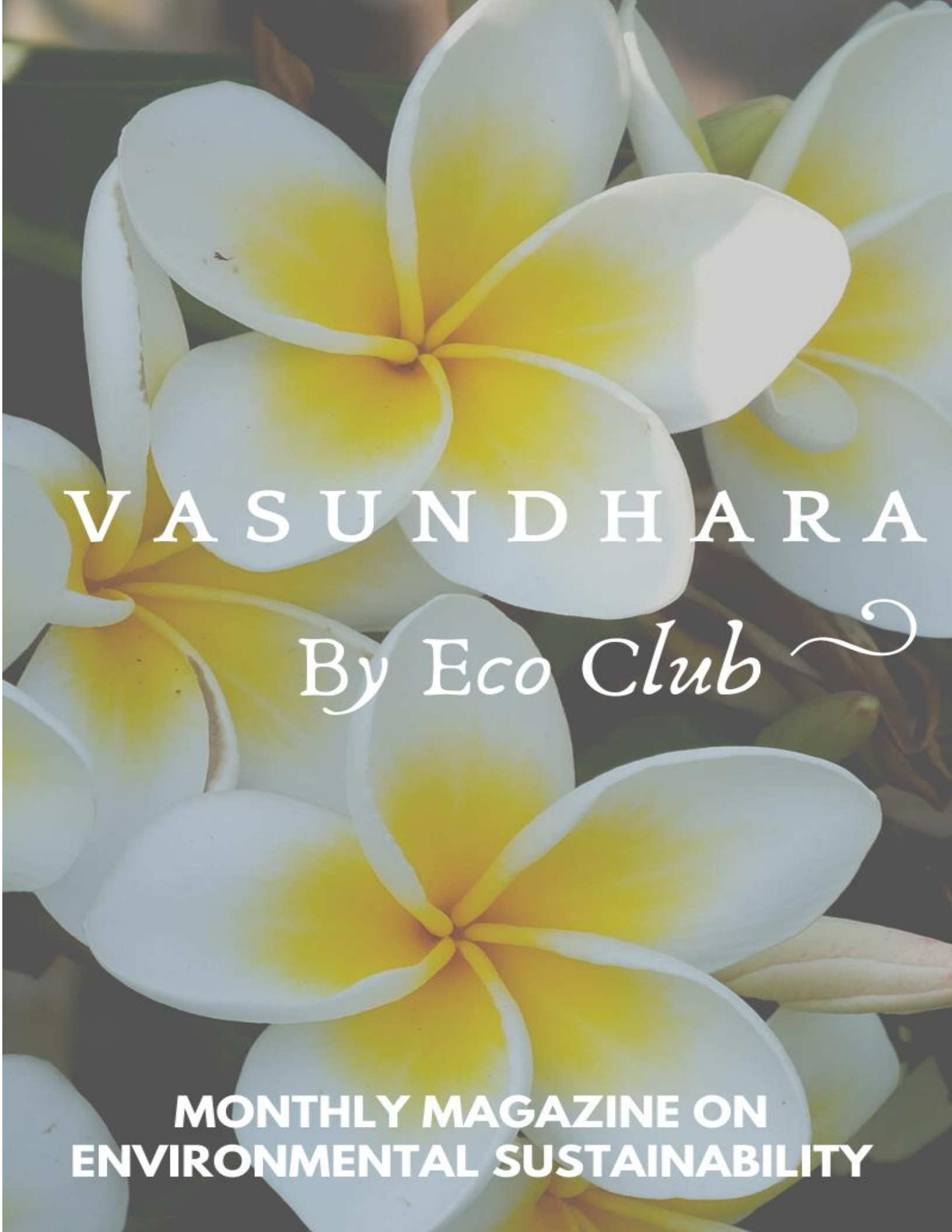

VASUNDHARA

By Eco Club

MONTHLY MAGAZINE ON ENVIRONMENTAL SUSTAINABILITY

ECO CLUB

Teri School of Advanced Studies

Damini

| FIRST EDITION |

DESIGNED AND PUBLISHED BY THE ECO CLUB, TERI SAS

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ABOUT DAMINI

'Damini' is the first Monthly Environmental Sustainability Magazine, designed and published by Eco Club, TERI School of Advanced Studies. This is the First Edition of Vasundhara, which is for the month of March 2020. Vasundhara literally means "The Earth" and therefore, is based on Environmental Sustainability topics. The magazine includes Bills/ Acts/ Notifications/ and Report with particular emphasis on India and general focus on the global institutions. The main aim of publishing this magazine is to impart knowledge among the readers, especially the TERI SAS family. The articles on General Knowledge and Current Affairs are curated ones and are compiled from open web sources.

Why the name Damini?

The word 'Damini' means lightening or conquering. People sometimes call nature "Mother Nature" because it can heal, nurture, and has the power to destroy. When we speak the charming phrase "Mother Earth," we mean something of great significance. The Earth is indeed our mother. It gives us everything we need. We all have been exploiting resources to make a living on this planet but it is high time that we start protecting our Mother Earth. This can be done once we start acknowledging the damages done to it and its contribution in our lives.

"We learned that mothers are not just women who birth flesh and blood children. Mothers birth ideas, movements, books, organizations and companies, and the birthing pains of that labor also makes them a sacred creatures. Mothers are the hands that rock the cradles that will change the world."

Damini basically personifies the Nature or our Environment as a strong compassionate woman who has the power to either enhance or destroy our lives, based on the way we treat her. I personally believe that God is Female because when we apply the 'Fe' (HUMILITY, Nurturing, Ability to Uplift, Caring, Humble) in 'Male' (Dominant Strong Independent Assertive Brave Innovative) then only we can achieve a balanced superpower who decides on the fate of everything rationally and judiciously.

According to a recent research, it has been proven that women are considered to be pro environmentalists as compared to males. There are many such global examples to prove this but one specific example from India relates to the Chipko Movement, where women came forward proactively and by risking their lives, just to protect the trees from being chopped!

In the post modern world, where there is more focus on the values such as empathy, compassion, and emotional intelligence, woman portray the characteristics which are crucial for the mankind and it may not be possible for males to have those qualities in them.

- Rajesh Kumar, Secretary, Eco Club

ACKNOWLEDGEMENT

The Eco Club would like to thank everyone who supported us in writing this report including Faculty Members, Eco Club core committee members, Department Assistants, and Close Friends. We have been able to put up so much effort because of your guidance and support. This wouldn't have been possible without you all.

SPECIAL MESSAGE

(By: Dr. Fawzia Tarannum, Assistant Professor and Programme Coordinator, Coca-Cola Department of Regional Water Studies)

We are amid, one of the greatest challenges, that mankind has ever seen! Unprecedented in its speed, spread and its effect! It is comparable to some of the greatest epidemics of the past – The Spanish Flu of the early 20th century and the black death of the mid14th century, come readily to mind. In its economic impact, it can be compared to the Great Depression of the 1930s! And to realise that this could be a devastating combination of both the disasters together, makes the present situation even more scary!

Amidst all these uncertainties, there are stories of incredible bravery that we hear from across the world-of frontline health workers putting their lives at risk to cover for the deficiencies of their countries health systems, and often paying the price for it; of the millions of volunteers, investing, time and money, with dollops of courage armed with nothing but empathy, to mitigate the sufferings of the destitute and the poor that seem to have been abandoned by their Governments. “Hope springs eternal”, when we hear examples of leaderships in several countries, taking decisive yet empathetic steps to secure their respective countries from the pandemic. Jacinda Ardern, Angela Merkel, Shailaja Teacher to name a few, have all shown how both the people and the economy could be effectively insulated.

TERI School of Advanced Studies, with its limited resources, has undoubtedly set an example for several educational institutions by effortlessly adapting to the new normal. Thanks to our resilient IT team, we were able to hold the classes, meetings, evaluations, and all other engagements through the virtual platform without losing any time. Eco Club team is another example of team resilience. They continued to actively engage during this work from home (WFH) period and have not allowed the lockdown to be an impediment to their routine activities. Resilience stems from positivity. And positivity emanates from the top ten most common emotions that are joy, gratitude, serenity, interest, hope, pride, amusement, inspiration, awe, and love as stated by Barbara Fredrickson in her book "Positivity". These emotions give us hope that the world would perhaps reboot, pause, reflect, and then choose a more sustainable future and choose leaders that believe in a happy and peaceful world.

Till then, be creative and build new roads. As Paolo Freire said, “We make the road by walking.” *The show must go on*.

KNOWLEDGE UPGRADE

1) Earth Hour

Every year, Earth Hour is observed on the last Saturday of March at 8:30 pm. And while previously it brought the public out onto the roads to mark the hour, this year the famous environmental initiative went digital as many countries are in lockdown.

What is Earth Hour?

Dating back to 2007, Earth Hour is an annual event organized by the **World Wildlife Fund** that promotes conservation and sustainable energy. During this time, civilians are encouraged to switch off their lights for one hour to help reduce the effect of global warming and raise awareness for climate change and wildlife conservation. Background: It was famously started as a lights-off event in Sydney, Australia in 2007. Since then it has grown to engage more than 7000 cities and towns worldwide. Today, Earth Hour engages a massive mainstream community on a broad range of environmental issues. The one-hour event continues to remain the key driver of the now larger movement. What's the difference between Earth Hour and Earth Day? Whereas Earth Hour stands as a climate change initiative where people reduce their electricity usage, Earth Day (April 22) celebrates our natural environment by inspiring people to plant trees, recycle regularly and keep the planet tidy.

Why do we need earth hour?

- Global warming and climate change have dominated the scientific discourse in the past more than one decade. With ever rising population of the world, the climate change has put the humankind at a great risk along with other species.
- Global warming, rising levels of pollution due to ever increasing industrialization, declining forest cover and rising sea levels are some of the dangers that drastically affect the workings of life on the earth.
- Though the largest polluters are big industries, the WWF tries to make the masses more and more aware about the impending dangers of adverse climate so that they could put pressure on the respective governments to frame environment-friendly policies and laws.
- With Earth Hour, the WWF aims to engage people across the globe to adopt more sustainable lifestyle. Turning off lights for an hour is just an annual reminder that if the world does not mend its ways, it will be heading to a dark age, literally.

2) Uranium Contamination in Ground Water

A report on Uranium Contamination in ground water in Parliament was recently released.

What is Uranium?

- Uranium is weakly radioactive and remains so because of its long physical half-life (4.468 billion years for uranium-238).
- The biological half-life (the average time it takes for the human body to eliminate half the amount in the body) for uranium is about 15 days.
- It is a naturally occurring element found in low levels within all rock, soil, and water.
- This is the highest-numbered element to be found naturally in significant quantities on earth.
- It is considered to be more plentiful than antimony, beryllium, cadmium, gold, mercury, silver, or tungsten.
- It is about as abundant as tin, arsenic or molybdenum.

What is the acceptable limit?

The Indian Standard IS 10500: 2012 for Drinking Water specification has specified the maximum acceptable limits for radioactive residues as alpha and beta emitters, values in excess of which render the water not suitable. These requirements take into account all radioactive elements including uranium. No individual radioactive elements have been specifically identified. As per Bureau of Indian Standard (BIS), maximum permissible limit of Uranium is 0.03 mg/l (as per WHO provisional guidelines) in all drinking water standards after following due process.

Affected states: A report brought out by Duke University, USA in association with Central Ground Water Board and State Ground Water departments states that Andhra Pradesh, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh, West Bengal and Jammu & Kashmir have localised occurrence of Uranium concentration.

Main factors responsible for uranium contamination: A report on Uranium Contamination in ground water in Parliament.

What is the acceptable limit?

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Main factors responsible for uranium contamination:

- Amount of uranium contained in an aquifer's rocks.
- Water-rock interactions that cause the uranium to be extracted from those rocks.
- Oxidation conditions that enhance the extracted uranium's solubility in water.
- The interaction of the extracted uranium with other chemicals in the groundwater, such as bicarbonate, which can further enhance its solubility.
- Human factors such as groundwater-table decline and nitrate pollution may be exacerbating the problem.

What needs to be done?

- Revision of the current water quality monitoring program in India.
- Evaluation of human health risks in areas of high uranium prevalence.
- Development of adequate remediation technologies.
- Implementation of preventive management practices to address this problem.
- Including a uranium standard in the Bureau of Indian Standards' Drinking Water Specification based on uranium's kidney-harming effects.
- Establishing monitoring systems to identify at-risk areas, and exploring new ways to prevent or treat uranium contamination.

3) Bharat Stage Emission Standards (BSES)

The Society of Indian Automobile Manufacturers has said it has approached the Supreme Court seeking directions to ensure that sale and registration of BS-IV complaint is allowed till March 31, 2020.
The move follows circulars from some State governments setting a cut-off date ranging between February 29 and March 25, 2020, for accepting registration applications for BS-IV-compliant vehicles.

About the Bharat Stage Emission Standards (BSES):

- Introduced in the year 2000.
- They are set by the Central Pollution Control Board under the Ministry of Environment and Climate Change.
- Objective: To keep air pollutants emitted by the internal combustion engine of vehicles under control.
- They are based on European (EURO) emission standards.
- Bharat Stage (BS) emission norms were first brought into effect in 2000 under the head "India 2000". This was followed by BS2 in 2001 and BS3 in 2005.
- However, the emission norms were made more stringent only with the enforcement of Bharat Stage IV (BS4). Thereafter, the Government of India skipped the implementation of BS5 in 2016 and decided to introduce Bharat Stage VI (BS6) in 2020 instead.

How do BS6 emission norms differ from BS4?

The following are the key differences between BS4 and BS6 emission norms:

- Diesel Particulate Filter (DPF) and Selective Catalytic Reduction (SCR) are being introduced with the roll-out of Bharat Stage VI norms, which were not a part of Bharat Stage IV.
- Real Driving Emission (RDE) will be introduced in India for the first time with the implementation of Bharat Stage VI emission norms. It will measure a vehicle's emission in real-time conditions against laboratory conditions.
- Onboard Diagnostics (OD) has been made mandatory for all vehicles.
- Sulphur and Nitrogen Oxide content: Sulphur traces in BS6 fuel is five times lower (10 ppm) as compared to sulphur traces in BS4 fuel (50 ppm). Further, nitrogen oxide level for BS6-grade diesel engines and petrol engines will be brought down by 70% and 25%, respectively.
- BS VI can bring PM in diesel cars down by 80 per cent. The new norms will bring down nitrogen oxides from diesel cars by 70 per cent and in petrol cars by 25 per cent.

4) BEE: Star Rating Program

Bureau of Energy Efficiency (BEE) launched star rating programme for Deep Freezer and Light Commercial Air Conditioners (LCAC).

Standards and Labeling Programme (Star Labeling)

- Star Labeling Programme was formulated in 2006 by the Bureau of Energy Efficiency, under the Energy Conservation Act, 2001.
- It provides informed choice to consumers through display of energy performance labels on high energy use equipment & appliances and lays down minimum energy performance standards.
- A star rating, ranging from 1 to 5 in the ascending order of energy efficiency is provided to products registered with the Bureau. An endorsement label is also provided for some products.
- It seeks to improve energy efficiency and also lower energy cost of appliances/equipment for the consumers.
- Labels also provide a common energy-efficiency benchmark that can work in association with other policy measures such as procurement programs, financial incentives etc.
- Through launch of these two new appliances under voluntary regime, 26 appliances would now be covered under this programme.
- 10 mandatory appliances: Room Air Conditioners, Frost Free Refrigerators, Tubular Florescent Lamp, Distribution Transformer, Room Air Conditioner (Cassettes, Floor Standing), Direct Cool Refrigerator, Colour TV, Electric Geysers, Variable Capacity Inverter Air conditioners, LED Lamps.

- Voluntary appliances: Induction Motor, Pump Sets, Ceiling Fans, LPG -Stoves, Washing Machine, Computer (Notebooks/Laptops), Ballast (Electronic/ Magnetic), Office equipment's (Printer, Copier, Scanner, MFD's), Diesel Engine Driven Mono-set Pumps, Solid State Inverter, DG Sets, Chillers, Microwave Oven, Solar Water Heater.

Related news: Urja Dakshata Information Tool (UDIT)

- It is a first ever initiative taken by BEE with World Resources Institute (WRI), to facilitate a database on energy e-fficiency. WRI is global research non-profit organization based in USA.
- It is a user-friendly platform that explains the energy efficiency landscape of India across industry, appliances, building, transport, municipal and agriculture sectors.
- It will also showcase the capacity building and new initiatives taken up by the Government across the sectors in the increase energy efficiency domain.

5) Sukhna Lake: A Living Entity

Punjab and Haryana High Court recently declared that Sukhna Lake in Chandigarh is a "living entity" or "legal person" with rights, duties and liabilities of a living person.

- The court observed that Sukhna Lake is required to be declared as a legal entity for its survival, preservation and conservation.
- It also declared all citizens of Chandigarh as loco parentis (in the place of a parent) to save the lake from extinction.
- The Chandigarh administration has been directed to declare it a wetland within a period of three months.
- States of Punjab and Haryana failed to take precautionary measures to save the catchment area of Sukhna lake and it is their duty to restore the catchment area. Moreover, they are bound to pay exemplary-penal damages under the doctrine of 'Polluter Pays'.

About the status

- By declaring legal entities, lake have same legal rights as a person in eyes of the law and polluting the lake would amount to harming a human being.
- Any person declared as loco parentis would be able to sue for the protection of such entities' rights.
- It also ensures legal responsibility to the appointed guardians or "loco parentis" to protect the nature.
- Any fine imposed for polluting or damaging the water body would go to the water body's restoration directly; instead of those aggrieved from the damage.
- Environmentalists also argue that the status of a living person would enable water bodies, through their representatives to enter into contracts with third parties in matters of constructions that could affect the body- such as hydroelectric projects, canals, dams, etc.

Challenges in implementing these orders

- Prescribing rights and duties without specifying the ambit of such rights would not lead to the desired impact of the decisions.
- It is possible that the person endorsed with the responsibility to protect the body fails in his duty and enters into contracts that later prove to be detrimental to the river or lake ecosystem's interest.

About Sukhna Lake

- The man-made Sukhna Lake was built in 1958 by Le Corbusier, the architect of Chandigarh.
- Located in the foothills of the Shivalik Hills, it was designed to collect runoff water from the Hills.
- It also has a nearby Sukhna wildlife sanctuary that is home to sambar, pangolin, wild boars etc.

Related information

- In common law jurisprudence, there are two types of persons — natural persons or human beings and artificial person, which are also known as juristic persons, juridical entity or a legal person other than a natural person. Living entity status in past
- New Zealand was first in world to declare "Whanganui river" as a person having living status.
- In 2017, the Uttarakhand High Court ruled that the rivers Ganga and Yamuna as living entities, which was later stayed by Supreme Court.
- In 2019, The Punjab and Haryana High Court accorded the status of "legal person or entity" to animals in Haryana.

6) Coalition for Disaster Resilient Infrastructure

Recently, UK was confirmed as the first co-chair of the Governing Council on the India-led global Coalition for Disaster Resilient Infrastructure (CDRI).

About CDRI

- It was announced by India's PM at the UN Climate Action Summit 2019 held in USA and first mooted as an idea in November 2016, while inaugurating an Asian ministerial conference on Disaster Risk Reduction.
  - Its other founding members include: Australia, Bhutan, Fiji, Indonesia, Italy, Japan, Maldives, Mexico, Mongolia, Rwanda, Sri Lanka and the UK.
- It is a voluntary international grouping, linking governments, UN agencies, banks, private sector groups, and academia to develop the resilience of infrastructure systems to climate and disaster risks.

- It is second major coalition launched by India outside the UN, after the International Solar Alliance which already has 80 member nations as partners. Its secretariat is in New Delhi.
- CDRI will set targets for member countries to bring down disaster deaths, economic losses and strive to achieve the Sustainable Development Goal. o It will also work at the intersection of the Sendai Framework for Disaster Risk Reduction and the Paris Climate Agreement.
- Governing Council is the highest policy-making body of CDRI.
  - It is co-chaired by India and a representative of another national government nominated by rotation every two years.
- As a road map for the coalition, the group will look at
  - Risk assessment for infrastructure;
  - Improvements in standards and regulation for infrastructure sectors;
  - Role of finance in promoting disaster resilience of infrastructure;
  - Mechanisms for supporting recovery in infrastructure.
- The grouping will support collaborative research, knowledge sharing as well as mutual technical assistance among coalition partners along these four areas.
- CDRI will uphold the UN Agenda 2030 principle of leaving no one, no place, and no ecosystem behind, focusing on the most vulnerable regions and populations, while enabling inclusive and deliberative processes that recognize national and local efforts as primal.

What is Disaster Resilient infrastructure?

- Infrastructure that can stand any huge damage from any kind of natural disaster is known as Disaster Resilient Infrastructure. It encompasses structural and non-structural measures.
- Structural Measures involve adjusting engineering designs and standards to reflect disaster risk such as flood control systems, protective embankments, seawall rehabilitation, and retrofitting of buildings.
- Non-structural measures refer to risk-sensitive planning, enabling institutional frameworks, hazard mapping, ecosystem-based management, and disaster risk financing.
- In recent weather and climate-related disasters, up to 66% of public sector losses were related to infrastructure damage.
- Hence, resilient infrastructure is critical for peoples' well-being, quality of life, and economic prospects.

CDRI and International Solar Alliance (ISA)

- While it is not envisioned to take the shape of a treaty-based organisation, CDRI can be seen as complementing ISA's efforts.
- ISA is about climate change mitigation — deployment of more solar energy would bring down the reliance on fossil fuels, thereby reducing greenhouse gas emissions. o CDRI, on the other hand, is about adapting to climate change, a need that is inevitable.

- India hosts ISA, with its headquarters in Gurgaon. The CDRI secretariat too would be based in New Delhi supported by the UN Office for Disaster Risk Reduction (UNDRR).
- With these two initiatives, India is seeking to obtain a leadership role, globally, in matters related to climate change.

7) National Clean Air Program

Union Environment Ministry has asked for city-level plans for the National Clean Air Programme (NCAP) as these problems need to be dealt with at the local level.

What is the National Clean Air Programme (NCAP)?

Launched in January 2019, it is the first ever effort in the country to frame a national framework for air quality management with a time-bound reduction target. The programme will not be notified under the Environment Protection Act or any other Act to create a firm mandate with a strong legal back up for cities and regions to implement NCAP in a time bound manner for effective reduction. The plan includes 102 non-attainment cities, across 23 states and Union territories, which were identified by Central Pollution Control Board (CPCB) on the basis of their ambient air quality data between 2011 and 2015.

What are Non-attainment cities?
Non-attainment cities are those which have been consistently showing poorer air quality than the National Ambient Air Quality Standards. These include Delhi, Varanasi, Bhopal, Kolkata, Noida, Muzaffarpur, and Mumbai.

Key features of the National Clean Air Programme (NCAP):

Target: Achieve a national-level target of 20-30% reduction of PM2.5 and PM10 concentration by between 2017 and 2024.
Implementation: Central Pollution Control Board (CPCB) will execute this nation-wide programme in consonance with the section 162 (b) of the Air (Prevention and Control of Pollution) Act. As part of the programme, the Centre also plans to scale up the air quality monitoring network across India. At least 4,000 monitors are needed across the country, instead of the existing 101 real-time air quality (AQ) monitors, according to an analysis.
The plan proposes a three-tier system, including real-time physical data collection, data archiving, and an action trigger system in all 102 cities, besides extensive plantation plans, research on clean technologies, landscaping of major arterial roads, and stringent industrial standards.
It also proposes state-level plans of e-mobility in the two-wheeler sector, rapid augmentation of charging infrastructure, stringent implementation of BS-VI norms, boosting public transportation system, and adoption of third-party audits for polluting industries.
Various committees proposed: The national plan has proposed setting up an apex committee under environment minister, a steering committee undersecretary

(environment) and a monitoring committee under a joint secretary. There would be project monitoring committees at the state-level with scientists and trained personnel.

8) 'United for Biodiversity'

The European Commission (EC) has launched the 'United for Biodiversity' coalition. It was launched on World Wildlife Day 2020- 3rd March.

What is it?

- The coalition is made up of zoos, aquariums, botanical gardens, national parks, and natural history and science museums from around the world.
- The coalition offers the opportunity for all such institutions to "join forces and boost public awareness about the nature crisis, ahead of the crucial COP-15 of the Convention on Biological Diversity in Kunming, China in October 2020.

A common pledge adopted:

The coalition adopted a common pledge, citing the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment finding that one million species were already at risk of extinction, and appeals to visitors to each of their institutions to "raise their voice for nature."

Need for this coalition:

These organizations are vital not only for cataloguing and preserving the natural world, but are indispensable and invaluable centres for education and mobilization — particularly for young leaders and decision-makers of the future.

9) Preservation of Eastern and Western Ghats

A public interest litigation petition has been filed in the Madras High Court seeking a direction to the Centre and State government to constitute a permanent body for taking serious steps to safeguard the flora, fauna and other natural resources in the Eastern and Western Ghat areas in Tamil Nadu.
The petition is on the basis of the recommendations made by the Madhav Gadgil and Kasturi Rangan committees.

What's the issue? Why there is a need for protection?

- Petitioner contended that the natural resources abundantly available in this area are being properly utilised by other regions, except Tamil Nadu. They are being misutilised and mismanaged not only by the administrators but also by the public at large.

- Besides, large-scale plantations of coffee, tea and orchards have been raised in the hills of Western Ghats. Aromatic and valuable trees like sandal are removed illegally. Despite the Wildlife Protection Act, hunting takes place in some pockets. The forests are getting degraded because of illicit collection of firewood, illicit grazing and illicit felling of trees.

What did the Gadgil Committee say?

- It defined the boundaries of the Western Ghats for the purposes of ecological management.
- It proposed that this entire area be designated as ecologically sensitive area (ESA).
- Within this area, smaller regions were to be identified as ecologically sensitive zones (ESZ) I, II or III based on their existing condition and nature of threat.
- It proposed to divide the area into about 2,200 grids, of which 75 per cent would fall under ESZ I or II or under already existing protected areas such as wildlife sanctuaries or natural parks.
- The committee proposed a Western Ghats Ecology Authority to regulate these activities in the area.

Why was Kasturirangan Committee setup?

None of the six concerned states agreed with the recommendations of the Gadgil Committee, which submitted its report in August 2011.

- In August 2012, then Environment Minister constituted a High-Level Working Group on Western Ghats under Kasturirangan to "examine" the Gadgil Committee report in a "holistic and multidisciplinary fashion in the light of responses received" from states, central ministries and others.
- The Kasturirangan report seeks to bring just 37% of the Western Ghats under the Ecologically Sensitive Area (ESA) zones — down from the 64% suggested by the Gadgil report.

Recommendations of Kasturirangan Committee:

- A ban on mining, quarrying and sand mining.
- No new thermal power projects, but hydro power projects allowed with restrictions.
- A ban on new polluting industries.
- Building and construction projects up to 20,000 sq m were to be allowed but townships were to be banned.
- Forest diversion could be allowed with extra safeguards.

Importance of Western Ghats:

- The Western Ghats is an extensive region spanning over six States. It is the home of many endangered plants and animals. It is a UNESCO World Heritage site.
- It is one of the eight "hottest hot-spots" of biological diversity in the world.

- According to UNESCO, the Western Ghats are older than the Himalayas. They influence Indian monsoon weather patterns by intercepting the rain-laden monsoon winds that sweep in from the south-west during late summer.

Eastern Ghats: The Eastern Ghats run from the northern Odisha through Andhra Pradesh to Tamil Nadu in the south passing some parts of Karnataka. They are eroded and cut through by four major rivers of peninsular India, viz. Godavari, Mahanadi, Krishna, and Kaveri.

10) Eco-Sensitive Zones

The Ministry of Environment, Forest and Climate Change (MoEF&CC) declared the National Chambal Sanctuary in Madhya Pradesh as eco-sensitive zone (ESZ).

- The MoEF&CC notified an area to an extent of zero to two kilometers around the boundary of National Chambal Sanctuary as the National Chambal Sanctuary ESZ.
- The MoEF&CC has also directed the Madhya Pradesh government to prepare a Zonal Master Plan, which shall provide for restoration of denuded areas, conservation of existing water bodies, management of catchment areas, watershed management, groundwater management, soil and moisture conservation, needs of local community and such other aspects of the ecology and environment that need attention.

Eco Sensitive Zones (ESZ)/ Eco-Sensitive Area (ESA)

- National Wildlife Action Plan (NWAP) (2002-2016) advocated the region around the Protected Areas (PAs) to be very vital in preventing the isolation of patches. Such zones would also form the important 'ecological corridors' and should be regulated to let the biodiversity survive in the long run.
  - The NWAP indicates that all identified areas around PAs and wildlife corridors to be declared as ecologically fragile under the Environment (Protection) Act, 1986.
- ESZs are declared around PAs through Notification under the provisions of Environment (Protection) Act, 1986 and Rules made thereunder.
- MoEF&CC has issued "Guidelines for Declaration of ESZ around National Parks and Wildlife Sanctuaries" in 2011 with consultations among the states/UTs. It prescribes general procedures to be followed while considering declaration of an ESZ.
- Nature of Activities in ESZ: 2011 Guidelines specify activities that are to be prohibited, regulated and permissible in the ESZ -
  - Prohibited- commercial mining, polluting industries, major hydroelectric projects etc.
  - Restricted with safeguards (Regulated) - Felling of trees, Establishment of hotels and resorts, Drastic change of agriculture system, widening of roads, introduction of exotic species etc.
  - Permissible- Rain Water Harvesting, Organic farming, Ongoing Agricultural Practices etc.

- Parameters considered to declare ESZs: In general, following parameters are considered for declaring ESZs: Details of the Protected Area; Proposed ESZ Area and Extent; Available Biodiversity, Flora, Fauna in the Area; List of villages in ESZ.
- As per 2011 Guidelines, proposal for ESZ should be prepared by the states considering various parameters and forwarded to the MoEF&CC for further processing and notification.

Extent of ESZ:

The width of the ESZ and type of regulations would differ from one PA to other. However, as a general principle the width of the ESZ could go up to 10 kms around a PA (may not be uniform all around it) as provided in the Wildlife Conservation Strategy-2002.

  - In case where sensitive corridors, connectivity and ecologically important patches, crucial for landscape linkages, are even beyond 10 kms width, these should be included in the ESZ.
  - Further, Supreme Court ordered that in case of non- declaration of ESZ around a PA, a minimum of 10 km buffer around a PA would be treated as ESZ.
- Monitoring Mechanism: The activities in the ESZ are monitored by a Monitoring Committee, chaired by the District Collector as the chairman and the Deputy Conservator of Forests (DCF) of the concerned National Park/Sanctuary as the Member Secretary.

Challenges associated with ESZ Declaration

- A survey of the implementation of ESZs in the Jim Corbett National park in Uttarakhand revealed that not only is the conception of ESZs ill-conceived—it is an exclusionary mode of conservation that displaces local communities and denies them their livelihoods—but also largely redundant as buffer zones already exist between forests and wildlife sanctuaries and human settlements.
- People who are living in biodiversity rich areas are mostly excluded from consultation process to identify the ESZ. However, they are the one who will be directly affected by regulated or restricted activities.
- Though ESZ does not affect the ownership rights of people on land resources, it restricts land-use change. The tribal people who mostly reside in these areas are affected as their livelihood mostly depends on forest products.
  - Recently the residents of 17 villages in Kanyakumari district protested the proposed ESZ in continuation with the planned Kanyakumari wildlife sanctuary in the district. They fear losing right to collect forest produces and thus their livelihood.
- States like Tamil Nadu, Andhra Pradesh, Jharkhand and Goa etc. kept the mining areas out of ESZs, irrespective of their ecological value. Besides, no ground investigation has been done in most proposals.
- States hesitate to finalize ESZ as it might hamper their finances due to closure of industries and tourism activities. • There are no quantifiable criteria defined for

including or excluding an area in the ESZ, leaving it to the forest officials to arbitrarily take decisions.

- In case of PAs in urban areas such as Guindy National Park in Chennai and Sanjay Gandhi National Park in Mumbai, ESZ loses relevance as the provisions of ESZ would apply on heavily populated areas. This forces to limit the extent of ESZ to few meters only. Moreover, it will adversely affect development of cities.

11) Notification of Environmental Impact Assessment (EIA) Draft 2020

The Ministry of Environment, Forest and Climate Change (MoEFCC) has proposed a draft Environmental Impact Assessment (EIA) notification to replace the current EIA notification 2006.

- All projects that fall under the purview of the Environment Protection Act (EPA), 1986, require an environmental clearance (EC) for running its operations. They are usually given before a project commences.
- EIA notification 2006 issued under EPA regulates EC given by government for projects such as dams, mining, thermal power plants, infrastructure projects like highways, ports, airport and big construction projects etc.
- The new notification is being brought in order to make the process more transparent and expedient by implementation of an online system, further delegation, rationalization and standardization of the EIA process.
- The notification incorporates several scattered amendments that the government made from time to time since the 2006 notification for streamlining the process, decentralization and implementation of the directions of Courts and National Green Tribunal (NGT).

Salient Features of the Draft EIA Notification and its Analysis

- Definition Clause: The 2006 notification did not have any definitions clause, which made it difficult to ascertain the meaning of various terms used in the notification. o 2020 draft defines several terms (such as severely Polluted Area, Public Consultation, Protected Areas etc.) which were previously not properly defined, giving the law on EIA some much needed clarity.
- Categorization of projects and activities: While 2006 notification categorizes all projects and activities broadly into two categories- Category A and Category B, the draft EIA notification divides all projects and activities into three categories - ‘A’, ‘B1’, and ‘B2’ based on potential social and environmental impacts and spatial extent of these impacts.
  - All projects under Category ‘A’ shall require prior-EC from the MoEFCC.
  - No EIA report shall be required for the projects listed under Category ‘B2’.
  - Draft brings certain projects for the first time under the EIA processes. E.g. “bridges and elevated roads” would now come under the ambit of green assessment.

Public Consultation Process

- Public consultation is made mandatory for category 'A' and category 'B1' projects. The Draft proposes to expand the list of projects exempted from public consultation before they seek environment clearance.
- Public consultation is exempted for projects including modernisation of irrigation projects, area development projects, inland waterways, expansion or widening of national highways, all projects concerning national defence and security or involving "other strategic considerations" as determined by the central government, all linear projects like pipelines in border areas and all the offshore projects located beyond the 12 nautical miles.
- As Strategic Projects are not defined, it will give wide discretionary powers to the government which can designate any other projects as of strategic importance in name of energy security etc. to steer it clear of any public consultation and push the project.
- Time period for Public Consultation:
  - It provides for a reduction of time period from 30 days to 20 days for the public to submit their responses during a public hearing for any application seeking EC.
  - It also requires that the public hearing process be completed in 40 days – compared to 45 days under the 2006 notification.
- However, lack of adequate time for preparation of views, comments and suggestions to those who would be affected by the project, would render such public hearings worthless (as noted by Delhi high court in the Samarth Trust Case).
- Monitoring Mechanism: In an Investor-friendly compliance mechanism, project owners are to submit environmental compliance reports (after getting clearance) every year against the earlier every 6 months under the EIA notification 2006.
  - During this period, certain irreversible environmental, social or health consequences of the project could go unnoticed because of the extended reporting time.
  - Further, the compliance mechanism requires the promoters to file the documents on which the environmental impact is to be assessed. This leaves a lot of room for promoters to pick and choose the data and information which is to be supplied.
- Dealing of Violation cases:
  - It is a new section in the draft notification. Draft defines "Violation" as cases where projects either start the construction or excavation or undertake expansion without prior EC or prior- Environment Permission (EP).
  - The draft also lays out a procedure for dealing with non-compliance with conditions stipulated in the environmental clearance by projects.
  - In March 2017, the Central government had come out with a notification that provided industrial projects with a chance to regularise such violation cases. It was supposed to be a one-time chance. However, present draft allows projects to seek post facto approvals in perpetuity, defeating the very purpose of prior approvals.

Conclusion

An EIA is considered an important tool to achieve sustainability. The Supreme Court has observed in Vellore Citizens Welfare Forum case that companies are vital for countries' development, but having regard to pollution, the doctrine of 'sustainable development' must be adopted by them as a balancing concept. EIA seeks to provide that balance.

Stages in the Prior Environment Clearance (EC) or Prior Environment Permission (EP) Process

- Stage (1): Scoping means the process of determining the Terms of Reference by Regulatory Authority for preparation of EIA Report.
- Stage (2): Preparation of Draft EIA Report by the project proponent through Accredited Environment Impact Assessment Consultant Organization (ACO).
- Stage (3): Public Consultation means the process by which concerns of local affected persons and others, who have plausible stake in the environmental impact of the project, are ascertained with a view to appropriately take into account all such material concerns while designing the project
- Stage (4): Preparation of Final EIA
- Stage (5): Appraisal means detailed scrutiny of the application in prescribed form(s) and all documents including final EIA report, outcome of the public consultations by the Appraisal Committee for grant of Prior EC.
- Stage (6): Grant or Rejection of Prior Environment Clearance. The draft EIA 2020 also proposes new committees and procedures. It includes
- Expert Appraisal Committee (EAC) at the Centre, State/UTs and district levels,
- State Level Environment Impact Assessment Authority (SEIAA) or Union Territory Level Environment Impact Assessment Authority (UTEIAA)
- Technical Expert Committee (TEC) shall undertake categorization or re-categorization of projects on scientific principles including any streamlining of procedures, other tasks assigned to the committee for the purpose this notification, by the MoEFCC from time to time.

12) Illegal Wildlife Trade

With the recent outbreak of Corona virus epidemic, speculations around the link between illegal wildlife trade and zoonotic diseases are doing rounds, which have brought the issue of illegal wildlife trade into the limelight.

- As per Worldwide Fund for nature, "illegal wildlife trade is estimated to reach $20 billion per year, which makes wildlife trafficking the world's fourth largest illicit trade, after narcotics, human trafficking and trade in counterfeit goods.
- There are varieties of products which are demanded by the trade and poaching includes Exotic pets and Luxuries, Bush meat, Traditional Medicines, Clothing & Jewellery made from animal fur, tusks, fins, shells, skins, horns and internal organs.
- Impacts of illegal wildlife trade:
  - Threat to conservation of species

- Risks to human health o negatively impacts a country's natural resources and local communities

IWT in India: A brief overview

- India is only 2.4 % of world's land area, but contributes about 8 % of known global wildlife, including over 45,000 species of plants and 91,000 species of animals.
- In India, the illegal wildlife trade includes diverse products including mongoose hair; snake skins; Rhino horn; Tiger and Leopard claws, etc.
- State of India's Environment 2017 highlights a 52 % spike in poaching and wildlife crimes between 2014 and 2016.
  - In 2018, TRAFFIC India released a study which revealed that at least 5,772 pangolins were captured in India from 2009 to 2017 for illegal trade.
- The main reason for the unabated wildlife trafficking across India is its porous international land borders.
- The main consumer markets are China and South East Asia, but wildlife is also smuggled to the Gulf, Europe and Northern America. Beyond India, the main transit countries are Nepal, Bangladesh, Bhutan, Sri Lanka and Myanmar.

Steps taken in India to counter IWT

- Constitutional safeguard: Under Article 51A (g), it is a fundamental duty of every citizen of India to protect and improve natural environment including forests, lake, rivers and wildlife and to have compassion for living creatures.
- Laws and Government Initiatives:
  - Trade in over 1800 species of wild animals, plants and their derivative are prohibited under the Wildlife (Protection) Act, 1972.
  - The Prevention of Cruelty to Animals Act 1960 empower authorities to penalize and jail those who harm wildlife.
  - Indian Penal Code, 1860: Section 428 and Section 429 reads that killing, poaching, maiming, poisoning or torturing an animal is a cognizable offence and the punishment for such act is rigorous imprisonment which may extent to five years or fine or both.
  - Wildlife Crime Control Bureau (WCCB) is a statutory multi-disciplinary body established by the Government under the Ministry of Environment and Forests, to combat organized wildlife crime in the country, under Wild Life (Protection) Act, 1972.
- Other initiatives:
  - Participation of local community: Five crore, people living around national parks and sanctuaries are working as partners in environment conservation.
  - A 15-year National Wildlife Action Plan (2017-31) with a special focus on peoples' participation has been launched.
- Demand-reduction campaigns: In May 2019, the WCCB launched a campaign in collaboration with the UN Environment named 'Not all animals migrate by choice' campaign launched to raise awareness on illegal wildlife trade at airports across India.
  - Tiger, Pangolin, Star Tortoise and Tokay Gecko featured in the campaign.

Way Ahead

- There is an urgent need for knowledge and action to bring legal wildlife trade within sustainable levels and stop all illegal wildlife trade that has threatened and even pushed many species towards extinction.
- Need for greater investment in wildlife forensic science as a discipline to deal with the enormity of the crime so that evidence get evaluated quickly, accurately scientifically, strongly.
  - For example, wildlife forensic scientists in the U.K., have developed techniques that can lift fingerprints off feathers and eggshells.
- Unless governments and civil societies work together to alter mindsets, the world's biodiversity will continue to dwindle, thus collaboration is needed, along with community participation.
- The need for the effectiveness of IWT investments to be better monitored and evaluated, and for investments to be aligned more clearly with defined needs identified on a country-by-country basis.

13) International Conference on Nano Science and Nano Technology (ICONSAT)

The International Conference on Nano Science and Nano Technology (ICONSAT) under the aegis of Nano Mission, Department of Science and Technology (DST) is being held at Kolkata focusing on the recent advances in this frontier research field.

Mission on Nano Science and Technology (Nano Mission):

- Launched in 2007.
- It is as an "umbrella capacity-building programme".
- The Mission's programmes will target all scientists, institutions and industry in the country.
- It will also strengthen activities in nano science and technology by promoting basic research, human resource development, research infrastructure development, international collaborations, among others.
- It will be anchored in the Department of Science and Technology and steered by a Nano Mission Council chaired by an eminent scientist.

Outcomes and significance of the mission:

- As a result of the efforts led by the Nano Mission, today, India is amongst the top five nations in the world in terms of scientific publications in nano science and technology (moving from 4th to the 3rd position).
- The Nano Mission itself has resulted in about 5000 research papers and about 900 Ph.Ds and also some useful products like nano hydrogel based eye drops, pesticide

removal technology for drinking water, water filters for arsenic and fluoride removal, nanosilver based antimicrobial textile coating, etc.

The Nano Mission has thus helped establish a good eco-system in the country to pursue front-ranking basic research and also to seed and nurture application-oriented R&D, focused on useful technologies and products.

14) Black Carbon Levels Spike at Himalayan Glaciers

Researchers recently conducted a study on varying levels of Black Carbon in Himalayas.

Key findings:

- Black carbon concentrations near the Gangotri glacier rose 400 times in summer due to forest fires and stubble burning from agricultural waste, and triggered glacial melt.
- The monthly mean concentration of EBC (equivalent black carbon) was found to be minimum in August and maximum in the month of May. The observed seasonal mean concentrations of EBC indicated a pristine glacial source and an absence of EBC sources in the locality.
- The concentration varied from a minimum of 0.01μg/cubic metre in winter to 4.62μg/cubic metre during summer. Being a pristine zone far from sources of pollution, the measurements are critical to establishing a baseline for pollution loads and estimating the contribution of various sources to pollution.

What is black Carbon? What are the concerns?

Black carbon results from the incomplete combustion of fossil fuels and biomass. BC is produced both naturally and by human activities as a result of the incomplete combustion of fossil fuels, biofuels, and biomass. Primary sources include emissions from diesel engines, cook stoves, wood burning and forest fires.

Concerns associated:

- The fine particles absorb light and about a million times more energy than carbon dioxide.
- It is said to be the second largest contributor to climate change after CO2. But unlike CO2, which can stay in the atmosphere for years together, black carbon is short-lived and remains in the atmosphere only for days to weeks before it descends as rain or snow.
- Black carbon absorbs solar energy and warms the atmosphere. When it falls to earth with precipitation, it darkens the surface of snow and ice, reducing their albedo (the reflecting power of a surface), warming the snow, and hastening melting.
- India is the second largest emitter of black carbon in the world, with emissions expected to increase dramatically in the coming decades, says an April 2019 study in the journal Atmospheric Research, with the Indo Gangetic plains said to be the largest contributor.

HANDY POINTERS: Complete combustion would turn all carbon in the fuel into carbon dioxide (CO2), but combustion is never complete and CO2, carbon monoxide, volatile organic compounds, and organic carbon and black carbon particles are all formed in the process. The complex mixture of particulate matter resulting from incomplete combustion is often referred to as soot.

FUN ZONE !!

The Fun Zone contains a Word Search Puzzle. There are more than 10 words but less than 20 words hidden in the word search puzzle, which are in some way or the other related to environmental sustainability. The words can be found horizontally, vertically, or diagonally and can be either left to right or right to left. Participants are required to find the maximum words by highlighting in the word search puzzle, taking a snapshot of the same, and sending it at Ecoclub@terisas.ac.in

Environmental Sustainability

I N E Z J B I O F U E L R O L L T X M J
V O T I U F H F K U P E M L G N Q J C B
R I S M S O B L R G U N O J E O S Z D I
G T A Q E U W M W S D R W M O W J H A O
R A W U V G M X E D T C E C P Q B R T D
N V O O C T B J Z Z W G L J E O Y G M I
A R R O S I L J H U A V S Y I D U Q Z V
S E E W C A R B O N F O O T P R I N T E
Z S Z A B A K C A K L H M A E D P F G R
F N E D K H N M U A I V J T O R P P I S
I O I C X K E K R L E D A M C P Q W O I
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W R X F E T Y G R E N E D N I W Z Y Y B

SPECIAL TRIBUTE TO THE DAMINIS OF TERI SAS

Dr. Chubamenla Jamir

Dr. Jamir teaches courses related to Climate Change Adaptation and Food Security at the University. Dr. Jamir joined TERI University in July 2012 as an Assistant Professor. Prior to joining TERI she was at the Stockholm Environment Institute (SEI), York, UK as a Ph.D. researcher. She has a doctoral degree from the University of York, UK.

Her key research expertise is Climate change adaptation, air pollution and food security. Besides research and teaching engagements, she has also been organizing a number of training workshops related to different areas of sustainable development for researchers, students, policymakers, and other stakeholders from India and other countries with support from the Ministry of External Affairs, Government of India, Department of Personnel Training, Government of India, UNEP, etc.

Dr. Deepty Jain

Dr. Jain has received her Ph.D. in preparing methodology for low carbon mobility planning in Indian cities from Civil Engineering Department, Indian Institute of Technology (IITD), Delhi. She holds M.Plan in Infrastructure planning from CEPT University, Ahmedabad and M.Sc. in Urban Development and Management from ITC, Netherlands. During her masters she had received funding from Volvo Research and Education Foundation (VREF) from January 2008 to June 2009 and worked on modeling urban form of Ahmedabad city.

Prior to joining TERI University, she was employed as Project Scientist at Transportation Research and Injury Prevention Programme (TRIPP), Indian Institute of Technology (IIT), Delhi. She has contributed in the development of revised toolkit for Comprehensive Mobility Planning published in 2014 by Ministry of Urban Development.

Dr. Kamna Sachdeva

Dr. Sachdeva works in the research domain of atmospheric process and its linkages with climate change. She has completed her doctorate in atmospheric chemistry in 2008 from JNU and published several research papers and book chapters in the area of atmospheric sciences.

During her tenure of research, she has explored basic and applied research questions on chemical and physical processes involving aerosols, as well as organic and metal pollutants of relevance to the environment and its interfaces. She and her research team's direct contributions are to the fields of atmospheric sciences and climate change, specifically aerosol-fog interaction, air pollution, aerosols and health, fog chemistry and micrometeorology.

Dr. Neeti

Dr. Neeti is a Geographer who specializes in remote sensing and Geographic Information Science. Her research interests focus upon the development and application of spatio-temporal techniques to the study of physical environment. Much of her work has focused on developing improved algorithms that enable the mapping and monitoring of forest carbon, land cover, and land cover change at regional and global scale and analyzing associated uncertainties. She has been in the field of remote sensing and GIS for almost 16 years and has worked at Indian Space Research Organization, Clark Labs, Goddard Space Flight Center, Boston University and Woods Hole Research Center.

Dr. Seema Sangeeta

Seema teaches Statistics, Development Economics and Trade, Development & the Environment. Her research interests include International Trade, Migration, Economic Growth and Development. She has published academic articles on topics on migration and international trade in journals such as Review of International Economics and Margin – The Journal of Applied Economic Research.

Dr. Shirley M.A.

Dr. Sherly M. A. is presently working with TERI SAS as Assistant Professor. She has more than 7 years of work experience that includes teaching, industry and research. She received her Ph. D on topic 'Urban Flood Risk Mapping of a Coastal Megacity – An Application to Mumbai' from IITB-Monash Research Academy (A joint Ph. D program between Indian Institute of Technology Bombay and Monash University, Australia) based in Mumbai. She completed her M. Tech in Hydraulics and Water Resources Engineering from the Department of Civil Engineering, Indian Institute of Technology Madras.

Her interests include urban flood risk mapping, design rainfall analysis, flood modeling and hazard mapping, hydrologic & hydraulic modeling, disaster vulnerability assessment & mapping, and optimization in water resources.

Dr. Shruti Sharma Rana

Dr. Shruti Sharma Rana is a doctorate in Business Management and Postgraduate in Marketing & Strategy Management. She is a quality oriented professional with 20 years of experience in Academics, Research, Marketing &Sales .Training and Consulting Educators and Corporates for Motivation, Communication effectiveness, Behavioral Training, developing Emotional Quotient and Competency Mapping she also developed expertise in Pedagogy skill development .Dr. Shruti has a proficiency in Strategy for Business sustainability, Change Management, Blue ocean

strategy and Marketing Management practices. She has served in organizations like The Indian Express, The Hindustan Times Ltd& Group M (WPP Concern), Strategic Planning, Business Development, alliance management, Corporate Communication Consulting across Publishing, Media, Interactive Media and Consulting domains. She is also associated with Ministry of HRD (GOI) as a Resource person. Dr. Shruti volunteers as a Mentor for Udayan Shalini Program. She trains and Guides Girls selected for scholarship by the government for the program.

Dr. Smriti Das

Dr. Smriti Das is an Associate Professor and Head of the Department of Policy Studies at TERI-SAS. Her research and scholarship are focused on areas at the interface of environment and development at local and regional scale. She specifically engages with topics such as environmental policy, processes and politics, forest policy and governance, institutional analysis, sustainable livelihoods and communities, decentralized governance, gender and resource politics. Some of her recently completed studies look at the land-water-community nexus in the mid-Ganga basin using a landscape approach; implementation of SDGs in the context of Delhi with specific reference to health and water and sanitation issues. She has been tracking the implementation of the Forest Rights Act (2006) in India, from resource and institutional sustainability perspective. Dr. Das has taught courses such as public policy processes and politics, governance of natural resources, social research methods.

Dr. Sukanya Das

Dr Sukanya Das is an environmental economist with an interest in environmental valuation and policy. Prior to joining TERI SAS she was a Faculty at Madras School of Economics for more than seven years after completing her Ph.D from Jadavpur University. She has an expertise in handling research projects in the area of environmental and resource economics, water economics and health economics.

She teaches courses in Environmental and Resource Economics, Environmental Valuation, Economics of Health and Environment. Her current research interests include environmental valuation particularly in the area of water and wastewater management, Ecosystem services, Agricultural economics, Water economics, Urbanization and environment.

Dr. Vidhi Madaan Chadda

Dr. Vidhi Madaan Chadda, is a commerce and law graduate from the University of Delhi. She is a fellow member of the Institute of Company Secretaries of India. She did her Masters in laws (with specialization in corporate laws) and has qualified UGC-NET. She obtained her Ph.D. in the area of Competition law from the Faculty of Law, University of Delhi.

She specializes in the areas of Company law, Competition law, Insolvency law and Tax law. She has been practicing, researching and teaching in the said areas for over a decade. Prior to joining

TERI SAS she worked as an Assistant Professor at the Vivekananda School of Law and Legal Studies affiliated to Guru Gobind Singh Indraprastha University, Delhi.

Dr. Ranjana Ray Chaudhuri

Dr. Ranjana Ray Chaudhuri is a civil and environmental engineer by training and pursuing PhD in Hydrology. She has over 25 years of experience in industry and academics. She has worked in the field of academics and infrastructure involving feasibility studies, design, evaluation and tender preparation. As a faculty member, she teaches courses in water planning, water demand management, integrated watershed management, ground water management and water optimization methods. Her areas of interest include water resource management, watershed hydrology, and analysis of hydrologic systems including predictions.

Dr. Anandita Singh

Anandita's broad research interest lies in the field of Plant Genomics. It primarily relates to developing an understanding of the natural genetic and morphological variation in crop and other plant species of economic value. The intent is to exploit and treat it as a resource, in combination with various genomic approaches, for interpreting the molecular basis of plant adaptation to stressful environments and important life history traits. The knowledge thus gained is envisaged to be useful for developing sound strategies for breeding crop species and other economically important plants. Together with her group, she is currently focusing on understanding and characterizing the regulatory elements viz. transcription factors and miRNAs underpinning such adaptive traits as flowering in members of Brassicaceae.

Dr. Pallavi Somvanshi

Dr. Pallavi Somvanshi is a faculty member in the Masters programme of Biotechnology at TERI University. She has contributed towards designing and teaching core courses like Bioinformatics and Computational Biology I & II, apart from co-supervising the laboratory course to masters and pre-Phd students. Her research interest lies in the field of bioinformatics and mainly relates to analyzing the data to solve biological problems associated with both basic and applied aspects of research work. Her research group focuses on homology modeling, molecular docking, simulations and quantitative structure-activity relationship (QSAR) for infectious, heredity and neural diseases.

She has more than 8 years of teaching and research experience. She has published more than 50 research articles in reputed journals and presented her work at various national and international conferences. Presently, she is supervising 5 Ph.D students and has an experience of successful supervision of more than 50 post graduate research students.

Dr. Anu Rani Sharma

Dr. Sharma joined TERI University in August, 2012 as an Assistant professor. Dr. Sharma obtained her PhD degree in the Environmental Sciences from Andhra University, Visakhapatnam and worked at NRSC-ISRO during her research tenure. Dr. Sharma's doctoral work focused on atmospheric corrections to satellite data towards generating normalized vegetation index (NDVI) data from different sensors over Indian region which provides operational methodology for monitoring drought conditions over the region from multi satellite missions.
Her research work so far resulted in significant international publications (more than 30 research papers and one book article) in peer reviewed journals, with some of them on top-25 referred research papers in climate change science and earth system journals. She has also received various travel grants and presented her research work at International conferences in Norway, China and India.

Dr. Bhawana Bali

Bhawna Bali is an alumnus of the Panjab University, Chandigarh, from where she had her academic training in the discipline of Urban Geography, with an M.Phil. and Ph.D. in the subject. Her teaching experience is quite diverse including urban studies, tourism and geography. At TERI SAS, she teaches core subjects of Urban Development Policies and Programmes, Theories of Urbanisation, City and Regional Planning and Management and Research Methodology in the MTech Urban Development Management (UDM) programme. She coordinates the MTech UDM student internships with Municipal Corporations, Smart Cities Special Purpose Vehicles and parastatals.

Dr. Fawzia Tarannum

Dr. Fawzia Tarannum, an Assistant Professor in the Department of Regional Water Studies at TERI School of Advanced Studies (TERI SAS), is interdisciplinary water professional with 20+ years of experience in project management, teaching and training. She is an Electrical Engineer with Diploma in Management and her PhD dissertation is on "Analysis of public perception of water quality and role of Information Communication Technology (ICT) in supporting participative management." In 2013, she was awarded the University of Nairobi- IDRC Doctoral Research Grant for her PhD study. She was also awarded the Fulbright Hubert H. Humphrey Fellowship by the US State Department in 2017 and has spent a year in Cornell University to enhance her skills in interdisciplinary approach to water management. She has received leadership training on Seven habits of highly effective people from Franklin Covey Institute and Climate Reality Leadership Corps Training by Al Gore, Former Vice President of the United States. She has also done four months of professional affiliation in Water and Ocean Governance Department at UNDP in New York City. Prior to joining TERI SAS, she was General Manager-Sales at M/S Cleantec Infra Private Limited, a company engaged in mechanized cleaning and

dredging solutions for shallow water bodies. Her research interests are gender, equity and water resources management, integrated water resources planning and management, water governance and food-water-energy nexus.

Dr. Jaya Vasudevan

Dr. Jaya Vasudevan is Associate Professor at the Department of Business and Sustainability. Before joining TERI SAS, she has been Alexander von Humboldt Postdoctoral Fellow at the Institute for Foreign and International Private and Business Law, at the Heidelberg University, Germany. She holds Ph. D from the University of Delhi in International Commercial Arbitration Law. She has had over 16 years of experience in academic teaching and research at various institutions including the University of Delhi, the Indian Law Institute, and the Heidelberg University. Broader areas of her research work include Corporate & Business Law. Her teaching as well as recent research has been in the field of International Trade Law including Dispute Resolution Laws & Conflict Management in Business with special emphasis on Commercial & Investment Arbitration Law. She had been a part of the editorial team of the Journal of Indian Law Institute, Excise Law Times, Service Tax Review etc. She is an active member of various widely regarded professional bodies & arbitral institutions in Europe. Currently she focuses on studying new forms of interdisciplinary cooperation in International Business Law unfolding the newer challenges to sustainability in global trade. Her recent research works include the GST law and Indirect Taxation and Comparative Law of International Commercial Arbitration in Europe and South Asia

The list does not end here… Daminis of TERI SAS does not only include the faculty members but also various other staff members such as the department assistants, program coordinators, IT team member, and so many more. So here is the tribute to them as well!

Not to forget, the Daminis of Eco Club, without whom the Eco Club at TERI SAS wouldn't probably exist! It's because of those super ladies that Eco Club has been able to create an impact.

END

For feedbacks/ comments/ views/ contributions/ corrections
Mail us at
Ecoclub@terisas.ac.in

Contributions for next month's edition are most welcome! Theme will be disclosed soon.

TEAM DAMINI

Writer and Compiler – Rajesh Kumar, Secretary, Eco Club, TERI SAS

Editor and Designer – Shreya Kalra, Executive, Eco Club, TERI SAS & Rajesh Kumar, Secretary, Eco Club, TERI SAS

Data Collection and Miscellaneous Work – Sibin Kartik Tiwari, Administrative Head, Eco Club, TERI SAS

Cover Designing – Shreya Kalra, Executive, Eco Club, TERI SAS

Watermark Image Credits – Mr. Vishal Kumar, Department Coordinator, Policy Studies

Special Message Credits – Dr. Fawzia Tarannum, Assistant Professor and Programme Coordinator, Coca-Cola Department of Regional Water Studies