ENVOICE

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

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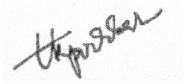
FROM THE DESK OF PRINCIPAL

It is really appreciable that Department of Environmental Science is going to publish ENVOICE, a newsletter, to mark their maiden effort in organizing the UGC Sponsored National Seminar on Advances in Environmental Science and Technology with active cooperation of Department of Chemistry. Newer and newer developments in science and technology amplify the demand of human society for comfort. This in turn, knowingly and unknowingly, creates many hazards to our life and pollution to the environment. Again, advances in science and technology help us to minimize those hazards. One of the avenue to ensure future safer life is continuous discussion among the various cross sections of academic world. ENVOICE shoulders this responsibility, march ahead.



Dr. Tapan Kumar Poddar,
Principal
Vivekananda College, Thakurpukur

The ENVOICE Team at the
Department of Environmental Science
Thanks

INDIAN SCIENCE NEWS ASSOCIATION
Kolkata
For being collaborator of the National Seminar

In This Issue

TIME TO ACT; NOT TO SPEAK

Dr. Rajarshi Mitra
Head, Dept. of Environmental. Science, Vivekananda College

Once again, the ENVOICE is on your desk to mark the occasion of First National Seminar hosted by the Department of Environmental Science. We are excited, we are proud, but at the same time we are scared! The University Grants Commission is sponsoring the seminar, it means, the money of commons are poured behind us with some expectations to meet. Will we be able to meet their expectations? Or all the money is going to be drained for an academic fad.

Numbers of seminars and conferences are arranged and we the academicians and students continue collecting certificate and credentials for mere fulfilment of service requirements. It is our time to ask how far our discussions reach the minds of commons, who pays a lot for us to grow.

On the dais frequently we ask to reduce carbon footprint, suggest walking or cycling or travel by a public transport system, but drive a car alone to the venue. Do we mean, exactly what we say?
It bites, whenever there is a hike in the price of fuel. But ever did we think that a blow to our pocket sometimes cut the use of fossil fuel and reduce carbon footprint?

Every day with every step towards economic prosperity, our environment is being hurt. The august gatherings like seminars and conferences aimed to share views and vows on 'what is to be done and what are being practiced'. The student's folk involved are expected to spread the same among the society. But, it's our willpower how seriously we take care of our promises towards the nature and society who make us able to sit together with a noble goal and to achieve it in true sense, beyond mere submission of a proceedings volume and utilisation certificate.
Let's write a new story with our first effort to tie a knot among academics and society.

INVITED ARTICLE

NATURAL HAZARDS PREPAREDNESS – *BASIC UNDERSTANDING*

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Natural Events like flood, cyclone, tsunami, avalanches, landslides, volcanic eruptions, earth shakes (earthquakes), droughts, desertification, locust invasion, etc. are normally referred as natural calamities or natural hazards, though in reality they are all natural events. Human beings are hardly responsible or having any role in creating these natural hazards or calamities. However, some of our actions, may accelerate, trigger or advance some of these natural events to a certain extent. The impact of these natural events on the human beings is largely functions of our alertness to respond, preparedness to face and precautions to safeguard. Natural events, natural hazards or natural calamities often become natural disasters in the absence of above.

Therefore, a calamity or event becomes disaster in absence of our preparedness.

Natural Hazards can also be defined as ***rapid onset hazards***, such as Volcanic Eruptions, Earthquakes, Floods, Landslides, Severe Thunderstorms, Lightening, and wildfires, which develop with little warning and strike rapidly, and also ***slow onset hazards***, like drought, insect infestations, and disease epidemics take a considerably long time to develop. In addition, there are manmade hazards may generated from bad governance and policy, hoarding, disparity, absence of equity, etc.

It is often wondered that who are vulnerable to such a disaster? The answer is everyone, right from a poor who become poorer to a billionaire, who faces a crash on share market, or it is a mother whose child screamed of horrified visuals in a TV channel, or a common man who need to pay a hefty price for something he must buy.

The impact of all major disasters are basically three fold and they affect all the primary resources like life and gender, water, land and biomass, cause damage to forest & greeneries, livestock & wildlife, population and property, and negatively impact the economy, education, infrastructure, health & sanitation and employment.

There are direct impacts like death, injury, infrastructure damage, disruption in lifeline services along with social and economic disruption, and impact on environmental conditions, which are tangible in nature. But, the intangible impacts like social effects on the remaining community, trauma, cultural losses, stress, loss of opportunities and reputation, etc. cannot be measured.

Major factors, which contribute to the disastrous consequences of natural hazards, are human vulnerability resulting from poverty and social inequality, environmental degradation resulting from improper land and water use, rapid population growth, especially among the poor and uneducated, and lack of preparedness.

PREPAREDNESS INCLUDES

- Awareness
- Sensitization
- Training & skill building
- Rehearsals
- Knowledge transfer
- Vulnerability analysis
- Hazard analysis
- Risk assessment
- Awareness build up
- Knowledge development
- Public commitment
- Application of risk reduction
- Early warning – installation
- Getting acquainted to warning
- Planning for Response & Rehearsal
- Planning for Recovery

The chronological events or phases of managing a disaster after a disaster strikes are called a disaster cycle which includes phases like, Emergency Response, Rehabilitation, Reconstruction, Prevention measures Development, Disaster Mitigation Measures (while developing), Disaster Preparedness (former two run concurrently), and Warning. Whenever, a disaster strikes we have to go back to emergency response phase and follow the cycle again and again. It raises a question that if this disaster cycle never ends, then how do we manage the situations? As a concept, a Disaster Cycle is a never-ending cycle and we need to learn to live with it. The more we reduce the Disaster Impact, the easier and less expensive will be its Management.

Presently, the disaster management in practice focuses on Emergency response to save life and properties, human centric rehabilitation, recovery and reconstruction as we reacts only after a disaster has struck. Most importantly our attention emphasizes on physical aspects of human beings, and overlooks any other species or an ecosystem as a whole. But, a disaster preparedness plan may change the situation as a whole. Preparedness for disaster is for disaster Impact minimization. As and when disaster strikes, we need to be mentally, physically, organizationally prepared to face it and see that, minimum damage happens to the life, health, properties and the environment. The topside bottom approach of preparedness needs a road map to prepare and keep in mind that next disaster is on the way, no time is left for rest and complacency and preparedness has to be round the clock and round the year.

BIOMIMICRY: A NEW WAY

Debolina Misra, 2nd year Environmental Science (Hons.)

Fascinated by the phenomenon of flight, Leonardo Da Vinci produced detailed studies of flight on birds and planned for several flying machines including a helicopter powered by four men (which would not have worked since the body of the craft would have Rotated) and a glider which could have flown.

Biomimicry is a new science that studies natures best ideas and then imitates those designs and processes solve human problems. Studying a leaf to invent a better example of an invention is inspired by the Nature. Biomimicry is actually an abstraction of good design form Nature.

The Tokey Geckos unique toe pads enable it to climb vertical surfaces. Gecko toes are covered with millions of fine keratinous filaments called setae. Setae are particularly effective in creating and maintaining adhesive interfaces. The millions of setae effectively forms a carpet of fibrils, when compressed the individual fibrils buckle much like plastic solid under compression. Molecules in these spectacular tips are attracted to molecules of the surface. Gecko toes and spider filaments might inspire innovations in adhesive manufacturing.

Biomimicry, as the idea is called is the nature in constantly perfecting energy use, recycling and sustainable survival. Therefore, if we copy natures trick we might solve our problems easily, smarter and in a way that does not harm the biosphere. The good news is this, the biomimicry is already in sale and making handsome profit for products like Latusan, a self cleaning house paint modeled on the white lotus plant and adhesive that copy the sticky footpads of Gecko.

George de Mentstrel took time to notice how burrs attached themselves to his cloths and his dogs fur while they had been walking into woods. After he examined the burrs under the microscopes he saw that they have a stiff hook like shape. His observations guided him to copy nature by designing a two sided fastner, comprised of tiny burrs like hooks and fuzzy fur like hooks – together called a Velcro.

The biomimetic Nanometerials applications are antireflecting coatings, diffractive images, adhesisves, anti corrosive coatings etc. With advent of Biomimicry invention of more and more biomimetic materials a market of the same is in making today.

GLOBAL DIMMING: A REAL CONCERN

Rik Bhattacharya,1st year, Environmental Science (Hon.s)

One of the dangerous and most discussed problems of todays world is Global Warming and the scientists are working hard to find its solution. But another massive problem, which has not yet been discussed to such an extent is Global Dimming.

The amount of the sun light received on the earth surface is gradually decreasing day by day i.e. the amount of sun light that is needed is not coming at present. Gradually the amount of reflected sunlight is increasing as the sun light gets reflected back to the outer space just after entering the atmosphere. This diminishing amount of sun light is known as Global Dimming.

British Scientist Jerry Stanhill first noticed that the sun rays are getting reflected back to the space. He started research on this phenomenon gathering records of 50 years on the amount of sun light coming to the Earth. He first chose Israel as site and found that in 50 years the amount of sunlight coming to the Earth has decrease by 22%! For confirmation he conducted his research in Soviet Union, Britain and United States. He found the same thing. He observed that the solar energy in USSR is reduced by 30%, in GB by 16% and in US by 10% in last 50 years. In 1990s Stanhill's paper was published with the headline "Global Dimming".

Till now we are not aware of Global Dimming, only in 2005 British Broadcasting Corporation highlighted the fact in one of their documentary "Horizon" and that's all. But it is of same importance like Global Warming.

If the amount of sun light that is getting reflected back to space increases continuously then it will affect precipitation/rainfall first followed by the problem in rate of photosynthesis. Hence, food security will be affected directly on the Earth.

The sun light that is getting reflected back to the space is due to a layer of cloud in the upper atmosphere. Due to air pollution the atmosphere is gradually becoming opaque.

According to the Environmental Scientists the main reason behind this is burning of fossil fuels and green house gases. As the burning of petrol, coal, wood etc. in high quantity leads to the formation of CO_2, SO_2, carbon and other particles. As the sun rays hit these particles, it reflects back to space instead of coming to earth.

If water vapor is more in the atmosphere the carbon comes in contact with the water molecules as a result the reflecting surface increases and more amount of sun light reflects back. A group Environmental Scientists opined that Global Dimming is responsible for the drought in Africa in 1970s – 1980s. However, till date, lack of information or awareness we are not concern enough of Global Dimming, but if it goes unnoticed, then we have to pay for it in future.

Adapted from an article published in "Career", Calcutta.

SEVEN ENVIRONMENTAL PROBLEMS THAT ARE WORSE THAN WE THOUGHT

Debolina Naskar, 2nd year, Environmental Science (Hons.)

The environmental problems that have received public attention are not as easy to deal with as it appears. There are problems, which are getting worsen with a pace, much more than that is thought off. Here a few of them are being discussed.

One in four mammals is facing the **threat of extinction**. It means we are going to lose not only much of the awe-inspiring diversity of nature, but also mass extinctions, which would cause a serious imbalance in the world's food chain. Failing to trace out the interconnections between all species on this planet really even at this situation is going to be disastrous.

In oceans around the world, there are eerie areas that are devoid of nearly all life. These **'dead zones of Oceans'** are characterized by a lack of oxygen, caused by excess nitrogen from farm fertilizers, emissions from vehicles and factories, and sewage. Many species die off at oxygen levels well above the current definition of 'uninhabitable'. The extent of dead zones in coastal areas that support fishing is much worse than previously thought. Since 1960's the number of dead zones has doubled every 10 years.

With advent of fishing gears commercial fishermen are pulling such a huge quantity of fish from the oceans that we are heading toward a **global collapse of all species currently fished** – possibly as soon as the year 2048. Twenty nine percent of species have been fished so heavily or have been so affected by pollution that they are down to 10 percent of their previous population levels. If we continue the way we are fishing today, there will be an absolute collapse by mid-century.

The WWF concluded this summer that, agriculture, drought, fire, logging and livestock ranching will **damage 55 percent of the Amazon rain forest** in the next 22 years. Another 4 percent will see damage due to reduced rainfall as a result of global warming. These factors together will destroy up to 80 percent of the rain forest's wildlife. Losing 60 percent of the rain forest would accelerate global warming and affect rainfall in places as far away as India. Massive destruction to the rain forest would have a domino effect on the rest of the world.

Polar sea ice is melting at an unprecedented rate, and it's not showing any signs of slowing down. It is perhaps the most dramatic, startling visual evidence of global warming. British researchers cautioned recently that the thickness of sea ice in the Arctic decreased dramatically last winter for the first time since records began in the early 1990s. The research showed a significant loss in thickness on the northern ice cap after the record loss of ice during the summer of 2007.

The aforementioned polar sea ice loss is yet another sinister sign of **Carbon dioxide levels building up in the atmosphere** – the main force behind global warming.

Greenhouse gas emissions caused by our modern way of life – vehicles, power plants, factories, giant livestock farms – will bring devastating climate change within decades if they stay at today's levels. Average temperatures could increase by as much as 12°F by the end of the century if emissions continue to rise – a figure that would easily make the world virtually uninhabitable for humans. A global temperature rise of just 7.2°F would cause a catastrophic domino effect, bringing weather extremes that would result in food and water shortages and destructive floods.

Whether we like to admit it or not, **our very own rapidly multiplying presence** on this planet is the biggest environmental problem, and it's getting bigger minute by minute. We voraciously consume resources, pollute the air and water, tear down natural habitats, introduce species into areas where they don't belong to and destroy ecosystems to the point of causing millions of species to become endangered and, all too often, go extinct.

We should have begun acting generations ago, but we can't go back in time, and that means we have to step up our efforts. If we want to keep this planet a healthy place for humans to live – for our grandchildren to enjoy – it's time to buckle down and do everything in our hand to reverse the damage we've done.

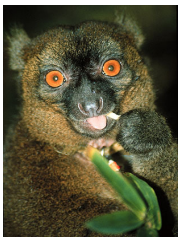
Adapted from Article of Stephanie Rogers at website: www.earthfisrt.com

ANIMAL BEHAVIOUR

Tilak Chatterjee, 3rd year Environmental Science (Hons.)

Our world is full of joy and surprise. The colourful living world fascinates us everyday with its amazing facts and acts. The animal behavior is something that surprise us the most. Followings are a few of those.

- The golden bamboo lemur of Madagascar can eat cyanide – an extremely poisonous chemical, without any ill effect. There is a type of bamboo, which contains cyanide in its shoot in an amount twelve times the lethal dose for human being. Actually the lemurs neutralize the poison by eating iron rich soil available at their homeland.



- It has been established that some birds are very intelligent. Hooded crows often steal baits and fishes from lines set through wholes in the ice, by taking the line in their beaks and walking backwards. Then they walk forward carefully stepping on the line to prevent it from slipping back and seize the fish caught in the line.

- The Formica ant is a quick learner. It can travel through a test maze from nest to source of food without an error after only twenty five trials.
- Honeybees have the ability to learn and remember the surrounding geography. If they are removed from a hive and released from a place from where they can see the hive but not the regular source of food then they can straight fly to the source of food without going through the hive.
- Though frogs have large eyes, they cannot see their prey clearly. Instead, frogs detect the movements of their prey to locate them. As soon as the insect moves, the frog immediately detects it and flicks out its sticky tongue to grab it. If the insect stands still, the frog cannot detect it and will end up hungry.
- Owls hunt mainly with night vision, but they are good listener too. They rely on their ability to detect minute sounds to catch their prey. Owl uses their entire face to listen. Actually, an owl's face is designed to channel even very feeble vibrations to its small ears, which are buried under its feathers. Owl can detect the exact location of their prey by analyzing sounds.
- Toads love to gobble caterpillars and the caterpillar of hawk moth has found a cleaver way to fool its enemy. If a caterpillar sense a toad is approaching, it draws its head and freezes. Its body bulges and its eyespots which are spots that resemble the eyes are thrown into prominence making it look like a snake. The cleaver caterpillar then moves slowly in a relax state. If the toad also relaxes the caterpillar exercise the routine again until it finds its way to escape.
- The archer fish is a small fish found in rivers of India and some other parts of Asia. The fish shoots water at insects sitting on the riverbanks. It presses its tongue against the roof of its mouth to squeeze out the water forcefully to knockdown the prey.
- The Klipspringer, a small rock dwelling antelope deposit scent on twigs and branches from a facial gland just below the eye, to mark its territory. The antelope produces the scent by carefully pricking the gland with twigs near its eyes.

- Some spiders use the silk of their cobwebs to fly. This is called ballooning. Most of the small spiders seeking territory will cast silk into the air and parachute to the new location. And before casting out a silk thread and swooping through the air, a spider checks the weather, just as the human pilot might do.

FRACTAL GEOMETRY: THE MATHEMATICAL WAY OF ENVIRONMENTAL STRUCTURES

Anurag Basu, 2nd year, Environmental Science(Hons.)

The multidisciplinary nature of environmental science – the study of environmental system is well known. Although, biological and chemical disciplines most frequently share the stake with environmental science, mathematics too plays important role in some areas. A comparatively new area of such overlapping arena includes fractal geometry.

Fractal in Mathematics is geometric shape that is complex and details in structure at any level of magnification. Often fractals are self-similar, that is they have the properties that each small portion of the fractal can be viewed as a reduced scale replica of the whole. One example of the fractal is "snowflacke" curve constructed by taking an equilateral triangle and repeatedly erecting smaller equilateral triangles on the middle third of the progressively smaller sides. Theoretically the result would be a figure of finite area but with perimeter of infinite length, consisting of an infinite number of vertices. In mathematical expression, such a curve can not be differentiated.

The discovery of fractal geometry by Polish born French mathematician Benoit B. Mandelbrot in 1970s marks the turning point of fractal study. Manbrot adopted a much more abstract definition than it is used in Euclidian geometry, stating that the dimension of a fractal must be used as an exponent when measuring size.

Fractal geometry is not simply an abstract development. A coastline, if measured down to its least irregularity, would tend towards infinite length just as does the 'snowflacke' curve. Mandelbrot has suggested that mountains, clouds, aggregates, galaxy clusters and other natural phenomena are similarly fractal in nature, and fractal geometry's application in the sciences is becoming a rapidly expanding field. In addition, the beauty of fractals has made them a key element in computer graphics.

The fractal has also been used to compress still and video images on computers. In 1987, English mathematician Dr. Michael F. Barnsley discovered the fractal transform which automatically detects fractal codes in real world image. It spawned fractal image compression, used in variety of multimedia and other image based computer applications. In botany, environmental science and ecology scientists used fractal formats to study leaves and carbon cycles in plants. Geologists use fractal to study mountain and rivers which can be useful in knowing the Earth and problems like earthquake and volcanism. Hence, we can say that the fractal sometimes can be more useful than the probability.

ARMY FIGHTS MOSQUITO WITH AN INNOVATIVE AGENT FROM ALOEVERA

Aniruddha Mondal, 1st Year, Environmental Science(Hons.)

Army – the protector of our countries borders, rescuers of the people at the verge of disaster and the most trusted managers of any emergency, plays some other roles too. Their research and development wing DRDO laboratories are known to produce several unique product formulas besides the defense utilities. An anti-mosquito agent produced from *Aloevera* is the latest addition in the list from its medical research lab. They made a chemical which is mainly originated from *Alovera*. If this chemical kneaded on the body then mosquito cannot touch the body because they cannot feel any human near them. The army officials claimed that this product is more effective than all other coils or lotions, which are available at market, in a recent journal report.

DRDO officials say 'the leaf juices of the plant have important medicinal uses, making aloe one of the most respected medicinal plants, found in many gels, creams and lotions. But one should not confuse aloe gel with aloe juice (drug aloes), which acts as a strong laxative.' Aloe gel has antibacterial, antifungal and antiviral compounds that help prevent wound infections. It also has immune-stimulating and anti-inflammatory compounds, and it stimulates collagen synthesis and skin regeneration.

The medicine was applied on their soldiers continuously for 5 years to ensure its effectiveness. The main thing is that it has no side effect. It has no bad smell or smoke and it already got the permission of Central Drug Control Department for selling this product in the open market.

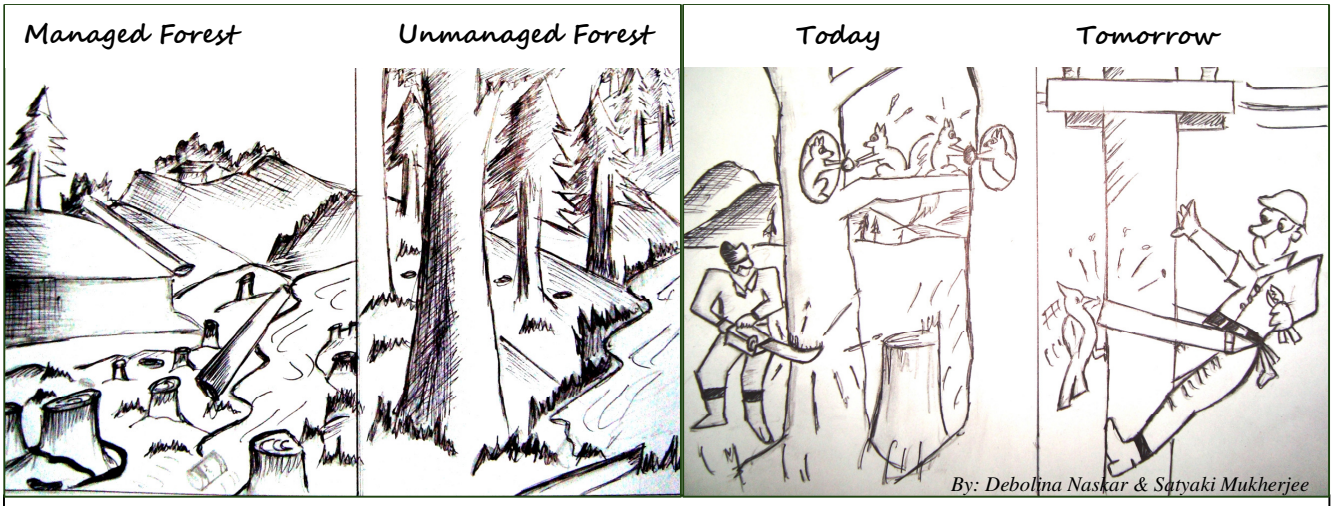
NEWS FROM THE DEPARTMENT

Earth day Observation, 22nd April, 2010: The Department of Environmental Science observed the day (on 23rd April, 2010) by organizing a half day seminar on Relevance of Earth Day Celebration in Indian context. The seminar lecture was given by Professor S. C. Santra of University of Kalyani. The day was also marked by publication of the first issue of ENVOICE.

World Environment Day celebration, 5th June, 2010: The department celebrated the day by arranging a group discussion among the students on 'Copenhagen: A failure or success?' Different views came forward with a central focus that, in the context of India or countries like India, it might be a success if the benefit penetrates upto bottom of the society. The focal question came out of the students that, how can we think of living a sustainable life or cut our carbon or natural resource footprints (either organised or diffusive) until the basic livelihood availability is secured.

Seminar Lecture on 24th December, 2010 by Ms. Prathana Ghosh, a Graduate Students from University of Alabama, USA on Scopes of Environmental Science.

Participation in an Environment Awareness programme at Barasat: On 14th of January, 2011 the department participated in a *Paribesh Sachetanata Fair* at Barasat. The head of the Department gave lecture on 'Sustainable Development: What should we do'.



WE ARE HAPPY TO HEAR FROM YOU. PLEASE WRITE TO:
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