



ENVOICE

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

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FROM THE DESK OF PRINCIPAL

We initiate many programmes with enthusiasm, we do many works with full of energy. But, we do not continue those with sincerity and devotion and as a result, they come to an end within a very short span of time. Still exceptions exist everywhere. Publication of ENVOICE is one such event. This is the eighth continuous year of publication of this newsletter. ENVOICE is published to mark and to show solidarity to Earthday. This year the international theme of Earthday is Environmental & Climate Literacy. All over the world, the activities of mankind deplete our soil, destroy our forests and animals, pollute our water and air continuously which directly affect change in climate that is threatening our survival. So, it is our duty to save our planet and we should find hope for the future. Lastly, I conclude with the remark of Maritza Morales Casanova, the Mexican Environmentalist and the National Geographic emerging explorer, "Education is the most powerful tool we have for solving environmental problems and empower children with information, leadership skills and confidence and they will change the World".

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Inferno in the City

Rajarshi Mitra

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It's the mid of April and the mercury has crossed the mark of 37°C and somehow it is sensed like 40°C or more. Global Warming – as we say it. But this time it may not all global but there is something local too. Urban Heat Islands (UHI) are being intensified day by day and Kolkata is competing to be one of the cities with maximum urban concentration in the World with an ever growing trend of UHI formation, that leads to urban heat imbalances, elevated ground level ozone concentration and most importantly enhanced mortality. UHI are patches with intense heat generally caused due to trapping of hot air at places with hindered ventilation and more sources of waste heat than the sinks.

Our city is growing, getting smarter every day with lots of elevated and wider roads accommodating the flaring numbers of vehicles. We feel delighted in having faster commute than ever. But have we ever chalked out the cost? All these came on the expense of avenue trees, small water-bodies and now even we are eager to grab the only Ramsar site of the State, the East Calcutta Wetlands in Eastern fringe of the city, which is known to absorb significant portion of city waste. The long stretches of EM bypass, VIP road, DH road used to be a green corridor earlier, have almost become concrete passages in search of more road space and speed. The parks and gardens are good to see but may not be as effective as large trees in accommodating the heat.

It seems essential to use more energy for comfort in terms of ACs and private conveyance. But ironically we are liberating huge waste heat while reducing its' sinks. If it is not possible to forgo the comforts at least we must fight the warming locally and protect the greens.

Let us hear from You

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Batting Experiences - A field waiting to be explored

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Although there are flying squirrels which can glide even up to 200m and flying lemurs which too can cover as far as 70m, bats are the only mammals capable of true and sustained flight. They are found everywhere except extreme deserts and isolated islands. With over 1100 species globally and more than 120 species in India, bats form the second most diverse order of mammals. There are two suborders in the order Chiroptera: Megachiroptera, the fruit eating (frugivorous) large ones, called *badur* in Bengali and Microchiroptera the insectivorous small bats, called *chamchike*. However, that division is being revised and researches are suggesting new names for the suborders like Yinpterochiroptera and Yangochiroptera or Pteropodiformes and Vespertilioniformes based on genetic data, molecular studies etc. So without going into this confusion of scientific names I am going to write about Vampires, which must be a very familiar name to all of us.

My current work is on a bat called Lesser False Vampire (*Megaderma Spasma*) which is found in North-East India and Western Ghats. This species is known to hunt and prey on insects, small birds, amphibians and even other bats too. This study was focused on 4 bat roosts which are basically old abandoned houses or sheds in Upudi District of Karnataka. During the day time we went inside these houses and caught a few bats with butterfly nets and attached a small radio transmitter on their shoulders with glue (surgical cement). Then we released them back to the roost. Then with antenna and receivers we tracked them at night and found out their foraging (feeding) locations.

The landscape is highly mixed with more than half of the area converted into some land use by the villagers. Using Google Earth Images we classified the area into 4 categories such as Natural Vegetation, Plantation, Paddy-field and Others (open area, houses etc). It was found that these bats are mostly selecting Natural Vegetation over other

habitats although the availability of natural vegetation is less or equal to plantations near these roosts. It is primarily concluded that for conservation of their feeding grounds we need to control the conversion of natural vegetations into plantation, paddy field or other land use.

This study is still in progress. For the next step from here we are going to find out the resource abundance for each habitat class by insect traps and call records to understand the driving factor behind the selection of habitat.

Another interesting volunteering opportunity that I got during my summer vacation was a diversity study on bats of Uttarakhand. We used to catch them in the valleys where they come in search of insects or to drink water with mist nets. Mist nets look like volleyball net suspended between two poles, used to catch birds and bats. We used to set up the net before the evening and check the nets every 15mins or so. In 7 days I got to see 8 species of insectivorous bats. The main aim of the study was to create an echolocation call library by recording the call they make just after we release them with the help of an ultrasonic bat detector. The ultrasound calls are characteristics of species and can help in identification of bats without the need for capture in future.

Bats play an important role in ecosystem as pollinators, seed dispersers, insect predators and nutrient cyclers especially in the caves. However, there is a lack of extensive knowledge on their behaviour and ecology and even on the baseline studies like their diversity, distribution and natural histories. In a time when we are already talking about conservation of other rare and endemic species we do not have the complete data to find out which species of bats are rare or endemic in tropics. It is true that studying bats in the wild is not very easy but the amazing and unique characteristics of this group of animal can make it worth.

[It is an extract from the research experience of an alumni during her M.Sc days.]

The Business of Nature

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We all are well aware of the importance and wide range of benefits provided by the Wetlands, though it covers approximately 4 to 6% of the land surface out of which 56% is in tropical and sub-tropical regions. The increased anthropogenic activities have been detrimental for the wetland ecosystems, their structure have been deformed and their services have been utilised to the extent in an unsustainable manner, where it is unable to maintain its function and structure. These unique ecosystems or biodiversity hotspots makes their conservation and protection a crucial topic, regardless of varying size and character. The need and greed of mankind has led to exploitation of mainly provisioning services out of regulating services, supporting services and cultural services and in order to minimise or put a stop on this rate of degradation, a monetary value has to be added to the resource and its services. The Economics of Ecosystem and Biodiversity (TEEB) is an initiative to take into account the benefits provided by biodiversity, valuation of ecosystem services, the increasing cost of biodiversity loss and its degradation and the benefits of conserving these ecosystems and their services.

Ecosystem valuation aims are to resolve the intricacies of socio-ecological relationships, and have a clear-cut knowledge on how human decisions affect ecosystem service values, and to express the change in values in units (e.g., monetary) so that they can be incorporated in public decision making processes and integrate ecosystem services with a development plan. India being a megadiversity country initiated TEEB study in February 2011, and committed to develop a framework for green national accounts by 2015. Through TEEB India Initiative (TII), India is also contributing towards Aichi Targets and National Biodiversity Targets. TEEB has specified some value types under the Total Economic Valuation approach which broadly categorized into Use Value (Direct Use value, Indirect Use Value and Option Value) and Nonuse Value (Bequest value, Altruist value and Existence Value). "TEEB for Water & Wetlands" is an

initiative taken up by Ramsar Secretariat in partnership with concerned organisations which follows the wise use concept of resources by involving more into understanding of ecosystem values and benefits and the scope of their integration at all levels.

TEEB has also initiated pilot projects valuation of natural resources in Loktak Lake (Manipur), Kanwar Jheel (Bihar) and Chilika Lake (Odisha), Ousteri wetland (Puducherry), Little Rann of Kachchh, River Ken, Wular Lake (Kashmir). With a large number of pilot projects, there are high chances of this initiative to cover other wetland bodies for the valuation of the natural resources.

Gender: A food security issue !

Gender is strongly related to the main pillars of food security, which are food availability, accessibility and utilisation and stability. The concept of feminization of agriculture or agricultural feminisation talks about the increased women participation in agriculture sector whether as self-employed, agricultural paid labour or worker (in Africa and Asia, approximately half of the labour-force is female). Evidences has shown a strong correlation between gender inequality and food and nutrition insecurity, yet the policy dialogue involving food and nutrition security in India has largely been gender-blind.

To achieve food and nutrition security for all, gender justice should be at the centre of all food and nutrition interventions. Food security has gained attention after its inclusion in MDGs (Goal 1) and SDGs (Goal 2) and even Indian policy makers have paid attention towards this issue. Consequently, the National Food Security Act (NFSA) has taken an effort to legitimize the most senior woman in the household as its "head" for purposes of securing food entitlements. It focuses on understanding the linkages between the recognition of women in food security policies, changing gender relations and well-being outcomes in terms of actual food and nutrition security and leads to a shift from gender-aware to gender-transformative approach in all policies and programs that address food and nutrition security.

~By Protusha Biswas

Electricity from Jelly fish

Rajesh Jena

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From very long time people have been trying to find a good and cheap replacement for fossil fuels as 80% of the electricity produced in the world is from fossil fuels. We, the general people are getting modern with our daily uses, our daily lifestyle but we often overlook that the resources we are using so vigorously will one day exhaust completely and we will be left with nothing. Thus, various researches are being conducted worldwide to invent methods and alternatives resources to make a lifestyle really sustainable. Scientists in the process of finding these alternatives are also opting for the biological beings like algae, fungi, jellyfishes etc.

Swedish scientist Zackary Chiragwandi has come up with an interesting finding that has caught everyone's eyes worldwide. He proposed a theory according to which jellyfishes green fluorescentprotein (GFP) can produce electricity. In his theory he stated the GFP of jellyfishes can be used as a replacement for the dye used in silicon solar cells and can be used to produce Nano voltages of electricity, which is enough for powering up the Nano devices inside a human body.

GFP is a protein which exhibits bright green fluorescence when exposed in light in blue or ultraviolet range. GFP has various uses in microbiology but Zackary has found its' nature of powering a solar cell electrical circuit. It is used as "green goo" which is basically the dye in photo sensitive solar cells called Gratzelcells. Chiragwandi explains that Nano devices are so sensitive that the most important and difficult task regarding them is powering them. Gratzel cells which are used in them contains titanium dioxide which makes them very expensive to manufacture. So if GFP is used it can directly be placed in the circuit of the cells and thus making it a very cheap alternative.

In the process first the GFP is collected form a species of jellyfish called *Aequorea victoria*, then the droplets of protein is added to aluminum

electrodes and exposed to UV light , an electric current is generated which is suitable for powering Nano devices. These Nano devices have a very fancy use in the field of medicine and diagnosis. They can be used for fighting tumors, medical diagnosis, communication devices, and even in reversing blindness. Chiragwandihas made a statement that within one or two years this technology will be available and will be ready for use. He challenges that it will surely create a revolution in the way of attaining a good power source. He further believes that this power of GFP can be used in making electricity in such a scale that no person in the world will be living in the darkness however we believe that still has time. But the fact that this new invented technique will surely open a new era of Nano devices is undoubted.



By: Ishani Chakraborty

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War on Environment

Soham Chakraborty

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With the modernization of weapons and the advancement in warfare technologies, the impact which it leaves on the environment has been a major issue of concern since the 19th century.

War between two countries or even individual groups lead to the extensive destruction done to the environment which is known as ecocide. Various wars in the past have left their marks on the environment with permanent damages that cannot be reversed. The biggest examples of such damages are seen from the big scale wars like World Wars, Vietnam War, Gulf War, etc.

The main destruction done during the World Wars came from detonation of the nuclear explosive in Hiroshima and Nagasaki, which ironically brought the War to its end. During the Vietnam war, USA spread 20 million gallons of herbicides in the form of Agent Orange to obliterate forests in Vietnam. These not only destroyed the complete ecosystem of the area but also affected the human population through biomagnification and leaching to the aquifers. The gulf war had an entirely different kind of damage through oil spills. The Iraqi forces spread thick layers of oil in the sea to prevent entry of the enemy, which led to the worst oil spill in the history of mankind. Apart from these large scale destructions, several small scale yet deadly devastations occur from the bullet shells, military wastes, unexploded ordinances etc. used in the wars. Coincidentally, all the damages from all these wars have not been fully recovered from. The effects still persist today.

These wars which are supposedly fought for personal gains of the parties lead to extensive damage of the environment which ultimately affects every party individually. The only way to stop environmental damages in war is to stop the war itself. The peace treaties and agreements and War laws have managed to do that to an extent, but we are still far away from a war less future.

Three Seconds

Moitrish Majumder

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How old are we? To be precise how old is mankind? If answered numerically then it's around 140 thousand years. And what's about the earth or according to us, our earth? It's 4.5 billion years old. Now the fun fact is if we condense the earth's span in 24 hours, then we are living on this planet only for about 3 seconds. Interesting to hear indeed! But on these 3 seconds what not we have done, we have discovered metals, elements, invented exaggerated technologies, guns, bombs, created army, nations, wars and what not. We are *Homo sapiens*, the wisest kind, but are we actually? Or we just think ourselves it to be? We are smart enough, but not smart enough to realize that whatever we have done till now has only resulted into the destruction of the Mother Nature. But, we still believe that it's not destruction, rather it is progress. The terms such as depletion of habitat, ecological crisis, health effects, pollution, energy crisis, threatened fauna and flora, nuclear wars, endangered species, global warming, bio-terrorism, ocean contamination, climate change etc. are all directly or indirectly related to human impacts. And it can be predicted that more such terms are yet to arrive in the dictionary. The main problem behind all these is we the human being, it is we who are responsible for extinction of animals, for increasing temperature, deforestation and so on. Ironically, it is only the same human being who can mend these all, not by preventing, but by recreating. Because, whatever done can never be undone, but we can now only re-create our nature in such a way where our greed will not overpower our need. Then only our future generation will not be deprived of the things we are having now. The loss needs to be stopped, urbanization needs to be ceased. For all these time we were just building the world in a way where we can get the best comfort. And in that process we have lost parts of nature, those parts whose existence were apparently unimportant to us. We just can't confiscate the natural rights from anyone, the right to breath fresh air, the right to drink clean water, the right to admire the nature's

beauty, the right to live and not just survive. We still have the time to rectify, we still have the chance, to make this world a better place to live in. we just need to stay as a family, we just need to follow the rules of reduce, reuse and recycle, we just need to hold on together till everything is going to be fine. We need to understand that we are just a part of the nature; we are never the owner of it. So we should take the responsibility of the earth as soon as possible before the clock stops ticking. So let's see, how we cure the wounds of Mother Nature and will we be able to roll down to the 4th second or not

Synopsis of Students' Research

Improvisation of Solar Disinfection System (SODIS) by heat intensification

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Solar Disinfection or SODIS is the process of elimination of harmful organisms from water with the help of ultraviolet radiation from the sun. Harmful bacteria, protozoa, viruses which are disease causing in nature are fatally affected by the ultraviolet radiation. This leads to their demise. However, SODIS procedure, although a cheap and effective option, takes nearly six hours of solar exposure to purify the water. Taking this factor under consideration, the study was designed to improvise the procedure with a goal of cutting the treatment span short.

The research students used a black coloured surface to be used as base of the treatment bottles, which was expected to intensify the heat transferred to the bottles under treatment as radiated heat capable of intensifying the treatment. Subsequently different exposure times viz. 4hrs, 5 hrs and 6hrs. were also chosen. The efficacy of the treatment was assessed by total coliform count as MPN, after stipulated periods of treatment.

The results, although very limited and insufficient to

be conclusive, came out with a strong definite trend. It was clearly noticeable that, keeping the bottles on an absorbing surface enhances the efficiency and therefore drags down the time of treatment. And in case of a prolonged treatment there may be nearly 100% removal of biological pollution.

Sustainability Indexing of Lifestyle: A quantitative analysis

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The National Geographic conducted a study in 2008, on the environmental impact of lifestyle in different countries Worldwide, and generated an index called Greendex. It was replicated in 2009, 2010, 2012 and 2014 to track progress or the lack thereof. Surprisingly, the developing countries were found to top the Greendex list followed by developed countries. In fact, Canadians and Americans, with their relatively massive environmental footprints, continue to score lowest. On the other hand India scored high there, mostly owing to its' less expensive lifestyle.

Keeping the fact in mind this present study was designed to revalidate the trend. Here, the researchers had taken sample populations from among two significantly different sets of socio-economic set up, viz. Urban and Rural area of the same district.

It was not possible to formulate any index within this limited scope of study. But a clear difference in lifestyle was evident among urban and rural population, most prominently in case of energy use. This actually suggests how lack of opportunities and economic limitations leads to social sustainability.

News from the Department

- The department of Environmental Science organised a career counselling workshop in the month of February, 2017.
- Observed Earth Day 2016 & 2017, and World Environment Day, 2016.