy (2012) is the EU's long term strategy to support sustainable growth in the marine and maritime

sectors which recognises the potential of the European seas and oceans for innovation, economic growth and job creation. (Economic and social affairs United Nations, n.d.).

**Challenges**

There are several challenges related to Blue Economy that must be addressed in order to achieve the desired goals. Maritime sectors such as marine fisheries, aquaculture, ports and shipping, renewable energy, tourism, etc. and closely interlinked, and all these sectors need to work together to create tangible and sustainable impacts towards improving ocean ecosystems. Moreover, the activities occurring on the coast of one country can have impact on the coasts of other countries. This can be avoided through cooperation and combined efforts between the countries (The Hindu, 2023).

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# MARINE LITTER IN MUMBAI AND STRATEGIES TO REDUCE IT

***By: Vikas Dhir, AAO***

*Mumbai Beaches,*
*Image Credit: (teri, 2019)*

**Definition**:- *Marine litter is any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment.* Marine litter consists of items that have been made or used by people and deliberately discarded into the sea or rivers or on beaches; brought indirectly to the sea with rivers, sewage, storm water or winds; or accidentally lost, including material lost at sea in bad weather. (UNEP, n.d.)

**Introduction:-**

Marine litter is a complicated problem that has global consequences for both human activity and the marine and coastal environment. The issues it creates are widespread, cultural, and cross-sectoral. They stem from inadequate solid refuse management procedures. It can have land based and sea based sources. Marine litter can sink and accumulate at different ocean depths depending on its composition, size, ocean characteristics, buoyancy and other factors.

Utilization of marine resources, a lack of infrastructure, careless human actions, and a lack of general awareness of potential consequences are all contributing factors. The effects of climate change, ocean acidification, invasive species, overfishing and other extractive activities, pollution and marine debris, habitat degradation, fragmentation, and loss, the explosion of human population,

tourism, and the effects of a wide range of human activities in the coastal zone are currently the main perceived threats to marine biodiversity.

**Marine Litter on Mumbai beaches:-**

Marine litter is a growing and widespread threat to the marine and coastal environment. Every day, approximately 8 million pieces of litter enter the marine environment, endangering marine species. Plastics account for approximately 90 per cent of ocean litter (Source: Ocean Conservancy Report 2017). Mumbai has 114 kilometres of coastline and nearly 16 kilometres of beaches stretching from Colaba in the south to Madh and Marve in the north (Maharashtra Maritime Board). Dadar Chowpatty is a popular tourist destination, as is Chaityabhoomi Beach. The high volume of visitors makes beach cleanliness a major challenge for MCGM (Murali, 2021)

According to Central Institute of Fisheries Education (CIFE) study, published in the Elsevier Journal Science of the Total Environment in 2020, estimated that the north-east Arabian Sea had 379 metric tonnes of marine debris, with plastics accounting for 40.6 percent by weight. Microplastics have also been discovered in widely consumed varieties of seafood in Mumbai, according to CIFE studies. (Hindustan Times, 2023). They are little bits of plastics with a length of less than 5mm. According to a new assessment of anthropogenic litter by researchers at the Aquatic Environment and Health Management Division, ICAR-Central Institute of Fisheries Education (CIFE), Mumbai, plastics predominate the contents of marine debris discovered on the city's sandy beaches. According to experts, the results underscore the enormous threat that such pollutants pose to marine ecologies and wildlife, as well as the city's poor waste management practises. (Hindustan Times, 2023)

It has also been discovered that 75.5 per cent of the 52,770 individual items of litter collected and analysed from two beaches - Juhu and Aksa - were different types of plastic. According to the peer-reviewed study, which was published this month in the Arabian Journal of Geosciences, "marine litter was quantitatively assessed on sandy beaches of the Mumbai coast, India". The beaches of Juhu

and Aksa were contaminated by macro litter larger than 2.5 centimetres in size. The amount of marine litter collected was greater than that recorded in other habitats such as creek water channels, the sea bottom, and mangroves along the Mumbai coast, indicating that sandy shores are more susceptible to litter pollution." (Hindustan Times, 2023)

Furthermore, according to extant study, the abundance of marine litter on the two beaches was higher than on other prominent sandy beaches in India. For example, the mean abundance of marine litter observed in Juhu was approximately 1,698 items/50 metres, while it was approximately 407 items/50 metres in Aksa, a comparatively cleaner beach. (Hindustan Times, 2023)

**Effect on Mangroves**

According to a CIFE research on marine waste published in October 2021, Mumbai's mangroves are also swamped by plastics. According to the study, plastics accounted for 62 per cent of all surface debris items (by quantity) and 43 per cent of all surface debris items (by volume) (by weight). (Hindustan Times, 2023).

**Effect on Fisheries**

Because of plastic pollution, fisher communities living near Mumbai's beaches and the Arabian Sea are losing access to fishing grounds and livelihoods. In 2019, according to a study which found 80 microplastic particles per 100 grammes of fish, bivalves (clams, oysters), and shrimp captured in Mumbai. Microplastics easily enter the environment as a result of the disposal and deterioration of various consumer and industrial items. Under the impact of wind, abrasion, and UV light, big pieces of plastic break off into smaller fragments over time. When humans consume fish, for example, these may be swallowed by marine life and migrate up the food chain. (Hindustan Times, 2021)

**Initiatives taken to reduce Marine Litter:-**

a) **UNEP-TERI joint initiative in Mumbai region**:- On March 4, 2019, the Japanese government and the United Nations Environment Programme (UNEP) announced a joint initiative to improve knowledge and information for developing countermeasures against marine plastic litter in Southeast Asia and India. The project, titled 'Promotion of countermeasures against marine plastic litter in Southeast Asia and India,' is being undertaken along the Ganges River Basin in Haridwar/Rishikesh and Allahabad, as well as the Yamuna River Basin in Agra, and is being funded by UNEP.

As part of this program, TERI will lead a public campaign in Mumbai called Rethink Plastic to promote awareness about plastic pollution, its effects, and strategies to control plastic pollution, as well as to inspire communities to limit their usage of single-use plastic. (teri, 2019)

b) **Mangrove Ecosystem**

A pilot clean-up project was organised on November 2nd as part of the project at two mangrove areas next to Vashi creek, Sagar Vihar and Mini Seashore in Navi Mumbai. The clean-up was carried out in two teams by 18 volunteers, including TERI workers, local people, and school kids. A total of 280 kg of waste from two locations was collected and separated into ten categories, including glass, paper, plastic bottles, rubber, and so on. TERI will use plastic bottles gathered during clean-up operations for the event on February 2nd. The pilot activity provided an opportunity to meet with other stakeholders, including government officials and corporate entities. (teri, 2019)

**c) United Way Mumbai (United Way Mumbai, 2022)**

United Way Mumbai is a non-profit organization working in urban and rural communities across India to identify and implement the most impactful solutions to community problems. It has been working towards cleaning the beaches through Clean Shores Mumbai. Through this project, it aims to enhance the overall state of cleanliness and waste management at the shores of Mumbai through public private partnership.

d) **Beach Ecosystem**

On December 3, 2019, a group of local volunteers conducted a second clean-up operation as part of their campaign at the Chimbai Beach in Bandra, Mumbai. They gathered and sorted debris. More than 30 participants were briefed by the TERI team on the clean-up effort, and personal protective equipment was distributed. Following waste collection, 16 different forms of plastic waste, including single-use plastic, plastic bottles, polyester, and cutlery, were separated. (teri, 2019)

*Volunteers segregating waste*
*Image Credit: (teri, 2019)*

*Before and after scenario at the cleanup site*
*Image Credit: (teri, 2019)*

e) **Creek Ecosystem**

On March 2, 2020, TERI and the National Productivity Council (NPC) organised the third cleanup event (Waste collection and characterization) as part of the Rethink Plastic campaign at Charkop, close to Gorai Creek, Mumbai. A group of 14 National Service Scheme (NSS) students from Mumbai's Jogeshwari Education Society (JES) college of Science, Commerce, and Information Technology joined

the TERI and NPC officials in volunteering for this project. Volunteers collected about 59 kg of mixed waste from the 315 sq.ft defined area. (teri, 2019)

**Conclusion**

Marine litter must be managed with a policy framework that sets clear objectives where stakeholders have different defined roles. There should be accountability for environment and economic costs and benefits of marine litter management strategies to ensure optimal use of coastal zone. Marine litter issue is a reality that needs urgent solutions. However solutions can take time to implement, it is likely that effects will only be seen in the long term. To increase the quality of the coastal environment and strengthen trash control, flexible solutions should be used instead of reactive ones.

Whatever mechanisms exist to collect, recycle, and treat waste, humanity will never achieve a really clean marine environment until there is a fundamental shift in human thoughts and conduct towards producing less trash and not littering.

We urgently need a global system for categorising trash, as well as more studies into the chemistry of plastics to create biodegradable and fully compostable new plastics. Stopping trash generation at the source is the key to producing less garbage. This is crucial in the production of micro- and nano-plastics. Product design is also important, because existing product designs are not focused towards end-of-life materials. The most successful ways of educating the public about the litter issue are beach cleaning, newspapers and TV programmes. (A.T. Williams, 2019)

To address and counteract the negative effects of growing marine trash, national policy and local initiatives must adopt an integrated and comprehensive strategy. Since final decisions involve governmental action, political will is essential. National policy setting must include litter management and awareness should be raised in planning and capacity building. If people start putting more emphasis on

planning for the future rather than just the present, the current circumstances may lead to a significant change towards a sustainable global civilization.

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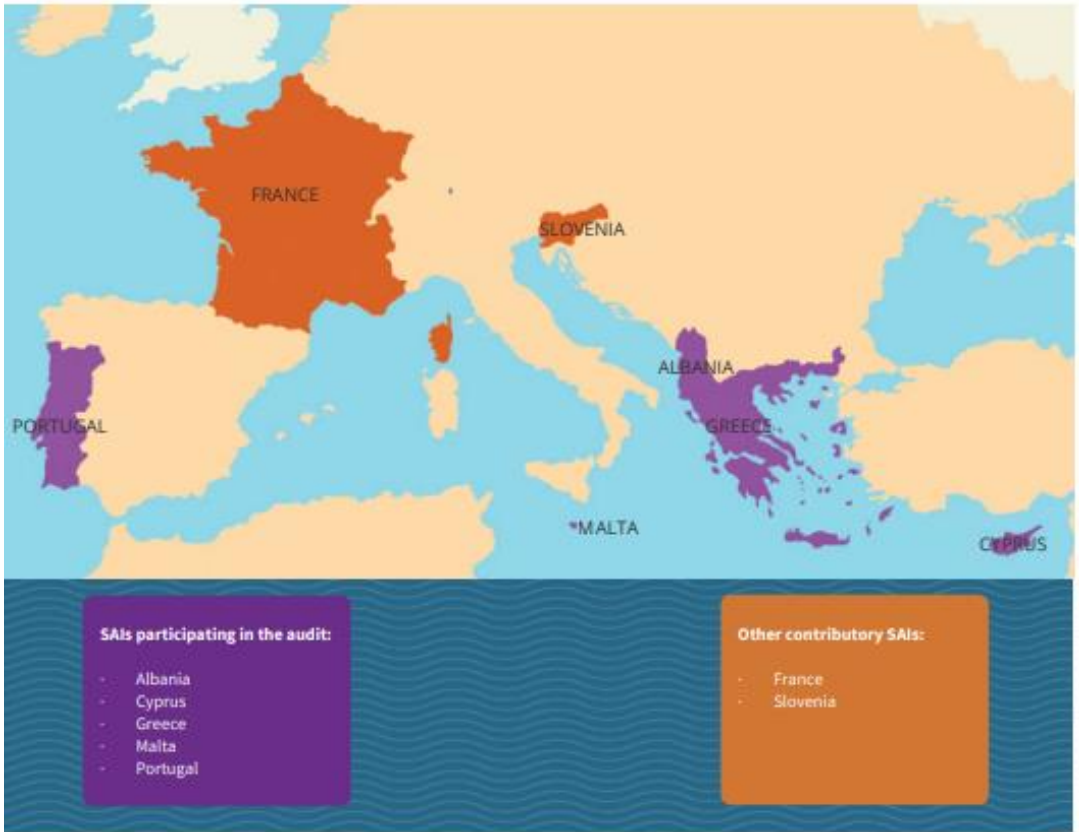
# COOPERATIVE AUDIT: ARE ADEQUATE MECHANISMS IN PLACE FOR THE DESIGNATION AND EFFECTIVE MANAGEMENT OF MARINE PROTECTED AREAS (MPAs) WITHIN THE MEDITERRANEAN SEA? (NAO Malta, 2019)

***By: - Anupam Srivastava, Sr.AO***




*SAI'S participating in the joint audit. Image Credit :- (NAO Malta, 2019)*

Environmental issues and sustainability are becoming increasingly important to Supreme Audit Institutions (SAIs). These issues are significant on the agendas of various international forums because to their cross-border implications. Within this spirit, the Supreme Audit Institutions (SAIs) of Albania, Cyprus, Greece, Malta, and Portugal, who are members of the European Organisation of Supreme Audit Institutions Working Group on Environmental Auditing (EUROSAI WGEA), decided to conduct a cooperative audit to examine the mechanisms in place by their governments to ensure the proper and adequate designation, as well as effective management, of Marine Protected Areas (MPA's) within their jurisdiction.

**Audit Focus**

This cooperative audit sought to elicit good practices and issues of concern, which influence the sustainability of biodiversity in the Mediterranean Sea. Consequently, this cooperative audit was aimed to extent to which:

- Governments developed the relevant legal and strategic framework to conserve marine biodiversity;
- National authorities carried out the required assessments to designate MPAs;
- Site specific management plans to conserve the marine habitats and species were drafted;
- The proposed measures to utilise MPAs in a sustainable manner are being implemented in an effective and timely manner; and National entities are monitoring that MPAs are managed in an and sustainable way.

***The cooperative audit identified that the necessary mechanisms for the designation and effective Management of Marine Protected Areas (MPAs) within the Mediterranean Sea were not always in place to achieve the desired equilibrium between the sustainability of Marine Protected Areas and blue growth.***

## Methodology

The attainment of the audit objectives entailed a number of methodological approaches which were applied to varying degrees by the partner SAIs. Collectively, the following were applied at the national level:

a. Adherence to ISSAIs – National audits were carried out in accordance with the Standard for Performance Auditing, International Standards of Supreme Audit Institutions (ISSAI), namely ISSAI 3000.

b. Documentation review – Thorough analysis of a broad legislative framework, related strategies and policies, as well as documentation related to assessments and management of MPAs both locally and abroad.

c. Semi-structured interviews – These interviews enabled the collation of qualitative data. To this end, participating SAIs interviewed key officials within their respective national authorities

d. Benchmarking – This involved comparing the methods used by other countries in designing assessments and management plans. The way MPA monitoring is carried out in other countries was also analysed, in order to get an overview of how countries can benefit in adopting such measures for their respective national monitoring and conservation process.

## Key Findings

The aim of the cooperative audit was to determine the degree to which countries in the Mediterranean region are effectively conserving marine biodiversity to attain the targets set in national legislation and international protocols. To address this aim, the participating SAIs compiled an audit design matrix based on issues relating to the regulatory framework, strategies, site assessments undertaken, management plans drafted and national surveillance efforts. The analysis of these five key areas, led to these main findings:

a. Participating SAIs reported that the legal framework regulating MPAs(Marine Protected Areas) seems to be sufficiently robust and mandates national authorities to ascertain the sustainability of the marine environment. However, it does not provide a common definition of what constitutes an MPA. In addition, overlapping and, in some instances, conflicting provisions were identified within the national regulatory frameworks.

b. National strategic frameworks, generally, reflected the political will and aimed to outline the relevant outputs as well as outcomes through the designation of MPAs. However, in some participating SAIs no comprehensive sector specific strategies were in place, while all SAIs identified the potential of strengthening national strategic frameworks, so as to optimize their impact.

c. While it is recognised that management plans are key to the implementation of measures to ensure the sustainability of MPAs, most participating SAIs reported that site-specific plans were not in place. Moreover, other technical and logistical limitations, such as coordination issues and the non-deployment of resources, influenced the degree to which participating countries could implement specific measures to ascertain the conservation of protected species within MPAs.

d. Site-specific management plans, administrative capacity weaknesses and coordination limitations between stakeholders are the key elements that hindered adequate monitoring and enforcement of measures in MPAs. Monitoring and enforcement shortcomings did not guarantee that MPAs and therefore the biodiversity they aim to protect were being managed, as well as utilised, in a sustainable manner.

## Recommendations

Following strategic recommendations were made in the report:

1. Mediterranean countries should aim to adopt a common definition of what constitutes a Marine Protected Area. This would enhance cross-jurisdiction cooperation, facilitate data collection and enable countries to better gauge their performance in the designation and management of MPAs through comparative analysis and set benchmarks.

2. Where circumstances permit, countries should consider establishing Specially Protected Areas of Mediterranean Importance (SPAMI) within the Mediterranean high seas. This would further extend the network of marine protected areas within the

Mediterranean. As a prerequisite, countries are encouraged to strengthen the level of cooperation and coordination on a bilateral and multilateral basis.

3. The strategic framework relating to MPAs should be strengthened. To this effect, national strategies are to refer to the expected outputs, outcomes and impacts of the strategic objectives. Furthermore, where necessary, action plans should be drawn up to reflect the strategic vision and subsequently allocate the necessary resources. This would better enable the expedient implementation of the measures listed in the strategic framework.

4. National authorities are encouraged to compile site-specific management plans as a matter of priority. This will encourage national authorities to embark on proactive approaches to ascertain the sustainability of the designated MPAs.

5. National authorities are to consider compiling site-specific monitoring and enforcement plans, which embrace risks analysis principles. These plans are to detail the monitoring approaches to be adopted, the frequency of inspections as well as the administrative capacity requirements. Such plans will contribute to more effective and transparent enforcement.

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# SEA WEED FARMING AND ITS POTENTIAL IN THE INDIAN OCEAN

***By: Vijendra Singh Tanwar, AAO***

## Introduction

*Sea Weed Farming*
*Image Credit (ScienceFriday, 2016)*

Sea weed farming is an efficient way to produce highly nutritious food for a growing population. It does not require fertilizer, pesticides, freshwater or land. Acting as underwater forest, it absorbs carbon, nitrogen and phosphorus which makes it a valuable tool to fight climate change while creating new habitat for diversity of marine life (WWF, n.d.) . The demand for seaweed products in the region has increased in recent years, particularly in the food and cosmetic industries, highlighting the need for sustainable seaweed farming practices. According to a 2022 report by the Food and Agriculture Organization of the United Nations (FAO) (FAO, 2022), seaweed production in Asia accounted for 99.54 per cent of the world's total in 2020.

## Advantages of Sea Weed Farming

One of the most significant advantages of seaweed farming is its potential to mitigate the effects of climate change. Not only does seaweed absorb large amounts of carbon dioxide from the atmosphere, reducing greenhouse gas emissions, but it can also provide critical habitat and food sources for marine life, helping in the protection and conservation of marine ecosystems. Seaweed farming can provide an alternative source of income and alternative livelihood for coastal communities, thereby reducing the pressure on other marine resources. By offering alternative livelihoods, seaweed farming can reduce poverty and promote economic growth in coastal areas while protecting marine ecosystems.

**Food Security**

Seaweed is also a rich source of nutrition and has been consumed as a traditional food source in many coastal communities. It is rich in minerals and nutrients such as iodine, calcium, and iron, which are essential for human health. Seaweed farming can, therefore, help to promote food security in coastal areas by providing a reliable source of nutritious food.

**Variety in Species**

Several species of seaweed are suitable for cultivation in the Indian Ocean, including Kappaphycus alvarezii, Turbinaria turbinate (as Fucus turbinatus) and Sargassum granulatum (as Fucus granulates) (Vaibhav A. Mantri, 2019) These species are widely cultivated in other parts of the world and have shown good growth rates in the Indian Ocean. Recent research studies have proved that Kappaphycus alvarezii has high potential for the growth in Indian Ocean. (Vaibhav A. Mantri, 2019) .

**Challenges**

Despite the potential advantages of seaweed farming, a number of issues need to be addressed in order to encourage its growth in the Indian Ocean. Regulatory and legal restrictions, a lack of funding and investment opportunities and lack of awareness about seaweed production, are some of these challenges.

**Conclusion**

In conclusion, seaweed farming has significant potential in the Indian Ocean to provide sustainable livelihoods for coastal communities while promoting marine conservation efforts. Seaweed farming can play a vital role in promoting food security, economic growth, and environmental sustainability in the Indian Ocean region by promoting sustainable and eco-friendly practices. With the right

investments, knowledge, and infrastructure, seaweed farming can become a significant player in the region's economy and a key contributor to sustainable development.

To stimulate the growth and development of seaweed farming in the region, governments and private investors must provide finance and investment possibilities. Furthermore, more research and development is required to identify the most suitable species for cultivation in the Indian Ocean and to develop effective and sustainable production methods.

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# BLUE ECONOMY-AIMING TO ACHIEVE NET ZERO EMISSIONS BY MID-CENTURY

***By: Lokesh Kumar Meena,AAO***

*"Blue economy takes forward the concept of Lifestyle for Environment (LiFE), introduced by India at the COP26 Glasgow summit, which emphasises the need for 'mindful and deliberate utilisation' to sustain and revitalise the marine and freshwater environments. As a priority area, it serves to bring the focus of SAIs to particularly (but not exclusively) SDG 14, viz. Life Below Water."*

**Shri Girish Chandra Murmu**

**Comptroller and Auditor General of India**

**Introduction:** - The Blue Economy is a concept that refers to the sustainable use of ocean resources to support economic growth, improve livelihoods, and ensure the health and well-being of coastal communities. It recognizes the importance of the ocean as a valuable source of renewable energy, food, and raw materials, as well as a critical carbon sink. The ocean has enormous potential for generating renewable energy from sources such as wind, waves, and tides. A new report has advocated that, wave energy could provide up to 10 per cent of global electricity demand by 2050 (Clean Technia, 2017), with significant potential for growth beyond that.

As the world faces the dual challenges of climate change and sustainable development, the Blue Economy has become an increasingly important framework for achieving a net-zero emissions future by the middle of this century.

**Sustainable Ocean Management**

The concept of sustainable ocean management is central to the Blue Economy. This involves balancing the economic benefits of maritime activities against the need to safeguard marine ecosystems and the communities that rely on them. Innovative and sustainable practices in sectors such as fisheries, aquaculture, shipping, and renewable energy are required.

**Towards Zero Carbon**

The Blue Economy includes areas such as shipping and tourism in addition to renewable energy and fisheries. Shipping is an important component of global trade, but it also contributes significantly to greenhouse gas emissions. Staying within the Paris Agreement's global warming limitations necessitates reducing greenhouse gas emissions to net zero by mid-century, which includes decarburization, as well as the removal and storage of CO2 from the atmosphere, referred to as negative emissions. Even if the Paris Agreement's target of keeping global warming well below 2°C is met (United Nations), persistent climate change and its effects necessitate forward-looking planning for adaptation to a climate resilient blue economy and coastal environments.

**Initiatives towards Zero Emission**

a) The Fuel EU Maritime Initiative, which will establish a maximum limit on the greenhouse gas content of energy used by ships calling at European ports, is yet another initiative to encourage the use of sustainable maritime fuels and zero-emission technologies (European Commission, 2022).
b) By promoting sustainable fishing and tourism, sustainable production, and raising people's awareness of their sustainability choices, the Blue economy can help to enhance the management of human activities at sea. Additionally, it can support with port greening, maritime transport decarbonization and de-pollution, and the production of renewable energy at sea (European Commission, 2022).
c) The Zero Pollution Action Plan for Air, Water, and Soil, which was adopted on May 12, 2021, provides a comprehensive 'roadmap' of what it will take to work together to achieve a pollution-free environment. This Action Plan plans, among other targets, aims to prevent and reduce pollution in waters and oceans, as well as to facilitate remediation (European Commission, 2022).

d) Another ambitious legal framework that is necessary to attain clean, healthy, and productive seas of "good environmental status" is the EU Marine Strategy Framework Directive. The Directive has pushed for a greater understanding of the pressures and effects of human activity on the sea, as well as the implications for marine biodiversity, habitats, and the ecosystems they sustain. It has developed a cross-sectoral, cross-policy framework to manage Europe's oceans effectively. To make sure that this Directive continues to benefit the future generation, the Commission has started an ambitious review process (European Commission, 2022).

e) By fostering decarbonisation particularly through marine renewable energy and zero-emission maritime transport, the Blue Economy can contribute to climate objectives (European Commission, 2022).

f) On 17 May 2021, the Commission adopted a Communication with a new approach for a sustainable Blue Economy in Europe for the industries and sectors related to oceans, seas and coasts (European Commission, 2022). The Commission asks that every blue sector adopt more sustainable business models, develop clean alternatives, and discover innovative ways to collaborate with others in order to lessen the cumulative consequences of our actions on the maritime environment in this Communication (Europea Commission, n.d.). The Communication identifies some concrete, desirable transformations in the various sectors of the Blue Economy that can guide public and commercial actions. The primary goals of these transformations are to:

- achieve the objectives of climate neutrality and zero pollution
- switch to a circular economy and reduce pollution
- preserve and restore biodiversity and ecosystems
- support climate adaptation and coastal resilience
- ensure sustainable food production
- improve management of space at sea

## Conclusion

To achieve a net-zero emissions future by the middle of this century, it is essential to take a holistic approach to sustainable ocean management. This means integrating the principles of the Blue Economy into national and international policies and frameworks, promoting sustainable practices across all ocean sectors, and investing in research and development of new technologies.

In conclusion, the Blue Economy provides a valuable framework for achieving a net-zero emissions future by the middle of this century. As we face the urgent challenges of climate change and sustainable development, the Blue Economy offers a vision of a future in which the ocean is managed in a way that benefits both people and the planet. As part of the zero-pollution action plan, initiatives are being taken to significantly reduce future emissions to the air, the sea, and the overall environmental impact from the maritime transport industry. These initiatives work in coordination with the deployment of alternative marine fuels (European Commission, 2022). Shipping must decarbonize, if the globe is to decarbonize. This requires zero-emission ships to become the dominant choice by 2030, as well as bridging the competitiveness gap between traditional fuels and sustainable alternatives fuels (European Commission, 2022).

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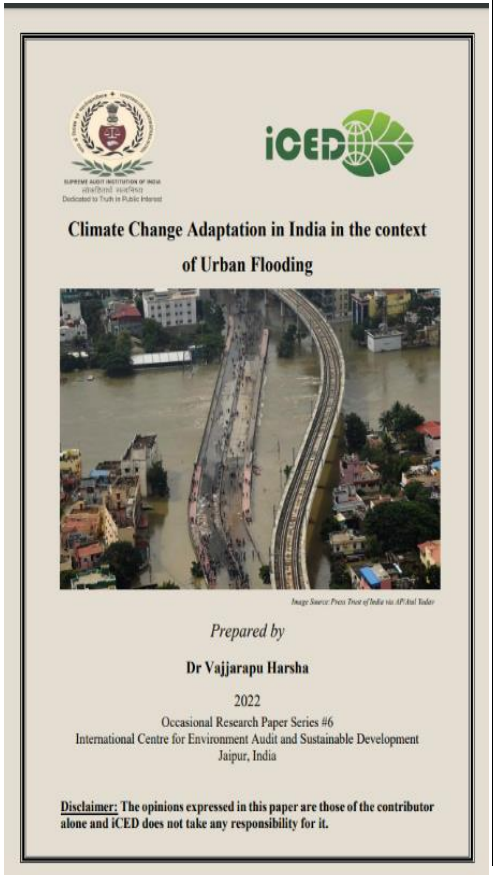


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## BIODIVERSITY AT iCED JAIPUR

**EURASIAN HOOPOE** (Upupa epops )

*The Eurasian hoopoe (Upupa epops ) is the most widespread species of the genus Upupa. It is native to Europe, Asia and the northern half of Africa. Eurasian hoopoes spends most of the time on the ground probing for grubs and insects. The bird mostly feeds on the ground and rarely feeds in the air where their strong and rounded wings makes them fast and manoeuvrable in pursuit of numerous swarming insects.* ***(Animalia, n.d.)***

***Eurasian Hoopoe found in iCED Campus Photo Credit: Capt. Shashank. ( Dy.Chief Mechanical Engineer-North Western Railway)***

***Grey Francolin found in iCED Campus Photo Credit: Capt. Shashank. ( Dy.Chief Mechanical Engineer- North Western Railway)***

**GREY FRANCOLIN*(Francolinus pondicerianus)***

*The Grey Francolin also known as "manu moa" or "Chicken Bird" is a species of francolin. It is found in the plains and drier parts of the Indian subcontinent and Iran. They are weak fliers and usually fly short distances . Their food includes seeds, grains as well as insects, particularly termites and beetles (especially Tenebrionidae and Carabidae). They may occasionally take larger prey such as snakes.* ***(Animalia, n.d.)***

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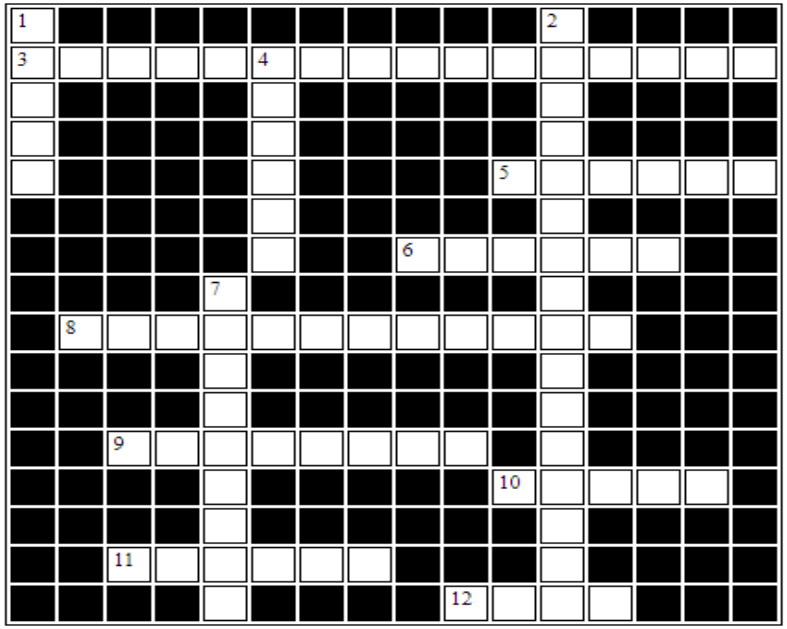
# CROSS THE WORD

*By: Vikas Dhir, AAO*



**Down**

1. **Which** country owns the largest deep water fishing fleet, with boats that stay at sea for months or even years?

2. Under **which** mission, the Government of Tamil Nadu has also planned to map and restore the degraded areas in Pichavaram.

4. **Which** SDG focuses on conserving and using oceans, seas, and marine resources for sustainable development?

7. The First G20 Environment and Climate Sustainability Working Group (ECSWG) meeting held in **which** place of India?

**ACROSS**

3. **Which** treaty focusses on to protect marine biodiversity in the areas outside the national jurisdictions?

5. **Which** is an international agreement that establishes the legal framework for marine and maritime activities?

6. **Which** scheme protect and revive mangrove ecosystems on the Indian coast while enhancing socio economic condition of nearby communities?

8. **Which** economic sector promotes the sustainable use of marine and fresh water resources while conserving the environments?

9. **Which** is the common name for countless species of marine plants and algae that grow in the ocean as well as in rivers, lakes, and other water bodies?

10. Comptroller and auditor general (C&AG) of **which** country pitched for greater collaboration among G20 nations for bolstering audit frameworks relating to artificial intelligence (AI) and the Blue Economy

11. Which aquatic ecosystem is the Earth's largest aquatic ecosystems?

12. **Which** bonds are innovative financing instruments that earmark funds exclusively for ocean friendly projects and critical clean water resources production?

**ANSWERS**

**ACROSS**

3. HIGH SEAS
5. UNCLOS,
6. MISTHI,
8. BLUE ECONOMY,
9. SEA WEED
10. INDIA,
11. MARINE,
12. BLUE

**DOWN**

1. CHINA,
2. GREEN TAMIL NADU,
4. SDG 14,
7. BENGALURU

***Water is life's matter and matrix, mother and medium. There is no life without water.***

Albert Szent-Gyorgyi