SDG 14 : Life Below Water

SDG 14 in India: Life Below Water

Sustainable Development Goal 14 (SDG 14) focuses on conserving and sustainably using the oceans, seas, and marine resources. India, with its vast coastline of over 7,500 kilometers and a rich marine ecosystem, plays a crucial role in achieving global marine sustainability. The government has implemented initiatives to protect marine biodiversity, combat pollution, and ensure sustainable fisheries, recognizing the importance of oceans for economic development and ecological balance.

Efforts by the Indian Government to Achieve SDG 14

1. **Marine Biodiversity Protection**:
   - Protected areas, such as **Marine National Parks** in the Gulf of Mannar and Gulf of Kutch, safeguard diverse marine species and ecosystems.
   - Initiatives like the **National Marine Turtle Action Plan** focus on conserving endangered species.
2. **Combatting Marine Pollution**:
   - The **Swachh Sagar, Surakshit Sagar** campaign aims to reduce marine litter, particularly plastics, through coastal clean-ups and waste management programs.
   - Efforts to monitor and regulate industrial and agricultural runoff help prevent ocean pollution.
3. **Sustainable Fisheries Management**:
   - The **Blue Revolution** program promotes sustainable aquaculture and fisheries, focusing on resource efficiency and biodiversity conservation.
   - Fishermen are trained in sustainable practices, and subsidies are provided for eco-friendly fishing equipment.
4. **Integrated Coastal Zone Management (ICZM)**:
   - ICZM projects focus on managing coastal resources sustainably, balancing economic development with ecological preservation.
   - Activities include mangrove plantation, coral reef restoration, and community awareness.
5. **Mangrove and Coral Reef Conservation**:
   - India has undertaken afforestation projects to restore mangroves, which act as natural buffers against coastal erosion and support biodiversity.
   - Coral reef monitoring and restoration programs in areas like the Andaman and Nicobar Islands aim to preserve critical marine habitats.
6. **Marine Research and Technology**:
   - Institutions like the **National Institute of Oceanography (NIO)** and **Central Marine Fisheries Research Institute (CMFRI)** conduct research on marine ecosystems, climate change impact, and sustainable resource use.
   - India invests in ocean exploration technologies to understand deep-sea biodiversity and resources.
7. **Climate Resilience for Coastal Communities**:
   - Programs such as the **National Cyclone Risk Mitigation Project (NCRMP)** strengthen disaster preparedness and infrastructure in coastal areas.

- Efforts to provide alternative livelihoods for fishermen reduce overdependence on marine resources.

8. **Global Collaboration**:
   - India participates in international agreements like the **United Nations Convention on the Law of the Sea (UNCLOS)** and **Global Coral Reef Monitoring Network** to align with global marine conservation goals.

SDG 14 at the University of Petroleum and Energy Studies (UPES)

UPES supports SDG 14 by integrating marine conservation into its academic, research, and outreach activities. The university leverages its expertise in energy and environmental sciences to address challenges related to marine ecosystems and sustainable resource use.

1. **Research on Marine Sustainability**:
   - Faculty and students conduct research on topics such as marine pollution, sustainable fisheries, and renewable energy solutions for coastal communities.
   - Collaborative projects explore the impact of climate change on marine biodiversity and propose strategies for ecosystem resilience.
2. **Sustainability in Education**:
   - UPES incorporates marine conservation topics into its environmental science and energy programs, educating students about ocean sustainability.
   - Courses emphasize sustainable practices, pollution control, and biodiversity preservation.
3. **Community Engagement**:
   - The university organizes workshops and awareness programs for coastal communities, focusing on waste management, sustainable fishing, and climate resilience.
   - Partnerships with local organizations promote mangrove restoration and beach clean-up activities.
4. **Reducing Marine Pollution**:
   - UPES encourages students and staff to reduce plastic usage on campus and in surrounding areas.
   - Initiatives like waste segregation and eco-friendly events contribute to minimizing land-to-sea pollution.
5. **Promoting Renewable Energy for Marine Ecosystems**:
   - Research projects at UPES focus on offshore renewable energy systems like wind and wave power, reducing dependence on fossil fuels.
   - Student innovations include prototypes for solar-powered desalination and sustainable aquaculture systems.
6. **Student-Led Initiatives**:
   - Student organizations lead campaigns such as "Save the Oceans" to raise awareness about marine conservation.
   - Participation in global challenges and competitions fosters innovation in ocean sustainability.
7. **Partnerships with Industry and NGOs**:
   - UPES collaborates with industries and non-governmental organizations to develop sustainable technologies for marine resource management.
   - Partnerships with government bodies enhance the university's impact on coastal and marine conservation projects.
8. **Raising Awareness**:

- The university celebrates events like **World Oceans Day** to educate the campus community about the importance of marine ecosystems.
- Regular seminars and expert talks highlight challenges and solutions for ocean conservation.

Impact of UPES's Contributions to SDG 14

UPES aligns with SDG 14 by fostering research, education, and community engagement focused on marine conservation and sustainable practices. The university's initiatives not only address local and regional marine challenges but also prepare students to contribute to global solutions. By integrating sustainability into its operations and academic programs, UPES demonstrates its commitment to preserving life below water for future generations.

Saving the ocean's vital ecosystems

https://www.unep.org/interactives/why-blue-ecosystems-matter/?gclid=EAIaIQobChMI3JK13uGiggMVWsHVCh3YIg47EAAYASAAEgI-CPD_BwE [1]

Join us for a deep dive into how humanity can safeguard and restore underwater habitats - kelp forests, mangroves, seagrass meadows and coral reefs.

Much of life underwater is concentrated in four key habitats: kelp forests, mangroves, seagrass meadows and coral reefs. But these havens are facing existential threats from a human-induced triple planetary crisis of climate change, biodiversity loss, pollution and waste. Coral reefs, the underwater cities that are home to 25 per cent of marine life, could be gone by the century's end, for example.

The loss of these ecosystems would not only be catastrophic for the plants and animals that call them home. It would also devastate human communities that rely on the ocean for food and jobs, while accelerating the climate crisis and exposing coastal zones to fierce storms and rising seas.

Kelp Forests

Mangroves

Seagrass Meadows

Coral Reefs

But it is not too late to avoid that future. Increasing knowledge and understanding of blue ecosystems supports the 2030 Global Biodiversity Framework targets by helping countries effectively protect and better manage 30 per cent of the ocean, restore 30 per cent of degraded coastal and marine ecosystems, and to measure & monitor success. By protecting and restoring key underwater habitats, we can ensure the ocean remains healthy and productive for generations to come as outlined by UN Sustainable Development Goal 14.2.

Forests of the Deep —Kelp

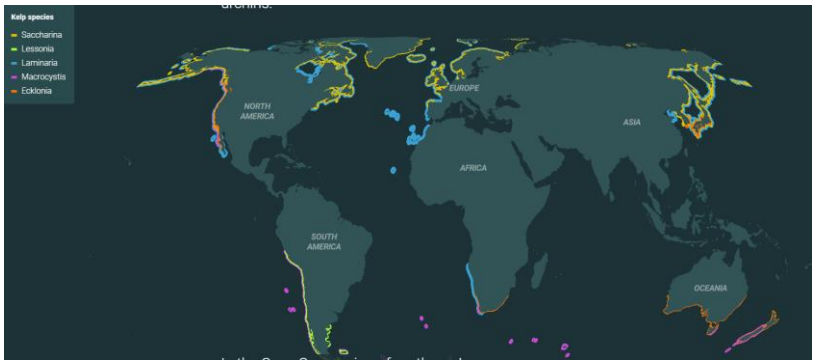
Kelp is a term commonly used to refer to over 100 species of large brown seaweeds. The complex 'forest-like' underwater habitats they form are some of the most productive and diverse on Earth.

Kelp is found along one quarter of the world's coastlines, where they offer shelter and foraging areas for seals, sea otters, octopuses, sea birds, sharks and large predatory fish. These vital habitats also support coastal fisheries, provide food and medicine, soak up planet-warming gases, provision biodiversity, buffer ocean acidification, improve water quality and provide cultural services, such as recreation through ecotourism.

Unfortunately, over the past 50 years, up to 60 per cent of kelp forests have been degraded, according to Into the Blue: Securing a Sustainable Future for Kelp Forests, a report published in 2023 by the United Nations Environment Programme (UNEP) and the Norwegian Blue Forests Network. A cool-water species, kelp are stressed by ocean warming, marine heatwaves and other climate related extremes.

Other threats include herbivory, sedimentation, invasive species, overharvesting (kelp has many uses ranging from food to fuels to pharmaceuticals), pollution and reduced water quality, especially from fertilizers that can feed toxic algal blooms.

Kelp species around the world — and the threats they face



With these findings, what is the outlook for kelp?

Kelp can act as a powerful nature-based solution to adapt to and mitigate climate change. Kelp forests are essential contributors to the carbon cycle; they sequester carbon dioxide and convert it into biomass. The kelp carbon which is not eaten may be buried in seafloor sediments or transported as detritus to the deep ocean where it may be stored for centuries.

Indigenous and coastal people have used kelp as medicine, food and material for generations, with kelp forming part of their identities and fostering the development of a sense of place and connectedness with nature. Sustainable cultivation and harvesting of kelp and other seaweeds provides economic growth and employment opportunities, climate benefits, and societal and environmental benefits.

Marine protected areas and other effective area-based conservation measures can help protect kelp from pressures occurring within designated areas. Although protected areas are rarely designated solely for the protection of kelp forests, kelp should be an important ecological feature that influences their establishment.

Engaging people that value and use kelp sustainably and recognizing kelps' value and contribution to services such as fisheries production and carbon capture helps spur restoration efforts. Protecting and restoring natural kelp forests can help countries deliver on SDG 14 Life Below Water, and support other SDGs, including SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 6 (Clean Water and Sanitation),

SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action).

Bridging Land and Sea —Mangroves

Mangroves are trees and shrubs which thrive at the intertidal edge of land and sea, in areas with low-oxygen soil where slow-moving waters allow fine sediments to accumulate.

Mangroves provide food, building materials, coastal protection and natural spaces for an estimated 2.4 billion people living within 100 km of the world's coastline. Associated with 1,533 different species, mangroves provide refuge for a diverse range of marine mammals, and numerous species of plants, amphibians, birds and reptiles. Unfortunately, 15 per cent of these species are threatened with extinction, and for the most at-risk species, including fish, sharks, manatees, otters, snakes, sloths and even tigers in the Asia-Pacific region and the Americas,the situation is getting worse.

Mangrove forests can be a highly effective nature-based solution. Although they make up less than one per cent of all tropical forests around the world, they have a critical role in mitigating climate change. Mangrove soils are highly effective carbon sinks, locking away large amounts of carbon. It is estimated that per hectare they store two to four times more carbon than terrestrial forests and when they are destroyed, a huge amount of carbon is released back into the atmosphere. In fact, between 1996 and 2020 mangrove forest loss led to an overall reduction of 139 megatonnes of carbon stocks (1 megatonne equals 1,000,000 tonnes), equivalent to ~4 times the global CO2 emissions of fossil fuel burning and the manufacture of cement in 2018. If left undisturbed, mangroves prove to be an efficient ally in the struggle to achieve net-zero carbon emissions by 2050.

In addition, mangroves can reduce the severity of climate-related impacts by helping local people and nature adapt to changing conditions. This includes by acting as a natural coastal defence against storm surges, tsunamis, rising sea levels and coastal erosion. Consequently, the loss of mangroves can have significant and long lasting impacts on the health, safety and prosperity of millions of people, as well as hampering the fight against, and ability to deal with, climate change.

It is vital that we understand the importance of mangroves to nature and people, what is driving their loss, what the consequences are and how we can work with nature and people to effectively conserve and restore these vital ecosystems. Mangrove restoration works to reverse the human impacts on mangroves. The UNEP and UNEP-WCMC 2023 status report on mangroves, Mangrove Forest Change: What does it mean for nature, people and the climate? provides an overview of the extent and health of the world's mangrove forests and shows where conservation and restoration action is most need for people and nature.

There has been a 3.4 per cent reduction in mangrove coverage since 1996.

Meadows of the Shallows

—Seagrass

Seagrasses are marine flowering plants found in shallow, sheltered coastal waters where they form extensive underwater meadows.

One of the most widespread coastal habitats, they are found in at least 159 countries, ranging from the tropics to the Arctic Circle, covering every continent except for Antarctica.

The 2020 report Out of the Blue: The Value of Seagrass to the Environment and People from UNEP, GRID-Arendal, UNEP's World Conservation Monitoring Centre (UNEP-WCMC) and the World Seagrass Association, showcases the fundamental importance of seagrass meadows.

It says seagrasses protect coasts from erosion, store carbon and contribute to food security by providing vital nurseries that support healthy fish populations upon which 20 per cent of the world's largest fisheries depend. Even though they cover just 0.1 per cent of the ocean floor, seagrasses store up to 18 per cent of the world's oceanic carbon.

Seagrass ecosystems play a critical role in climate change as a vital carbon sink. But their destruction and degradation is potentially releasing up to 0.65 gigatonnes of greenhouse gases per year, roughly the equivalent of the global shipping industry's annual emissions.

Large animals and seagrass meadows

Seagrass meadows produce a life-sustaining habitat for many charismatic endangered species. Manatees in the Atlantic Ocean and Caribbean Sea, dugongs in the Indian and Pacific Oceans and adult green turtles around the world use seagrass meadows as their principal foraging habitat, eating up to 50 kg, 40 kg and 2 kg of seagrass a day respectively.

Dugongs are large marine mammals found in the Indian and Pacific Oceans, and their fate is tied to the health of seagrass meadows. Unfortunately, they are classified as vulnerable to extinction, threatened by illegal fishing, boat strikes, and loss of the seagrass meadows on which they depend. Protecting and restoring seagrass meadows also means protecting and restoring dugong populations.

Techie from UPES lends his expertise in biodiversity research and conservation

https://blog.upes.ac.in/techie-from-upes-lends-his-expertise-in-biodiversity-research-and-conservation/ [2]

PRADEEP JAGWAN · DECEMBER 7, 2020

Sajal Sharma, an alumnus of UPES, class of 2015-2017, M.Tech Robotics, has been a part of the Wildlife Institute of India (WII) as an individual contributor for the technical aspects of the surveys on Gangetic River Dolphins, Dugongs, Great Indian Bustards, Swamp Deer, Wild Elephants, and for 3D and 2D mapping of wetlands and rivers

Sajal Sharma is an alumnus of UPES, class of 2015-2017, M.Tech Robotics, School of Engineering. His academic session started a month later than everyone else in his batch. Though Sajal wanted to pursue Aerospace with a specialisation in UAV due to the limited seats, he had to opt for Robotics. Pursuing robotics was never in the plan, but gradually Sajal developed an interest in the program. His passion for robotics, electronics and DIY project started in the first semester.

When the Research Initiative for Students of Engineering (RISE) was launched in the year 2015, it was a golden opportunity for Sajal, and he grabbed it with both hands. Winning this competition gave him exposure and made him confident. He realised that there is much more to learn, and he could do wonders in the field he had chosen.

When asked about his journey, Sajal says, “There are real-world applications of the devices I make and the projects I undertake. I was introduced to Professor Qamar Qureshi, who is the Principal Investigator for the Development of Conservation Action Plan for Gangetic River Dolphin, by Professor Saurabh Shanu who was my senior at that time. I presented the RISE project to him, which was Unmanned Aerial Vehicle (UAV) for Environmental Health Monitoring. I got the opportunity to be a part of IIT Bombay’s project ‘Design and Development of Solar Powered Autonomous Vehicle’. Later, I presented the project as my Master’s thesis.”

Sajal Sharma has been a part of the Wildlife Institute of India (WII) as an individual contributor for the technical aspects

Eager to grow as a professional, Sajal reached out to Professor Qamar Qureshi after completing M.Tech. Sajal wanted to be a part of his team working on Gangetic River Dolphins. Professor Qureshi's response was positive, and he was all set to grow and learn.

"Working on this project was completely a new and different world for an engineer like me. It was an extremely exhilarating and life-changing experience for me. The problems were new and finding solutions to them was challenging," says Sajal.

Sajal has been a part of the Wildlife Institute of India (WWI) as an individual contributor for the technical aspects of the projects which include developing new data recording devices, piloting unmanned aerial vehicles and underwater vehicles for surveys on Gangetic River Dolphins, Dugongs, Great Indian Bustards, Swamp Deer, Wild Elephants, and for 3D and 2D mapping of wetlands and rivers.

Sajal wanted to work on Gangetic River Dolphins

Not only this, but Sajal has also designed prototypes such as water testing kits, flow meters, VHF trackers, portable power supply units, unmanned aerial vehicles, solar–powered buoy indicators and trackers, to name a few. This job has allowed him to work closely with various forest officials and Forest Department staff members of Madhya Pradesh, Andaman, Tamil Nadu and Himachal. He has had the opportunity to train and update them with the latest tools of technologies that are being used for more effective ways of data collection.

Says Sajal, “Finding an easy solution to the problem and overcoming every challenge that comes my way, fascinates and drives me to work harder. UPES played an important role in achieving my goals and fulfiling my dreams. UPES faculty supported, encouraged and guided me at every step and in every project I worked on.”