ENVOICE

A Newsletter from the Department of Environmental Science, Vivekananda College, Thakurpukur, Kolkata

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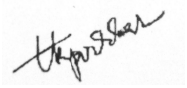
FROM THE DESK OF PRINCIPAL

Untiring eight years have already gone away. Now the time for publication of the ninth issue of ENVOICE. The most important factor for continuity and maintenance of standard of any project is involvement or attachment. Students, staff and teachers of the Environmental Science Department of our college are s uccessful in their mission. Their devotion, sincerity and honesty are the source of their prosperity. The focus of the ENVOICE should be creating environmental awareness among the people, who are in close proximity of us. A small but strong powerful and imperceptive group of people are always exploiting the wealth of our Earth indiscriminately for their short term gain. We all have to fight united to arrest the degradation of our mother Earth caused due to the act of those evil creatures. So, always be alert, active and confident and support this movement for ceaseless flow of life in this beautiful planet in the Universe. Let's join hands –

WE SHALL OVERCOME



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Count the Drops

Rajarshi Mitra
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July 15, 2018 is going to set a mile stone in the World Environmental History as it marks the first ever DAY ZERO of water availability at Cape Town, South Africa.

Huhhh…. it is far away a city, that too in a region known as arid since long. Yes the city is far away, but the threat is not. The water resource is becoming scares day by day and already a good number of cities are heading towards a 'Day Zero', and our very known Bengaluru is one of the top runner in that aspect. A recent study by Centre for Science and Environment, published in 16th March issue of 'Down to Earth' magazine predicts Bengaluru, Beijing, Mexico City and Istanbul to top the list of cities heading 'Day Zero', Robert McDonald, a scientist in a US-Based Environmental Organisation The Nature Conservancy predicts around 36% cities throughout the Globe going to face water crisis by 2050. So, shouldn't we be better conscious, before it is too late?

The Government of Cape Town has decided a water ration of 25 liter per person per day to be given to the citizen from 15th July, half the amount they are allowed to use without paying a skyrocketing tariff. Cape Town received the C40 Cities Award for Water Demand and Management Programmeme in 2015, but since then owing to climate change very low rainfall led to the condition today. Hence, the future may be closer than it appear.

On an average, per person per day water demand in India is 135lit, while our consumption is still being maintained above 200 liter. But we are not yet prepared to accept any water tax, capable of cutting the water wastage. ***Contd…p 3***

Remembering Stephen: The man who lived a life worth living

Sumana Mukherjee,
Faculty Member, Department of Environmental Science
Vivekananda College

The Earth Day celebration will be incomplete without bidding a due farewell to Professor Stephen Howking. Prof. Hawking took his last breathe on 14th March of this year. This revolutionary physicist, who dazzled the scientific fraternity with some paradigm shifting theories, took up science not as a 'career' but as passion and believed that science has no boundaries. He is fondly remembered saying - *"Science is not only a disciple of reason but, also, one of romance and passion".*

However, beyond his contribution in theoretical Physics and cosmology, his life is inspiring to many of us in many ways. At the age of 21, shortly after his 21st birthday Stephen was diagnosed with ALS, a progressive motor neurone disease. In spite of being wheelchair-bound and dependent on a computerised voice system for communication he continued to combine family life (he has three children and three grandchildren) with his research. In addition, he never backed down from extensive programmeme of travel and public lectures. Such was his spirit of life – disease cannot stop scientists from doing science. In his own words, *"I'm not afraid of death, but I'm in no hurry to die. I have so much I want to do first".*

Only some of us can understand the full length and breadth of his scientific contributions and perhaps he felt obliged to reach out to those who are not physicists by training. His popular lectures and articles allowed many to visualize even the most abstract concepts as black holes, origin of the universe, the development of intelligent life and many more. However that is only the surface of what he was up to – a grand theory of everything.

"My goal is simple. It is a complete understanding of the universe, why it is as it is and why it exists at all"

The legend redefined cosmology and proposing that black holes are mortal. But the Nobel Prize for Physics remained elusive as his theory could not be observed or experimentally verified. To him, it was a "pitty". Nonetheless, he was honoured by many degrees and awards. He was awarded CBE (1982), Companion of Honour (1989) and the Presidential Medal of Freedom (2009), the Fundamental Physics prize (2013), Copley Medal (2006) and the Wolf Foundation prize (1988). He was a Fellow of the Royal Society and a member of the US National Academy of Sciences. He will always be one of the brightest stars on the sky of science who believed in science more than anything in this universe. Perhaps more than ever we need a philosopher like his to clear our mind of the muddled misconceptions of what is logical and what is not.

"There is a fundamental difference between religion, which is based on authority, [and] science, which is based on observation and reason. Science will win, because it works."

Why only one Day Earth Day?

Protisha Ghosh
B.Sc. 1st yr, Department of Environmental Science

We should celebrate all 365 days as Earth day. Planting trees on this day, making other people aware to safeguard the Earth, talks, debates etc. only on Earthday won't save our Earth.

It is not the point that we have to save our Earth, rather we have to save ourselves because this planet would survive in all extreme conditions as other planet like Jupiter, Saturn etc. being cool or hot, but we living beings on this planet will not survive in extreme conditions.

We have to act to reduce environmental pollution and degradation. Let's start with one of the very common solution and "SAY NO TO PLASTICs".

Is it really possible to say no to plastic? Are we in such a stage where we can't think without plastic? Perhaps no. But we can reduce the use of it and we can manage the problems occuring because of plastic. Reuse of plastics materials and recycling through industrial processes is effective measures for reducing plastic waste.

This Earth is our home and we have to solve the problems of our home to stay here. 22nd Day of April is not the only day to celebrate for our Earth, rather every day of our life is for Earth and we should celebrate it all 365 days.

Urban Wetlands-CO_2 Sink or Source?

Protusha Biswas, (Batch 0f 2015)
Research Associate (Climate Change and Ecosystem),
The Celestial Earth, Gurgaon, India

Studies on wetlands are huge in number, where the same system is looked up from different angle and perspective. Owing to the multi-facet roles, benefits and subsequent stakeholders in and around these unique ecosystems, such studies are important, mainly for awareness and off course for its management and conservation. Industrial Revolution and its after-effects can be held responsible for the increased amount and concentration of greenhouse gases in the atmosphere, but there also exists a harsh truth that says under several conditions, even natural ecosystems can be equally responsible for the same emission. It has been noted how biological functioning may convert the nature of a system from sink to source. And as these fragile ecosystems are frequently affected by dynamic environmental conditions, there short-term and long-term carbon balance is an issue that needs attention.

Though wetlands cover a small area (approximately 6-9%) of the total global area, the carbon storage and sequestration capacity are assumed to be the highest compared to other terrestrial ecosystems, that makes up to 35% of the total terrestrial carbon. The concerned area in the wetlands is the amount of methane released into the atmosphere, as the methane and carbon dioxide ratio determine the overall carbon exchange and the aggregate of the same determines whether the countervailing process makes the wetland system an overall contributor of GHGs.

The concerned study done on East Kolkata Wetlands was aimed to observe whether the EKW complex was acting as a source or a sink. The study was done taking into consideration a 3 seasonal data set, namely Pre-Monsoon, Monsoon and Post-Monsoon. The Hydrological data included water surface temperature, Electrical conductivity, pH, salinity, partial pressure of water, Dissolved oxygen and Photosynthetically Active Radiation, whereas the atmospheric data includes atmospheric temperature and partial pressure of surrounding atmosphere. The data once assimilated has shown that the complex is acting as a source of carbon dioxide in all the 3 seasons studied. Air-water CO2 flux varied largely in the three seasonal data, an average of which was 4184 µmol m-2 h-1, 2897 µmol m-2 h-1 and 437 µmol m-2 h-1 during pre-monsoon, monsoon and post-monsoon respectively. Temperature is observed as a determining factor in air-water carbon dioxide flux, indicating to the fact that with continuous increase in temperature in near future, more CO2 will be naturally emitted in the atmosphere, thereby changing the micro-climate. In case of EKW, the wastewater composition from the city results in the enhanced methane and carbon dioxide emission from the oxidation ponds. The Urban wetlands though releasing a mere amount of CO2 may have an immediate or distant after effect on the city's climate. The adaptive capacity of the city to natural disasters, owing to the mere existence of the wetland system stretching till the Bay of Bengal, decreases with wetlands converting into sources of CO2, subsequently contributing to temperature rise and their alarming deterioration may also make the metro city more vulnerable to sea level rise and climate change.

Read the full version at:
http://www.recentscientific.com/urban-wetlands-%E2%80%93-co2-sink-or-source-case-study-aquaculture-ponds-east-kolkata-wetlands

Drops….*(Contd. From p1)*

The authority too is hardly doing anything to reduce water wastage, conserve water or to recycle, particularly at mass scale. Of let, it has been made mandatory to install water recycling and conservation strategies in large residential projects, but that may not be sufficient to defer the ‘Day Zero’ even in our city until the lifestyle of the commons is curved to reduce the water consumption.

Energy Star

Sayan Debnath
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Simply, energy is the capacity to do work and we get this from the utilization of different kinds of resources (renewable source and nonrenewable source). So when we operate a machine, an amount of energy is being lost. Scientists are researching for a long time to build such type of product which is energy efficient but in other hand also give performance and comfort like before. **Energy star** is the outcome of the thinking of the scientists. It is basically a programme launched by the U.S Environmental Protection Agency (EPA) in 1992 and then it is operated by the authority of the Clean Air Act. But now it is managed by the EPA and U.S Department of Energy (DOE).

This programme basically encourages manufacturers of different electronic gadgets to produce energy efficient products. At first the programme was designed for computers and monitors, but after the huge popularity among Americans, other electrical equipments like air conditioner, heater was added to this programme and later every single electronic gadget was in the list. There was a specific label of energy star found on the products come under this category. At first products are tested and verified by the EPA and then the performance, product cost and the demand among customers is judged according to current market. The only products which passed through this test and judgment process get this label from EPA.

This programme not only makes easy for consumers to buy energy efficient product and giving them scope for saving money by saving energy, it also reduce environmental pollution. The products reduce emission of green house gas and do not emit other pollutants caused by the use of excess energy. It also focuses on more use of renewable energy sources. According to the EPA, Commercial buildings contribute nearly 18 percent of green house gas emission in United States, but those with the energy Star label cut their energy consumption by 35 percent.

But there are only six countries (Australia, Canada, Japan, New Zealand, Switzerland and Taiwan) recognize the energy star products. There are several workshops happening around the world and more countries are invited to join this programme.

In India, Bureau of Energy Efficiency (BEE) is doing a similar kind of work like Energy Star. It is established in 2002 under Energy Conservation Act (2002). It monitors energy usage in energy consumption unit. S and L programme is launched by BEE to reduce overall energy consumption. Now in India there are several electronic products come with BEE star labels. But these products are not so much famous among the consumers so there is a need of lots of media campaign and product awareness.
Let's take a step forward and say yes to BEE. Next time as you buy anything check once for the BEE stars.

- The Government of India set up Bureau of Energy Efficiency (BEE) on 1st March 2002 Under the provisions of the Energy Conservation Act, 2001
- **To assist in developing policies and strategies with a thrust on self-regulation and market principles**
- The primary objective is to reduce energy intensity of the Indian economy
- This will be achieved with **active participation of all stakeholders, resulting in accelerated and sustained adoption of energy efficiency in all sectors**

Bee Responsible

Rajesh Jena
B.Sc. 2nd yr, Department of Environmental Science

Yes, you read the title of this article right it's not a spelling mistake. Bees are the most underrated and the forgotten species in the world. For some people, bees are simply an annoyance. They buzz around, crawl inside our soda cans, chase people down the street and sometimes sting. "The bee is more honored than other animals, not because she labors, but because she labors for others"- St. John Chrysostorm.

Over the last two decades, startling research has shown that this hardworking species- once described by Earthwatch as the "most invaluable species in the planet"- is in rapid decline. This past winter, 23.2% of America's managed honeybee colonies were lost. The figures are worse than the prior years. The most disturbing thing is that they are still dying out there at a very disturbing rate. Even if we don't want them they are still going to be needed by the nature for a very important task: Pollination. In fact, one third of our food supplies are pollinated by bees. In India fast decline is reported particularly from the southern India. It has been estimated that without pollinators nearly 80% productivity will be lost. Simply, put bees keep plants and crops alive. Without bees, humans wouldn't have very much to eat.

Our daily household products like almonds, apples, orange, berries, grapes, kiwis, mangoes etc. are not going to be seen in the supermarkets near you. Be it the jam in your breakfast or the fruit salad for your dinner there will be nothing, if bees extinct. The work done by bees if we put human labor to do the same work then it will be a yearly expenditure of $225m so God bless the economy then. And also, expensive fruits and vegetables for consumers! Approximately 250,000 species of flowering plants depend on bees to help them pollinate. Without these incredible insects, many wild flowers and other plants would struggle to reproduce. As these flowers and berries are often a food source for insects, birds, animals, it could have severe consequence for survival of those animals.

Now, talking about the cause a study from Harvard School Of Public Health found that pesticides like Neonicotinoids is responsible for the decline in the number of bees. These pesticides directly contribute to a phenomenon known as Colony Collapse Disorder (CCD). CCD is essentially the process by which honeybees spontaneously abandon their hives. When bees are exposed to pesticides like neonicotinoids, the go insane and don't know how to return home. It's almost like Alzheimer's. there are other reasons too like the Varroa mite. Ultimate outcome is still the same. Some beekeepers have tried to replace the natural nectar with a substitute to feed their bees, but it doesn't bee health the same way. There is no substitute to natural way of the world.

Simply put humans are terrible for bees. Pesticides, environmental degradation and pollution, are all contributing to the alarming rate of decline of the bees. Albert Einstein famously said "without bees' humans cannot live more than four years on earth".

Thus, now is the high time to save these pollinators. We only got one planet earth, there are no second chances. When a species go extinct, that's the end. We cannot allow bees to go extinct if we have any hope of surviving.

Reunion Programmeme, 2017

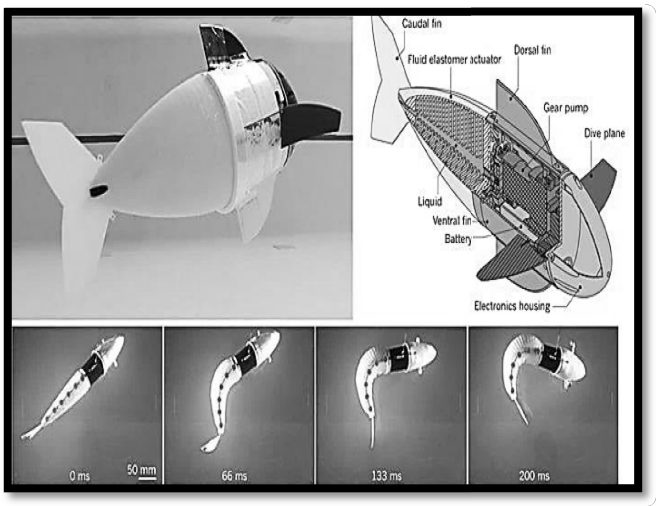
"SoFi": A new way to explore the marine life

Diana Datta
B.Sc. 1st yr, Department of Environmental Science

As the days are passing by, the technological developments are having a rapid expansion.The recent advances, for example, neural sensing headsets, cryogenic treatments, unmanned vehicles, to name a few, are awe-striking. Particularly, the robotic engineering is one of the breeding ground for creativity and innovation. Its take on improving agricultural, medical, and manufacturing industrieshas made life a lot easier. To understand environmental issues and for environmental monitoring, robotics is taken into consideration along with other methods. Today's robots are already exploring our deep oceans, tracking harmful algal blooms and pollution spread, monitoring climate variables, and even studying remote volcanoes.

One such invention that caught my attention was the Soft Robotic Fish.

On the 21st of March, a team from MIT's Computer Science and Artificial Intelligence Lab (CSAIL) released a paper in the journal Science Robotics, describing their latest invention, a new tool for



studying ocean life. They call it 'SoFi', short for Soft Robotic Fish. MIT researchers report the first self-contained autonomous soft robot capable of rapid body motion: a "fish" that can execute an escape manoeuvres, convulsing its body to change direction in just a fraction of a second, or almost as quickly as a real fish can. This invention is also sturdier, such that it cannot only survive collisions better but can also provide information about the collision, in order to form a more efficient motion plan.

Basically, SoFi is a 1.5 foot robot consisting of two parts:The first part is rigid and stores all the supporting hardware in a smaller frame and the second part is movable where all the continuous, natural movement occurs.This structure happens to be similar to that of a fish. But how does this work?SoFi consists of a motor that pumps water into two balloon-like chambers in the fish's tail that operate like a set of pistons in an engine. As one chamber expands, it bends and flexes to one side; when the actuators or the valves push water to the other channel, that one bends and flexes in the other direction. These alternating actions create a side-to-side motion that mimics the movement of a real fish. The mechanism is similar to hydraulic pump. By changing its flow patterns, the hydraulic system enables different tail manoeuvres that result in a range of swimming speeds, with an average speed of about half a body length per second. The urethane foam chamber provides buoyancy.Its battery runs for 45minutes and receives commands from a Super Nintendo console controller and can relay data to scientists from about 65 feet away.

All these advantages helps it to blend with the surroundings meaning that the robot can capture rare footage of marine life that was earlier off-limits. The head of this robot uses a fisheye lens to take high-resolution videos and photographs. Its body is made of a silicone elastomer, and several parts are 3D-printed, making it relatively inexpensive to manufacture. Existing autonomous underwater vehicles typically are tethered to boats and powered by propellers or jets that can disrupt the natural environment. SoFi swims alongside fish and other marine creatures without sending them fleeing. The robot can be used as a marine biology instrument and also to measure pollution in coastal waters, to create maps, to do inspection, to monitor and track. It has the potential to be a new type of tool for ocean exploration and to open up new avenues for uncovering the mysteries of marine life.

Crossing the Threshold of Environmental Ruin

Sarodarchita Goswami
B.Sc. 1st yr, Department of Environmental Science

The city of Kolkata lost its winter charm just after the month of February by smart hitting of summer with 37º celcious and during April, 2018.

According report from The Times of India, Jan 17, 2018, Air pollution levels shot off the charts in Kolkata early on Tuesday, earning for the city the unenviable distinction of having the most foul air in the world. The US Embassy & Consulate that monitors particulate matter emission around the globe, Kolkata's PM 2.5 count shot up to 565 at 5am on Tuesday, which was 9 times more than the permissible limit of 60 and higher than any other city in the world at the time and more than double the highest count clocked by Delhi on the same day. While environmentalists called the sudden pollution surge — which made the city's AQI far worse on Tuesday than on Diwali — 'mystifying', they pointed out that a combination of construction fumes, vehicular emission and environmental factors could be responsible.

Sweeping of roads by civic workers and the practice of burning garbage early in the morning are age-old practices that need to be altered taking pollution into account. But sadly, nothing is ever done.

Imbalance of equilibrium has its all sphere effect on nature derived from evolution of human civilization, population growth and different activities. Lust for discovery and invention establishing small and big industries toward development of our country has made our life no doubt easier but malpractices towards exhaustion of pollutant from industries in rivers, emission of gases smokes in the air polluting the environment which is alarming to human health with harmful diseases like asthma, Lung Cancer. The water pollution contaminates water of Ganga which is also used for drinking purpose. This contaminated water causes the problem of Diarrhea, stomach pain, Jaundice and other types of diseases.

As a measure to prevent pollution level to some extent the river Ganga needs well be protected from discharging the waste to the river and it should properly be maintained. Again the pollution can also be controlled by use of modern methods and technologies in the industries like setting up Electrostatic precipitators and Scrubbers in the chimneys. This may reduce the harmful chemicals and SPM (Suspended Particulate Matter) from the industries. Use of alternative energy resources like Solar energy in transport sector can also reduce the menace of poisonous smoke emission in the environment'. The public transport needs to be made efficient to attract more people to use those reducing the carbon footprints.

According to WHO report on ' Ambient Air Pollution 2016 ' India has the most polluted cities in the world. Out of the 100 most polluted cities in the world, India has 33, while it also contributes 22 cities to the top 50 most polluted ones.

Unless human awareness for existence being awoke all the steps being taken by governments towards preventive measure for pollution in all sector of land, water and space may go in vain and prediction of Nostradamus be inevitable.

News from the Department

- Soham Chakraborty and Soumi Ghosh stood 1st class 1st and 2nd respectively in Calcutta University Examination, 2017.
- Observed Earth Day 2017 & 2018, and World Environment Day, 2017. On the World Environment Day, a debate was organised in collaboration with the Debate club of the college.
- The 3rd Reunion of the Department was organised in the month of September, 2017. Quite a good number of alumnus participated in the occasion to make the bonding further strong.
- The department of Environmental Science organised one day nature study trip to Chintamoni Kar Bird Sanctuary on 24th January, 2018.

Synopsis of Students' Research

Impact of crop composition on organic matter content of soil

Srirup Chakraborty, Adwitiya Kundu & Snehasis Maity
Department of Environmental Science

Soil the matrix, where plants grow is the key element for our food security. The fertility of soil depends on presence of nutrients, water, air and soil biota. Parameters like pH, ECe and Organic carbon controls the availability of nutrients and other key factors and hence, may act as a primary indicator of fertility. However, the soil condition may also be altered with alteration of its covers and vegetation is holds.

In this study efforts have been made to identify, whether there is any influence of vegetation on the soil quality or not. For the purpose, three sampling area were chosen with different vegetation profiles, like well maintained college garden, grass land and agricultural lands. Ten composite top soil samples were collected from a depth of 15 cm at each of the fields and subjected to laboratory analysis for Soil pH , ECe (as measure of salinity), moisture content and organic matters.

The scope of study although was very limited to reach any conclusion, but comparative analysis confirms a close influence of vegetation cover and use profile beyond doubt. It has been clearly visible that the garden soil is having higher nutrient dis-balance than the other two, as evident through high pH and low organic carbon values. However, in that context the agricultural land was most suitable land with moderate moisture and optimum pH values.

A study on variation in soil organic matter with depth and cropping composition

Rajesh Jena & Sarodarchita Goswami
Department of Environmental Science

This is study a collateral study of the previous one. It is well known from different literatures that, not only horizontally, but also the depth of the soil has some influence on soil quality. The vegetation covers also varies accordingly, as their root lengths differ. With the aim to see the soil quality variations with soil depth, at five sampling point in the same three sampling locations from the other study, soil was collected from different depths, viz. 15cm, 25cm and 40cm, and analyzed at departmental laboratories.

The result confirms that the maximum moisture get settled at the middle depth of the topsoil (25cm) below which it starts decreasing. However, the trend of change in moisture and ECe showed to some extent the similar pattern of changes with depth with a few site specific variations while organic matter contents were found to have no uniformity in depth-wise variations among all the locations at least for such shallow depth profile.

This study with reference from the other one confirms that, both the vegetation type and depth of the soil are responsible for soil quality variability.

A comparative study of impact of different road side tree shade with special reference local climatic parameters

Moitrish Majumder, Ishani Chkraborty, Debabrata Das
Department of Environmental Science

This was a second study of its' kind in this department. Earlier in 2013-14 session another study on influence of canopy cover on the micro climate was done reporting a definite influence. However, in continuation to that, this time only the road-side trees were taken under consideration and the study was made more intensely. This time the total number of canopy studied was 48 and for all the sampling points data have been collected on the size and type of canopies, temperature, relative humidity and related parameters useful for calculation of Discomfortibility index and Heat Stress Index.

The present findings has successfully revalidated our earlier study, but failed to identify any species specific contribution, while confirming clear impact of the canopy area on the climate parameters have been noticed.

This time, we have noticed that, it is always better to have a comprehensive estimation than estimation of single parameter for the climate conditions. In fact this time we did not come across a uniform data set for the relative humidity, but got when the same was integrated within a index calculation a clear and uniform trend was visible.

However, this study, once again strengthen the claim that, we must have trees in urban areas for our own survival.