THE SCIENCE OBSERVER

[A Multidisciplinary International Science Newsletter]
[Published By: Society of Education, India]

Volume 1 [1] July 2013

ISSN 2321-8746

Frequency: Monthly
Abbreviation: The Sci. Obser.
Total Pages: 30

Abstracted & Indexed: Universal Impact Factor [Germany], PDOAJ, E-Journal, Global Impact factor [Australia], NewJour, Cabell's Directories [USA], Jour-Informatics, OAJSE [India], Ulrich's™ Serials Analysis System .Ulrich's™ Serials Web Directory.

The Science Observer
[A Monthly Multidisciplinary International Science Newsletter]
Volume 1 Issue 1 July 2013

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Uttarakhand: Most Disaster Prone State of India, Need for Effective Management

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ABSTRACT

Dev Bhumi Uttarakhand has the credit for Char Dham Yatra (Gangotri, Yamunotri, Kedarnath & Badrinath). The most sacred river Ganga originates from the Uttarakhand Himalaya. It is the most disaster prone state of India. Both natural and manmade disasters are more common in the state. During the last decade the fragility of Uttarakhand Himalaya has been increased due to over exploitation of natural resources and excess tourism in the region. The frequency of earthquake, landslide, avalanches, flash flood, forest fire and cloudbursts has also been increased in the state. Devastating cloudbursts and flash flood in Kedarnath shrine is the recent example. There are clear evidences of climate change in Himalayan region. The present article focused on the causes of disasters in the Uttarakhand state. There is urgent need for the implementation of ecofriendly model and effective disaster management plan as the state is known for pilgrims and tourism activities.

Keywords: *Kedarnath shrine; Disaster management; Biological resources; Landslides; Cloudbursts; Anthropogenic activities*

INTRODUCTION

The Himalayan state, Uttarakhand (UK) is located between 28° 43' – 31° 27' N latitudes and 77° 34' – 81° 02' E longitudes. The river Tons separates the state from HP the northwest, whereas the river Kali separates it from Nepal in the east. The greater Himalaya is the northern boundary of the state and is also the international border with Tibet[4]. Foothills in the south are bound by UP. Starting from the foot hills in the south, the state extends up to the snow-clad peaks of the Himadri making the Indo-Tibetan boundary. It contains a great wealth of biological diversity in its forests, its wetlands and in its marine areas which are distributed all over the country. This richness is shown in absolute numbers of species and the proportion they represent of the world total. The great Himalayan region has peculiar identity in the perspective of its unique biogeography. It supports a large number of glaciers, lakes, rivers, flora and fauna due to its variable climate. It has a profound effect on the climate of the subcontinent. But due to anthropogenic activities the global climate has changed since last few decades. The climate of the subcontinent has also adversely affected the biological resources of the country along with that of the Himalayan region[2].

DISASTER PRONE STATE

Uttarakhand is a disaster prone state. Landslides, forest fires, cloudbursts and flashfloods are seasonal in nature and these strikes at a certain period of the year with high frequency. Apart from frequent cloudbursts in hilly regions of the State which cause a great deal of damage to life and property in hills. There are frequent droughts in the State as main stays of agriculture in the hills are mainly rains. Natural calamities are common in UK, which lies in the fragile mountain belt of the Himalayas and has experienced tectonic turmoil several times in the past. Since the last quarter of 20th century, there has been an increase in the frequency of natural disasters in this region. Major disasters in the recent past include earthquakes of 1991 and 1999 in Uttarkashi and Chamoli respectively, landslides at Okhimath and Malpa in 1998 and cloudbursts and flash floods at Khetgaon and Budakedar during monsoon in 2002[2].

DEVASTATION IN KEDARNATH SHRINE

Kedarnath temple, dedicated to Lord Shiva and situated near the Mandakini River in a valley of the Garhwal Himalayas, was constructed in the 8th century and folklore has it that Adi Shankaracharya oversaw the building of the shrine. Extreme rains have wreaked havoc in the region, with the tenuousness of the Himalayan soil stability resulting in killer landslides[1]. It is due to that man-made factors have added to the tragedy. The widespread and almost unregulated expansion of giant hyder-electric projects in the region, the incessant construction of roads to serve the burgeoning tourist population, and the adverse effect on the fragile ecosystem in the region due to growing human presence and pollution are the major causes for the devastation. However, huge rocks broke away from Kedar Dome after the flash floods caused by the cloudburst. These rocks, however, got stuck some distance away from the Kedarnath temple, possibly saving the holy shrine's main structure from being demolished. Excessive rainfall provides only a partial explanation for why the 'abode of the Gods' the Himalayan hill States of UK and HP has been battered beyond measure in recent days.

Images: Kedarnath temple before and after devastation

It is evident that the problem of poor soil stability on the steep slopes in this fragile region has been compounded by man-made factors like indiscriminate deforestation and mindless construction[5]. Hundreds of buildings along the banks of the Alaknanda and the Bhagirathi have been swept away in Rudraprayag district alone. Downstream, the Ganga, Yamuna and other rivers have reached levels not seen in years, posing difficulties even in Delhi. This tragedy truly has the makings of a national calamity. A mighty task of evacuation, relief and reconstruction lies ahead. The longer term lessons are many. Towns and villages in such terrain ought to be better planned. There should be a comprehensive renewal and rebooks at construction techniques and methods employed. Better systems of forecasting and dissemination of weather-related information are also essential[2]. Strategies to ensure better overall management of water resources in the region are needed. However, observations by the CAG (Comptroller and Auditor General) in 2010 expressing concern over disturbance to the natural ecology and destabiliza-

tion of hill slopes caused by the construction of hydel projects along the Bhagirathi and the Alaknanda, and over the failure of the administration to plant enough trees to mitigate risks arising out of soil degradation, have a fresh resonance at this point.

CAUSES OF DEVASTATION

There is little doubt that the present Himalayan disaster has been triggered by natural events, but the catastrophe is man-made. Let us address the various man-induced drivers. One, there is ample scientific evidence that the Himalayan watersheds have witnessed unprecedented deforestation over a long period[4]. There is a whole environmental degradation going on in the name of power projects. This is probably going on without any environmental and ecological audit.

Deforestation

Deforestation as a commercial activity began during the British Period and has continued unabated after independence. While official estimates say forest cover has increased in the Himalaya, a number of credible independent studies have found significant discrepancies in this claim. The fact is that forests have been diverted for a host of land use activities such as agriculture, human settlements and urbanization[3]. Massive infrastructure development such as hydropower construction and road building has taken place. Scientific studies indicate that at the current rates of deforestation, the total forest cover in the Indian Himalaya will be reduced from 84.9 per cent (of the value in 1970) in 2000 to no more than 52.8 per cent in 2100. Dense forest areas, on which many forest taxa (groups of species) critically depend, would decline from 75.4 per cent of the total forest area in 2000 to just 34 per cent in 2100, which is estimated to result in the extinction of 23.6 per cent of taxa restricted to the dense Himalayan forests[1].

Global warming

Vegetative cover slows the speed of falling rain and prevents soil erosion and gully formation the precursors to landslides and floods. Dense vegetation, by evapotranspiration, also stops nearly 30-40 per cent of rainwater from falling to the ground, thereby significantly reducing run-off. Besides holding the soil together, forests and soil soak water from the rain, release it slowly and prevent water flowing as run-off. So, deforestation brings about slope destabilization, landslides and floods. Given that the Himalayan range is geologically young and still rising, it makes the area vulnerable to erosion and instability. Therefore, it is all the more necessary to take land use change more seriously. Two, there is mounting evidence that global warming is fast catching up with the Himalaya. In a recent study, it has been reported that Himalayan ecosystems have experienced faster rates of warming in the last 100 years and more than the European Alps or other mountain ranges of the world. In such a scenario, we expect faster melting of glaciers causing higher water discharges in the Himalayan Rivers[1].

Expanding settlements

Expanding human settlements and urbanization which, besides bringing about land use changes offer themselves as easy targets to the fury of natural forces. While it is important to appreciate the aspirations of the local people and their economic activities, there cannot be a lack of enforcement of land use control laws on the part of local governments and officials. Huge building construction, cheap hotels and individual dwellings at Uttarkashi, on the banks of the Assi and Bhagirathi rivers have been allowed. There is little buffer between the river and the human settlements. Large-scale dam building in recent years has caused massive land use changes with ensuing problems in the Himalayan watersheds. Hydropower and allied construction activities are potential sources of slope weakening and destabilization. Massive intervention in the Himalayan ecosystems through manipulation of rivers and their hydrology is linked to what we are witnessing today. Most downstream damage in otherwise flood-free areas is caused by dams and barrages, which release large volumes of water to safeguard engineering structures. Dam operators often release more water during rains than the carrying capacity of downstream areas, causing floods[1].

Pilgrims

Five, neo-religious movements, linked to changing socio-political developments in India, are responsible for significant human movement into the Himalaya beyond the region's carrying capacity, whether it is Amarnath in J & K Kedarnath, Badrinath, Gangotri and Hemkund in UK. The heavy pilgrim population has also resulted in the mushrooming of shanty towns, cheap accommodation and numerous ramshackle buildings along river banks[1].

NEED FOR EFFECTIVE MANAGEMENT

There are needs to be an integrated policy on the Himalayan environment and development. Enough information is available in the public domain, which only needs to be put together and looked at in a cohesive manner. Himalayan State governments need to consider imposing high environmental tax on visitors, particularly during summer and monsoon months. Heavily sizing down pilgrim numbers in fragile areas must begin. All vulnerable buildings need to be either secured or relocated away from rivers. Governments must impose penalties on building structures within 200 metres of river banks. Hydropower policy must consider building fewer dams and prioritise those that have the least environmental and social costs. Independent and serious monitoring of the catchment area treatment plans proposed by Forest Departments with funds from hydropower companies needs to be carried out.

CONCLUSION

It is concluded that UK is the most disaster prone state. Anthropogenic activities, excess tourism and over exploitation of natural resources are responsible for various types of disaster in UK Himalaya. Thus there is an urgent need to implement eco-friendly development model, which is area-specific and not based on a borrowed theme. Thus the lesson comes from these incidents is to have development in harmony with nature, restriction on the overflow of the tourists, emphasis on disaster management. Additionally it is important to draw the attention of the people and the government of Uttarakhand to the extreme vulnerability of the people lives in hilly area of UK Himalaya.

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Status of Population Distribution and Sewage Generation In Class- I Cities

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Urban water supply and sanitation are important basic needs for the improvement of the quality of life and enhancement of productive efficiency of the people. In urban areas, water is tapped for domestic and industrial uses from rivers, streams, wells and lakes. Almost 80% of the water supplied for domestic use, comes out as wastewater. In most of the cases wastewater is let out untreated and it either sinks into the ground as a potential pollutant of ground water or is discharged into the natural drainage system causing pollution in downstream areas. There are different disposal points of the waste water for each and every city of India. Population of a state is directly proportional to the sewage production.

In this article, the 2011 population of the class I cities of each state is included along with their sewage production and the disposal points. Municipal sewage may be defined as "waste (mostly liquid) orginating from a community; may be composed of domestic wastewaters and/or industrial discharges". It is major source of water pollution in India, particularly in and around large urban centers. In India about 78% of the urban population has access to safe drinking water and about 38% of the urban population has access to sanitation services. Water requirement for various sectors is given (Table 1). This indicates that demand for drinking water is increasing, since the population in urban areas is increasing. The increasing trend for urbanization is shown in (Table 2).

Table 1 Water Requirements for Various Sectors

Sector	Water Demand in km^3 (or BCM)					
	Standing Sub-Committee of MoWR			NCIWRD		
Year	2010	2025	2050	2010	2025	2050
Irrigation	688	910	1072	557	611	807
Drinking Water	56	73	102	43	62	111
Industry	12	23	63	37	67	81
Energy	5	15	130	19	33	70
Others	52	72	80	54	70	111
Total	**813**	**1093**	**1447**	**710**	**843**	**1180**

Source: Website of Ministry of Water Resources, Govt. of India, National Council for Integrated Water Resource and Development (NCIWRD)

With the enhancement of drinking water supply to urban areas, the wastewater generation is increasing. If such wastewater is not collected, treated and disposed properly, it will create directly contribution to the locally available freshwater supplies. Additionally, the cumulative results of untreated wastewater can have broad degenerative effects on both public health and ecosystem. Class I cities are those whose population is much higher and as a result sewage production is also high. Urban environmental management is one of the most pressing issues as the urbanization trend continues globally.

Among the challenges faced by urban planners is the need to ensure ongoing basic human services such as the provision of water and sanitation. The under-management of domestic wastewater in many southern urban areas presents a major challenge. The accumulation of human waste is constant and unmanaged wastewater directly contributes to the contamination of locally available freshwater supplies. Additionally, the cumulative results of unmanaged wastewater can have broad degenerative effects on both public and ecosystem health.

S No.	Census Year	Population	Urban Population of class-I cities	Percent Urban Population of class-I Cities
1	1901	25616051	6586347	25.7
2	1911	25580199	6955756	27.2
3	1921	27691306	8142241	29.4
4	1931	32976018	10090279	30.6
5	1941	43558665	16519922	37.9
6	1951	61629646	27308404	44.3
7	1961	77562000	39380309	50.7
8	1971	106966534	60123375	56.2
9	1981	156188507	94292998	60.3
10	1991	217611000	138802000	63.7
11	2001	286119689	178426355	64.6

Table 2: Total urban population and share of class-I cities

CONCLUSION

As the population of a city increases, the sewage production also increases. Since 1998, number of class I cities have increased which indicates the population increase. The key findings include following interventions:

There are total of 499 class I cities in the 29 states. The total population of 499 class I cities is 43, 21, 71,130. The highly populated class I cities crossing population above 1 million constitute 6.20% of the total population. Mumbai city is having the maximum population among the class I cities. Total sewage generation of the class I cities is 67488.906 MLD. Maximum sewage among the class I cities is generated by MS and it is 21.50% of the total sewage generation. 71.14% class I cities dispose off the sewage into the rivers, 23.04% onto land and 5.41% into have coastal as their mode of disposal.

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"Food" to Increase Immunity or Carcinogenicity in Body

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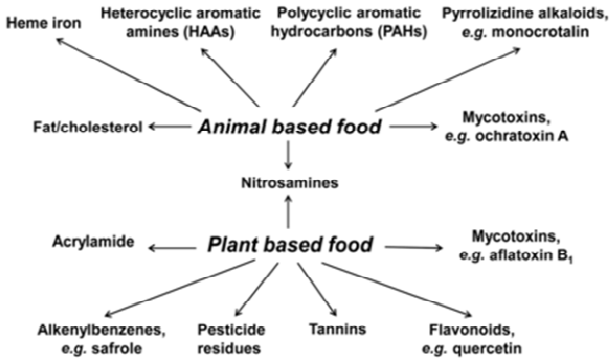
It was long back when it was believed that the food increases the immunity of the body and helps the body to fight germs and diseases. With the remarkable growth in the industrial sector we have witnessed the green revolution owing the credit to chemical fertilizers and pesticide industries. The occurrence of potentially harmful chemicals in food continues to be a big concern for many scientist, environmentalist and individuals. The synthetic coloring, additives, preservation material and naturally occurring chemicals were found to trigger the growth of cancerous cells in the body.

During the cooking, charring or preserving processes new chemicals are formed that may induce cellular damage and mutation in the body. Cases are reported where the foods have even caused deaths. With the increase in environmental pollution the factors influencing cancer formation in humans are numerous and interrelated particularly human diet is a grieve concern. Modern agricultural practices have introduced new environmental exposures to carcinogens and endocrine-disrupting complexes. These chemicals are popularly known as carcinogens which mean cancer causing chemicals. Carcinogens do not cause cancer in every case, all the time. Carcinogens may have different levels of cancer-causing potential and different factors that govern the cancer inducing phenomenon. Some may cause cancer only after prolonged, high levels of exposure.

Chemicals in food may also be derived from environmental or agricultural chemicals for e.g. fertilizers, pesticides or water used for irrigation contaminated with heavy metals. Artificial colors are mostly are derived from coal tar, which is a potential carcinogen. Butylated hydroxyanisole (*BHA*) and butylated hydroxytoluene (*BHT*) are widely used as preservatives, stabilizers and antioxidants. BHA is already documented to cause cancer in humans. Both BHA and BHT are toxic to the liver and kidneys. Nitrates and nitrites are found mainly in processed meats. Combining with stomach acids and chemicals in foods they transform to form nitrosamines, which are powerful carcinogens. Propyl gallate is used as an antioxidant in fats, oils, candy and a variety of processed foods. It is known to cause kidney, liver and gastrointestinal problems. Saccharin, or Sweet 'N Low, is an artificial sweetener and known to cause cancer.



Potential carcinogens in food and its sources

Omnipresence of these chemicals is big challenge for today's scientist researches and other scholars. The presence of polycyclic aromatic hydrocarbons (PAH) as carcinogens in foods has been known since 1950s. They entered in the food chain via soil, water or air, finally ending up into human body. Some of the potential carcinogenic factors in animal and plant based food are.

Many mutagenic and/or carcinogenic polycyclic aromatic hydrocarbons are known at present. These chemicals have also been found in uncooked vegetables, fruits, cereals, and vegetable oils. The amount of polycyclic hydrocarbons present in cooked foods depends on the time of cooking, the distance of materials from the heat source, whether the melted fat is allowed to drop into the heat source, etc.

The efforts to create awareness about the carcinogens found in dietary intake should not be misunderstood with threatening people or society about the consumption of processed

Name of Carcinogen	Type of Cancers	Major food sources
1. Benz (a)anthracene	Lung adenoma, hepatoma, bladder carcinoma, skin papilloma, etc	Broiled or smoked meat, Smoked Fish, Vegetables & Vegetable oils
2. Benzo (a) pyrene	Papilloma and carcinoma of forestomach, skin; leukemias, mammary carcinomas	Smoked meat, Vegetables & Vegetable oils
3.Benzo(b)fluoranthene	Local sarcoma, skin (papilloma and carcinoma)	Broiled or smoked fish, smoked meat
4.Benzo(j) fluoranthene	Lung carcinoma and skin (papilloma and carcinomas)	Smoked fish, Grilled sausages & Margarine
5.Dibenz(a,h) anthracene	Fore stomach (papilloma and carcinoma)	Broiled meat Vegetable oils & fats
6. 2-Methylchrysene	Skin	Vegetables
7. 3-Methylchrysene	Skin	Vegetables
8. Benzo (e) pyrene	Skin (papilloma and carcinoma)	Smoked fish, Broiled or smoked meat; vegetable oils
9. Chrysene	Skin (papilloma and carcinoma), local sarcoma, hepatic tumor	Broiled meat, Smoked fish & Vegetables
10.Indenol(1,2,3-cd) pyrene	Skin, local sarcoma	Broiled sausages Margarine
11. Anthanthrene	Skin, lung	Charcoal-broiled steak
12. Benzo (b) chrysene	Initiating activity (skin papilloma)	Broiled meat

food or other dietary products. The concern is to make people understand the importance of the healthy environment and a little awareness can prevent the big problems in future. It is definitely sensible to consider food contaminants as underlying risk factors for the increasing incidence of cancers detected since few decades. The food-processing related compounds that may arise due to new or changed technologies require careful evaluation of potential human health risk. A little reduction in the fatty, oily and junk food intake and adopting a healthy life style is worth than inviting fatal diseases.

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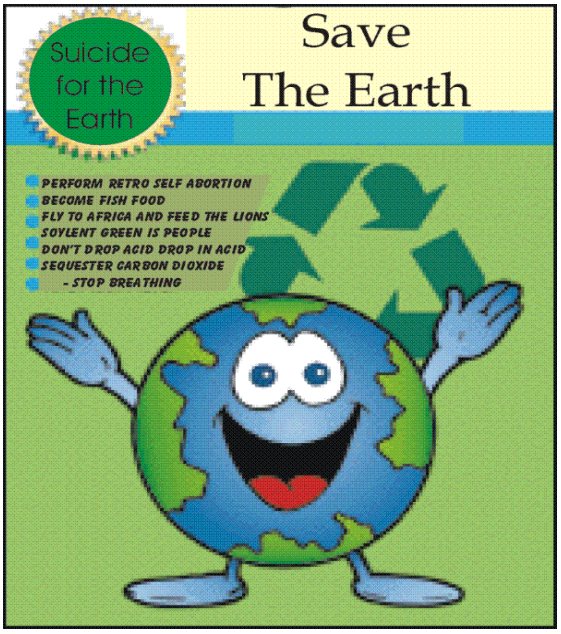

TODAY'S MEDICNAL PLANT

Emblica officinalis: An Update

Phyllanthus emblica (syn. *Emblica officinalis*), the Indian gooseberry, or aamla from Sanskrit amalika, is a deciduous tree of the family Phyllanthaceae. Natural vitamins herb (has vitamin C) for immunity booster and gives amla benefits to a great extent as it is used in amla oil, amla juice.It is mainly used in loosening weight to become slim,lowering cholesterol levels,and for food absorption.As it contains Vitamin C, it is beneficial to heart patients.

Indian gooseberry has undergone preliminary research, demonstrating in vitro antiviral and antimicrobial properties. There is preliminary evidence in vitro that its extracts induce apoptosis and modify gene expression in osteoclasts involved in rheumatoid arthritis and osteoporosis. It may prove to have potential activity against some cancers. One recent animal study found treatment with E. officinalis reduced severity of acute pancreatitis(induced by L-arginine in rats). It also promoted the spontaneous repair and regeneration process of the pancreas occurring after an acute attack.

Experimental preparations of leaves, bark or fruit have shown potential efficacy against laboratory models of disease, such as for inflammation, cancer, age-related renal disease, and diabetes.

Indian gooseberry reduced blood cholesterol levels in both normal and hypercholesterolemic patients. Another recent study with alloxan-induced diabetic rats given an aqueous amla fruit extract has shown significant decrease of the blood glucose, as well as triglyceridemic levels and an improvement of the liver function caused by a normalization of the liver-specific enzyme alanine transaminase activity.

Emblicanins are a type of polyphenolic antioxidant found in Amla aka Indian gooseberry.. Emblicanin is different from most other antioxidants as it is a pro-oxidation free cascading antioxidant.While most antioxidants go directly from an active to an inactive role, Emblicanin utilizes a multilevel cascade of antioxidant compounds resulting in a prolongation of its antioxidant capabilities.Emblicanin A (one of the key compounds in Emblicanin) aggressively seeks and attacks free radicals. After it neutralizes a free radical, emblicanin A is transformed into emblicanin B, another antioxidant. Emblicanin B in turn also attacks free radicals and is transformed into Emblicanin oligomers. This makes emblicanins one of the best free radical scavenging antioxidant [Source: https://en.wikipedia.org/wiki/Emblicanin_(antioxidant)].

Increasing Incidences of Water Pollution Imposing Hazardous Influence on Aquatic Fauna and Flora: A Grievous Environmental Concern

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Human activities are major responsible for water pollution. Water bodies get dirty due to pollution and are looked upon with disdain. Water pollution affects the fish severely and proves lethal to them. Water pollution imposes this adverse effect on all kinds of aquatic flora and fauna. Fishes are mainly affected from the human nuisances. So, it is the need of time to pay adequate attention to this issue and implement necessary corrective measures [1].

Pollution from sewage and human waste introduce pathogens into the water sources resulting in pathogenicity, infections and death of aquatic inhabitants.

Fishes die due to pollution of water from pesticides adjoining the cultivation fields. Pesticides flow off into the water proving fatal for the aquatic life [2].

As a procedure during leather manufacturing in the industries, large quantity of wastes produced are discharged in natural water bodies directly or indirectly through open drains either without any treatment or with inappropriate and inadequate treatment processes causing pollution and leading to serious public health hazard [3].

WATER POLLUTION AND EFFECT ON AQUATIC FOOD CHAIN

Seals are very sensitive among the marine mammals that accumulate toxins in their blubber. Marine mammals that rely on blubber to regulate body temperatures accumulate higher level of toxins. As animals having blubber have high quantity of fat, high amount of toxins get accumulated in the blubber marine animals. Many toxins get stored in fat [2].

The many sources of water pollution cause devastating consequences to marine life. Fish and marine mammals those are at the top of the aquatic food chain are exposed to higher levels of toxins directly from the polluted water and by feeding on other fishes who are already exposed to high levels of toxins in water [2, 4].

PRIMARY SOURCES OF WATER POLLUTION

Trash, especially plastic and litter cause adverse effect on fish. Plastics do not degrade easily in environment and therefore remain in the same stable / undegraded form in water bodies. Fish mistakenly confuse plastics as food materials and ingest them which causes blockage in the digestive system and kill the fish. There is also probability that fish and other marine life often get stuck in plastic items. Plastic often cause fish to starve to death by getting stuck around their mouth making them unable to eat. Plastic items can also cause slow choking of marine life to death by getting stuck around the neck of marine life. Plastic bags floating or submerged in water give the appearance like jellyfish. Fish when try to eat these plastic items generally die by getting trapped inside them. Apart from plastic, metal, rope, nets and 'styrofoam' are among other human made trash items which are disposed off in water bodies and harm marine life [4].

Tannery effluents contain both organic and inorganic solids in high concentration in either suspended or dissolved forms which results to high oxygen demand in water including admixture of harmful elements like toxic metal salts and chromium metal ion in the water. Without proper treatment and discharge of untreated wastes in water bodies causes serious harm to both environment and life threatening for the aquatic flora and fauna. It has deleterious effect on the soil also adjacent to the water bodies are characterized by high contents of dissolved, suspended organic and inorganic solids giving rise to high oxygen demand and potentially toxic metal salts and chromium metal ion. The tannery effluent, if not treated properly, can cause serious damage to soil and water bodies resulting to increase in soil salinity, reduced fertility and soil infertility and reduces potentiality for growth of crops. In many underdeveloped countries, the harmful and climatic unfriendly effluents from the tanneries are discharged directly into large water bodies even without proper treatment which is a grave and serious issue of concern for the environmental, climatic and public health [3, 5].

Oil spills from industrial sources runoff into the water sources which coat the skin of fish and kill them. Oil provides a source of toxins for fish that can cause disease, genetic defects / alterations and death. The oil damages the surface protective activity of skin which keeps the marine mammal warm [1, 6].

Some sewage feed algae that also flow off in the ocean. These algae grow at a rapid rate and have a high nutrient concentration producing red tides. They are called red tides because of the red appearance of the foam of the ocean waves. Red tides kill fishes by releasing toxins [2].

SECONDARY SOURCES OF AQUATIC POLLUTION

Excessive noise production from boats and drilling causes stress on fish and other marine life which make them sick and lethargic. This affects their mating behavior adversely.

Fluctuations in water temperature from power plants and factories kill off coral and cause marine life to migrate for relocation in an attempt to find waters with a more sustainable thermal condition.

Radioactive waste generated from industrial and military wastes enter the water bodies and are absorbed by fish and can cause genetic, mutagenic and teratogenic defects in them [2, 4].

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Intensifying Apprehension for Food Protection

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Food safety is an increasingly important public health issue. Governments all over the world are intensifying their efforts to improve food safety. These are in response to an increasing number of food safety problems and rising consumer concerns. Contamination of food leads to food borne diseases. Food borne illnesses are diseases, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food. Every person is at risk of food borne illnesses. Food borne diseases are widespread and growing public health problems, both in developed and developing countries. The global incidence of food borne diseases is difficult to estimate, but it has been reported that during the year 2000 alone 2.1 million people died from different diarrhoeal diseases. A great proportion of these cases can be attributed to contamination of food and drinking water. Additionally, diarrhoea is a major outcome of malnutrition in infants and young children. Most of the food borne diseases are sporadic and often not reported, food borne disease outbreaks may take on massive proportions. Salmonellosis is caused by the Salmonella bacteria and symptoms are fewer, headache, nausea, vomiting, abdominal pain and diarrhoea. Examples of salmonellosis are eggs, poultry and other meats, raw milk and chocolate. Campylobacteriosis is a widespread infection. It is caused by certain species of Campylobacter bacteria and in some countries, the reported number of cases surpasses the incidence of salmonellosis. Food borne cases are mainly caused by food items such as raw milk, raw or undercooked poultry and drinking water. Acute health hazards of campylobacteriosis include severe abdominal pain, fever nausea and diarrhoea. In two to ten per cent cases the infection may lead to chronic health problems, including reactive arthritis and neurological disorders. Infections due to enterohaemorrhagic (causing intestinal bleeding) E coli, e.g., E coli 0157, and listeriosis are important food borne diseases, which have emerged over the last decades. Cholera is a major public health problem in developing countries, also caused by the bacterium Vibrio cholera. In addition to water, contaminated foods including rice, vegetables, millet gruel and various types of sea food have been implicated in outbreaks of cholera. Symptoms including abdominal pain, vomiting and profuse watery diarrhoea, may lead to severe dehydration and possibly death, unless fluid and salt are replaced.

Surveillance of chemical and biological contaminants of food is important for public health as well as due to the adverse economic impact of contamination. For developing countries like India, lack of balanced diet too can cause permanent physical and mental disabilities, particularly in the early years of development of an individual. Therefore nutritional security happens to be extremely important across the entire world. Food safety program aims at improving health of population by reducing incidences of food-borne illness. The objectives of the program are to ensure that food is prepared with accepted public health practices and to stop the sale or distribution of food unfit for human consumption by reason of diseases, adulteration, impurity or other cause.

Producing safe food supply is a prerequisite to successful domestic and international food trade and a key to sustainable development of national agricultural resources. All consumers have the right to expect and demand good-quality and safe food at affordable prices. An effective food control system must have the fundamental components viz. (a) Laws and regulations requiring sound hygienic practices along the food chain, the establishment of food standards, safe use of food additives and pesticides and informative labelling (b) Inspection and analysis with adequate food laboratories and other facilities (c) Certification and reporting to give the producer and the purchaser confidence in the food control system (d) Information and education on proper food handling and storage (e) Quality control to provide consumers with good-quality and safe foods and (f) Co-operation among food producers, processor and handlers.

Open field trials of genetically modified crops (GMCs) would contaminate global environment forever, destroy food sovereignty and biodiversity. Genetically modified crops should not remain untested so as not to risk the bio-safety of our planet. Food safety in developing countries is based on the major steps viz. Development of national strategies to improve food quality and consumer protection; Advice on legislation related to food quality control; Training and human resources development and Improving export food inspection and international trade. Naturally occurring toxins, such as mycotoxins, marine biotoxins, cyanogenic glycosides and toxins occurring in poisonous mushrooms, periodically cause severe intoxications. Mycotoxins, such as aflotoxin and ochratoxin A are found at measurable levels in many staple foods; the health implications levels in many staple foods; the health implications of long-term exposure of such toxins are poorly understood. Unconventional agents such as the agents causing bovine spongiform encephalopathy (BSE, or "mad cow disease"), is associated with variant Creutzfeldt-Jacob disease (vCJD) in humans.

POPs are compounds that accumulate in the environment and the human body. Among well known dioxins and PCBs (polychlorinated biphenyls), dioxins are unwanted byproducts of some industrial processes and waste incineration. Exposure to POPs may result in a wide variety of adverse effects in humans. Metals such as lead (Pb) and mercury (Hg) cause neurological damage in infants and children. Exposure to cadmium (Cd) can leads to kidney damage, usually seen in the elderly people. These pollutants contaminate food. The safety of food derived from biotechnology needs to be carefully assessed. To provide the scientific basis for decisions regarding human health, new methods and policies to assess such food need to be developed and agreed upon internationally. The assessment should consider health benefits as well as possible negative health implications. Crops modified to resist pests foods with allergens removed or food with an increase of essential nutrients are possible examples of the former, while anti-microbial markers in some generally modified foods have been suggested to be an example of the latter. The weighing of potential risks and benefits is an important aspect of assessment of foods derived from biotechnology that has not received much attention in the past. Likewise, clear communication of the basis for safety assessment in this area is generally lacking at national and international levels. If not properly monitored and assessed, changes in animal husbandry practices, including feeding, may have serious implications for food safety. Adding low levels of antibiotics to animal feed, in order to increase growth rate, has raised concern about the transfer of

antibiotic resistance to human pathogens from this practice. Modern intensive agricultural practices contribute to increase the availability of affordable foodstuffs and the use of food additives can improve the quality, quantity and safety of the food supply. However, appropriate controls are necessary to insure proper and safe use along the entire food chain. Pre-market review and approval followed by continuous monitoring and necessary to ensure the safe use of pesticides, veterinary drugs and food additives Other challenges, which need to be addressed to help ensure food safety, include the globalization of trade in food, urbanization, changes in lifestyles, environmental pollution, deliberate contamination and natural and manmade disasters. The food production chain has become more complex, providing greater opportunities for contamination and growth of pathogens. Many outbreaks of food borne diseases that once contained within a small community may now take on global dimensions. The WHO policies to promote the safety of food cover the entire food chain from production to consumption and will make use of different types of expertise. The WHO Food Safety Programme is mainly for strengthening food safety systems, promoting good manufacturing practices and educating retailers and consumers about appropriate food handling. Education of consumers and training of food handlers in food handling is one of the most critical interventions in the prevention of food borne illnesses. The WHO food safety measures include the followings.

- To promote in-country laboratory surveillance of priority food-borne diseases in humans and animals, as well as the monitoring of pathogens in food. In cooperation with its Member States, WHO is working to support the development of internationally agreed-upon guidelines for data collection in countries. WHO is also compiling outbreak and surveillance capacity to include food-borne disease outbreaks.
- To expand global network of participating institutions to monitor chemical contaminants of the food supply, particularly in developing.
- To promote the use of all food technologies which may contribute to public health, such as pasteurization, food irradiation and fermentation.
- To undertake an important an important new initiative to strengthen the scientific basis of food safety activities through the establishment of a WHO/FAO (Food and Agriculture Organization of the United Nations). Expert advisory body to assess microbiological risks in food.
- To participate in work of the FAO/WHO Codex Alimentarius Commission, whose standards, guidelines and recommendations are regarded as the international reference for food safety requirements by the WTO (World Trade Organization) WHO and FAO are initiating a thorough review of Codex primo 2002.

Now, biotechnology has become a major public issue in developed as well as developing countries. Thus, WHO jointly with FAO will convene a series of expert consultations to assess the safety and nutritional aspects of foods derived from genetically modified plants, microorganisms, and animals. Moreover, WHO has initiated work to establish a knowledge has focussing on a broader evaluation of risks, benefits and other considerations related to the production and consumption of foods derived from biotechnology.

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HEALTH INFORMATION SECTION

Best Beneficial Foods and Herbs for Cancer Prevention

Grapefruits: Vitamin C — an antioxidant found in many fruits and vegetables such as grapefruit, oranges, bell peppers, and broccoli — helps to prevent the formation of cancer-causing nitrogen compounds.

Berries: Of all the fruits and vegetables studied, berries rank among the most likely to reduce cancer risk. An antioxidant called pterostilbene, found in high quantities in blueberries, has cancer-fighting properties and cranberries contain a whole drugstore's worth of cancer-fighting natural chemicals.

Sweet potatoes: Beta-carotene is a powerful antioxidant. Studies have shown that people who eat a diet high in beta-carotene — found primarily in orange vegetables andleafy greens — have a reduced risk of cancer, particularly of the lung, colon, and stomach.

Wild salmon: Low vitamin D levels have been linked to several cancers, including colon and breast.

Ground flaxseed: Omega-3 fatty acids may help prevent cancer by inhibiting cancer cell proliferation and disrupting steps that are critical to tumor growth.

Tea: Tea contains compounds called catechins, compounds that scientists theorize may help stop the growth of cancer cells and prevent cellular mutations that contribute to cancer development.

Cruciferous vegetables: All plant foods — grains, fruits, and vegetables — contain small amounts of phytonutrients: naturally occurring chemical compounds that are just as important as vitamins and minerals are for maintaining health.

ASTRAGALUS (Huang Qi): A Chinese herb; an immune system booster, known to stimulate bodys natural production of interferon. Work with the herb in both cancer and AIDS cases has been encouraging.

BLOOD ROOT (Sanguinaria canadensis): Research shows consistent anti-neoplastic activity. It is effective against cancer tumours, and can shrink them; and has proven useful with sarcomas.

CATs CLAW (Uncaria tormentosa): An adaptogen and powerful immuno-stimulant, it enhances the white cells clean up process (phagocytosis). It is an excellent companion to astragalus, curcumin and Echinacea and also helps reduce the side-effects of chemo and radiotherapy.

CHAPARRAL (Larrea mexicana): It appears to boost the immune system, stop metastases and reduce tumour size. Seems especially interesting with breast cancer.

CURCUMIN (Turmeric): New research shows that it can both shrink cancer tumours and inhibit blood supply growth to tumours.

SUTHERLANDIA (Cancer Bush): Research studies indicate that this herb is anti-inflammatory, anti-viral and anti-fungal. It boosts the immune system and inhibits Tumour Necrosis Factor.

HARES EAR (Bulpleurum scorzoneraefolium): Research has shown its ability to enhance the production of natural interferon and it seems especially useful in bone cancer.

WHEATGRASS: It acts as a blood purifier, and liver and kidney cleansing agent. After two weeks of daily use, blood and tissue oxygen levels improve, as does circulation. And oxygen is the enemy of the cancer cell.

Importance of Crop Physiology In Agriculture

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Crop physiology is concerned with the processes and functions of the crops at cellular, sub-cellular and whole plant levels in response to environmental variables and growth. In short, physiology is the study of functional aspects of crop plants.

The role of crop physiology in different aspects of agriculture is discussed here.

1. Mineral Nutrition

The detection of deficiencies and toxicities of particular mineral nutrient elements have enabled us to make adequate soil amendments for better plant growth. Several physiological diseases of crop plants such as wheat, rice, pulses and oil seeds have been successfully corrected with the help of knowledge on physiology. For example, application of zinc has corrected *khaira* disease of paddy. Similarly, knowledge of water relations and mineral utilization has led to improved crop management and now it is possible to grow plants at places where they never grew, by providing proper physiological conditions. Studies on *chelates* and chelating agents have gone a long way in making unavailable elements available at functional sites and controlling toxicities of heavy metals.

2. Photoperiodism and Vernalization

Researches on photoperiodism and vernalization have made it possible to grow certain plants and make them flower even in *off* seasons by suitably altering the photoperiods and providing low temperature treatments.

3. Production Physiology

Carbohydrates are major produce of plants and highly valued to human beings. Hence, for increasing its yield capacity, three aspects may be considered: i) production (Photosynthesis) ii) storage (sink potential), and iii) control of distribution in plants, i.e. directing the food material efficiently towards storage organ (translocation of solute). Higher translocation capacity towards storage organs like seeds helps to produce higher yields. In case of rice, the sink capacity of panicles, as well as, the size and longevity of the photosynthetic system after anthesis (flowering) can influence grain yield appreciably.

4. Photosynthesis

Green plants utilise less than one per cent of solar energy for the production of food, and there are two types of plants, C_3 and C_4 based on CO_2 assimilation. C_3 plants re less efficient photosynthesisers than C_4 plants, though these plants are more precious to human beings. C_3 plants include pulses, oilseed crops, fibre crops, important cereals such as wheat, rice, barley etc. Their lower efficiency is due to occurrence of photorespiration which deviate *Rubisco* enzyme from photosynthesis. Therefore, there is a great need to reduce wasteful process of photorespiration or to find out newer crop varieties with low rate of photorespiration.

5. Plant Growth Physiology

Synthetic auxins and related compounds are being used for thinning of crops, prevention of premature fruit drop, promotion of plant growth and yield, induction of seedless or parthenocarpic fruits, promotion of root formation in cuttings for vegetative propagation, budding or sprouting, induction of flowering, control of fruit set and quality, hastening maturity, inducing dormancy in potato, controlling weeds etc.

Gibberellins have found great use in breaking dormancy, inducing uniform crop emergence, producing staminate flowers in cucurbits, loosening fruit clusters, increasing fruit size, hastening maturity, improving fruit quality, production of seedless ness, increasing sugar content in sugarcane, inducing flowering etc.

Cytokinins have been widely used for increasing shelf life of fruits, quickening root induction and producing efficient root system, increasing yield and oil contents of groundnut, breaking dormancy, delaying senescence of living organisms, causing cell division etc.

Ethylene has shown great potentials in making chemical harvesting possible, thinning by causing abscission, inducing bulbing in onion and tillering in other crops, causing dwarfness of plants, preventing lodging and inducing femaleness.

A number of other chemicals are also being used for causing male sterility, overcoming incompatibility, environmental engineering and land maintenance. In well-developed countries, some growth regulators are frequently used in agriculture. For example, chlormequat (CCC) is used as dwarfing agent in wheat. Ethephon is used to induce flowering in pineapple and as sugarcane ripener. Maleic hydrazide is used as growth retardant, for sucker control on tobacco, and as turf grass growth inhibitor. Daminozide is used to enhance size and colour of various fruits. Glyphosine is used as sugarcane ripener. Mepiquat chloride is a recent addition in the group of growth retardants, having potential use in cotton, ground nut, banana and many vegetable crops.

Role of various hormones like, auxins, gibberellins, cytokinins and ethrel in inducing and promoting flowering is now well documented. Ethrel is widely used to increase the number of female flowers followed by higher yield in cucumber.

In several plants such as mango, apple, cotton *etc.,* the fruits abscise and fall before attaining maturity. Auxins have been found successful in preventing immature fall of fruits and thus saving the enormous loss. Planofix (a formulation of NAA) is commonly used in cotton, mango and coconut.

Tissue culture is the technique used to make successful *in vitro* growing of plant parts under controlled aseptic conditions. Tissue culture practices are now widely used and found immensely valuable in crop improvement programmes and hybridization programmes. -This technique is commonly used in:

- Micro propagation in orchids, bananas, potatoes etc.
- Production of disease free plants in potato, cassava, sugarcane, sweet potato etc.
- Androgenic haploid and their use in breeding
- Embryo rescue for successful hybridization, as in case of interspecific hybridization between *Phaseolus vulgaris* and *P. angustissimus*.
- Induction and selection of mutants
- Somoclonal variations, as in case of wheat, potato and tomato
- Protoplast technology, as in production of pomato (a hybrid of potato and tomato produced by protoplasmic fusion)

6. Environment Physiology

The environmental factors influencing growth and yield of

crops include temperature, solar radiation (light), atmospheric carbon dioxide, water supply, air humidity, wind velocity etc.

i) Temperature

Extreme temperatures are destructive to plant growth. The critically low and high temperatures normally vary from one stage to another. The critical temperature will be below 20°C and above 30°C for many of the crops. These temperatures also differ according to variety, duration of critical temperature, diurnal changes and physiological status of the plant. Temperature greatly influences the growth rate just after germination. Within a temperature range of 22-31°C, the growth rate increases almost linearly with increasing temperatures.

Depending on the growth stages, injury to crop due to low temperature occurs when the daily mean temperature drops below 20°C. Common cool injuries are failure to germinate, delayed seedling emergence, stunting, leaf discolouration, panicle tip degeneration, incomplete panicle exertion, delayed flowering, high spikelet sterility and irregular maturity. On the other hand, high temperatures cause high percentages of spikelet sterility, when the temperatures exceed 35°C at anthesis for more than 1 hour.

Vernalization: This is a method of inducing early flowering in plants by pre-treatment of their seeds at very low temperatures. Practical utility of vernalization are i) crops can be produced earlier ii) crops can be grown in the regions where they do not naturally reproduce and iii) plant breeding work can be accelerated.

ii) Solar Radiation

Most of radiant energy from the sun has a wavelength between 300 and 3000nm, often referred as short wave radiation. Photosynthesis in green leaves uses solar energy in wave lengths from 0.4 to 0.7 mm (400-700 nm), often refer as Photosynthetically Active Radiation (PAR). The solar radiation requirements of a crop differ from one growth stage to another. For example, in rice, shading during the vegetative stage only, slightly affects yield and yield components. Shading during the reproductive stage, however, has a pronounced effect on spikelet number. During ripening, it reduces grain yield considerably because of a decrease in the percentage of filled spikelets.

Flowering

The physiological mechanism responsible for flowering is found to be controlled by duration of light (photoperiodism) and temperature (vernalization).

Photoperiodism: On the basis of length of photoperiod requirement the plants are classified into: short-day plants, long-day plants and day-neutral plants.

Short-day plants: For flowering of short-day plants, the day length must not exceed a certain critical value; the day length required is less than the critical length. Short-day plants will not flower even if a flash of light is provided during the continuous dark period. *eg*. Rice, onion, upland cotton and strawberry.

Long-day plants: Long-day plants require a photoperiod of more than a critical length, which may vary from 14 to 18 hours. The best flowering of long day plants usually occurs in continuous light. *eg.* Lettuce, radish, alfalfa, sugar beet, spinach etc.

Day-neutral plants: Their flowering is not affected by the length of the day. They can flower even if the light provided is from few hours to continuous illumination. *eg.* tomato, cucumber, cotton, pea, maize, sun-flower etc.

iii) CO_2 concentration

Being one of the raw materials for photosynthesis, CO_2 concentration affects the rate of photosynthesis markedly. Because of its very low concentration in the atmosphere (360 ppm), it acts as a limiting factor for natural photosynthesis. The rate of photosynthesis increases markedly with increase in the CO_2 level up to a certain extent. Under full sunlight, photosynthesis increases up to 1000 ppm CO_2.

iv) Water Supply

Water stress at any growth stage may reduce yield. The most common symptoms of water deficit are leaf rolling, leaf scorching, and impaired tillering, stunting and delayed flowering, spikelet sterility and incomplete grain filling. Depending on topography and rainfall patterns, low-lying areas may be subjected to different water depths and to different duration. When a crop is submerged for a long time during critical growth stages, the grain yield is reduced.

Melting of Glaciers at Faster Pace

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Glaciers are melting much faster today than they were a hundred years ago. The main culprit is thought to be global warming caused by the industrial revolution of the past century. A glacier can be described as a huge block of ice that has formed from falling snow. Glaciers contain almost all the fresh water present on earth.

Glaciers are formed in places where the temperatures are extremely cold. This could even include places that are at sea level, but are mostly places that are high up on mountains.

In such cold places it snows most of the year. This snow will settle down and when it snows again the lower layer of snow gets compressed. Every time it snows, the below layers will compress more, finally turning into hard ice. This ice is what forms the glacier.

When the temperature rises slightly, the outer edges of the formed glacier and fresh snow will melt. For a glacier to form and sustain itself it is of prime importance that the amount of snow that falls on it must be more than the amount of glacier that has melted. This is the only way in which the glacier will be able to maintain itself and keep increasing in size year after year.

Melting of glaciers is perfectly normal. The only criterion is that falling snow must exceed the melting ice to sustain the glacier. Many people worldwide depend on melting glaciers for survival. All their freshwater needs are met by these melting glaciers year through. This is the water these people use for drinking and irrigation. If this source of fresh water were to stop it will create chaos. People will be forced to shift to places with other sources of freshwater. Certain nations depend a lot on the flow of this water for the production of electricity. It has been noticed that glaciers have melted more than normal over the past century. It was argued in the past that this was a normal process that takes place over time, but this is now proving wrong. Many glaciers have melted so fast over the past few decades that they have vanished from the face of the earth forever. Many glaciers that remain are today facing the same fate. They are reducing in size year after year because the falling snow is not able to replace the amount of melting ice.

Glaciers are melting faster today as compared to the past many centuries. Why this sudden change? Almost everyone believe that the prime reason for this is sudden and rapid industrialization which in turn has caused global warming - the prime culprit of fast melting glaciers. Global warming is the rise in average global temperature that has happened over the past century. The 'industrial revolution' is the main cause of this rise in average temperature. The indiscriminate burning of fossil fuels have resulted in extreme atmospheric pollution leading to this condition. Coal is still burnt in huge quantities for various reasons such as electricity production. Burning of oil is a major culprit in the past century. Deforestation has increased to procure wood and make more space available for farming, resulting in an increase in carbon dioxide concentrations. All these pollutants help in trapping more heat in the earth's atmosphere, increasing global temperatures.

It is due to this increase in temperature that glaciers are melting more than they actually should. When a glacier melts fully, it exposes the earth below. Glaciers absorb approximately 20% heat from the sun, reflecting back 80%. When the earth gets exposed this percentage gets reversed. This in turn causes a further increase in temperature. This is a vicious trap which has already begun and it will be almost impossible for us to stop it totally.

In the future the global temperature will in all likelihood keep increasing, melting glaciers even faster than they are today. The western Antarctic Peninsula has warmed so drastically because of a combination of rising global temperatures and regional shifts in ocean and air currents. Worldwide, temperatures have warmed far more slowly—an average of one degree Fahrenheit (0.56 degrees Celsius) over the past century—yet even that relatively small change is rippling through the natural world. Fraser's painstaking studies on the Antarctic Peninsula provide clues to how rising temperatures can profoundly affect ecosystems all over the planet, where animals, plants, and insects are already adapting to moderate climate change by shifting their ranges, advancing migration dates, and altering times of mating and flowering. Faster than normal melting glaciers will cause the streams and rivers to overflow causing flooding. This is a reality that many places have and are currently facing. Those living in proximity to these rivers will need to relocate. Farmlands get destroyed in these flood waters. Higher up on mountains this excess water creates new ponds. As these ponds keep getting filled with more water they form lakes with the pressure on the boundaries increasing. There is always a threat of these lakes bursting, causing huge floods

in villages situated below.

Once the glacier has totally melted, the streams and rivers will run dry. Farmland will turn dry. Those depending on freshwater from the melting glacier will have to relocate. Places that depend on the constant flow of this water for the production of electricity will have to look for other sources to produce electricity. This will cause further atmospheric

pollution and cost much more to produce. Sea levels that have already risen due to warmer waters will rise even further when all this water from melting glaciers empty into the sea. At immediate risk will be to those living in lowlying areas in close vicinity to seashores. These areas will get flooded and sweet groundwater will get polluted with sea water making it unfit for human use. All these people will have to relocate.

Many animals, birds, and fish that depend on the fresh water from glaciers that empty directly into the sea will become endangered. Corals will suffer because of low sunlight due to increasing sea-levels. Fish feeding on these corals will in turn get affected. Animals and birds feeding on these fish will be affected.

There are many more dangers that could crop up due to fast melting glaciers in the coming years if we do not do something to reduce the menace of global warming immediately. Each one of us can play a part in helping reduce harmful emissions, leading to a possible reduction in future global warming . The melting glaciers of the Himalayas are India's canaries in the coalmine. If they don't wake up politicians and people on climate change, nothing else will.

The implications are grave. The Hindu-Kush Himalaya region stretches across Afghanistan, Pakistan, India, China, Bhutan, Nepal and Myanmar. It contains the largest mass of ice in the world after the North and South Poles and is called the 'Third Pole'. It is home to ten major river basins and provides water for one fifth of the world's population. But the life-giving glaciers – the water towers of Asia – are melting. Scientists estimate that these peaks are melting at twice the rate of surface temperature and we are therefore witnessing the impact of climate change on high-altitude glaciers earlier than at other areas such as the plains.The causes are only warming temperatures as a result of greenhouse gas emissions but also soot emissions or 'black carbon' from the burning of biomass such as wood, crop waste and dung.

The Intergovernmental Panel on Climate Change generated controversy earlier this year by erroneously suggesting that Himalayan glaciers could be gone by 2035. While the date was retracted, there is no doubt that glaciers are receding and at faster rates than witnessed before.

Once the melting accelerates it is projected there will be floods, death, destruction and loss of livelihoods downstream. Once the stocks of water held frozen in the glaciers have been drawn down, there will be precious little left for future generations. Precipitation in an era of warming is expected to be lower and the water security of millions will be further compromised. The dangers of climate change and glacier melt on a region that is home to not only the largest populations in the world, but the largest number of poor people in the world means that action cannot be delayed. Unknown risks such as the dangers to the Monsoon mean that both preventative and adaptation strategies must be deployed.

The Indian government is waking up to the threat of climate change – slowly - but is hedging its bets. A discussion paper released by the Ministry for Environment and Forests in 2009 suggests that Himalayan glacier melt is cyclical and not necessarily a result of global warming. This flies in the face of more detailed Chinese studies and analysis conducted by regional governments of Bhutan and Nepal and institutions such as ICIMOD **(**The International Centre for Integrated Mountain Development) which call for vigorous action to curtail greenhouse gas emissions and black carbon. More recently, the Indian government has established an Indian Network of Climate Change Assessment (INCAA) to assess domestic climate impacts and is seeking to partner with China on glacier research and mountain ecosystem studies. The country's National Action Plan on Climate Change (June 2008) also contains a section on Sustaining Himalayan Ecosystems to protect and conserve Himalayan ecosystems.

Most importantly, people across India are beginning to mobilize on the issue. Organisations, research institutes and concerned individuals are beginning to network in the Himalayan states in particular and efforts are being made to both reduce the risks to the region through mitigation strategies, as well as prepare for changes underway through adaptation strategies.(Courtesy: Maheshwari R K, Department of Chemistry, MDSU's Government PG College, Nagaur, Raj.).

Is Nanocosmetics Deleterious?

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Recent advances in the field of nanotechnology have allowed the manufacturing of elaborated nanometer-sized particles for various biomedical applications. The cosmetic industry is one of the most enthusiastic early adopters of nanotechnology. It uses nano-scale ingredients routinely. But, in the absence of mandatory product labeling, it is difficult to estimate the number of cosmetics, sunscreens and personal care products containing nanoparticles that are now commercially available. The increased capacity of nanoparticles to penetrate skin and gain access to our bodies' cells is a double edged sword**:** it may be useful for medical purposes, but it could also result in far greater uptake of substances that have a negative health effect. Since nanomaterials represent a great group of structurally, physically and chemically variable substances, specific toxicological studies are required for each product prior to commercialization.

Nanotechnology has aggressively entered the cosmetic field, and is considered the *"hottest technology"* available. The cosmetic industry's willingness to use novel nanoparticles in its products while their health effects remain so poorly understood has raised a few eyebrows among the scientific community. The beauty industry's willingness to use novel nanoparticles in its products while their health effects remain so poorly understood has raised a few eyebrows among the scientific community. The properties of nanoscale materials (measuring < 100nm) differ significantly from larger scales. There is a general relationship between particle size and toxicity; the smaller a particle, the greater its surface area to volume ratio, and more likely it is to prove toxic. Toxicity is partly a result of the increased chemical reactivity that accompanies a greater surface to volume ratio. Thus, the diverse array of surface properties achieved due to reduction in particle size that catalyzes the surface chemistry of nanoparticles is supposed to be responsible for their toxic potential. The increased capacity of nanoparticles to penetrate skin and gain access to our bodies' cells is a double edged sword: it may be useful for medical purposes, but it could also result in far greater uptake of substances that have a negative health effect.

Moreover, the fears arising from the use of nanotechnology in cosmetics are due to questions about possible genetic mutation as a long term effect. Traditionally, anti-aging skin care products were designed to hold moisture in the skin by creating a barrier between the skin and the outside world. Nanoparticles in the new generation of cosmetics do not work this way. They are designed to penetrate the upper layers of the skin and stimulate new skin cell production which gives skin a new, plump, and youthful appearance. Nanoparticles make it possible to get a multitude of chemicals into the deeper layers of skin because the chemicals can be covered by the particles. Many of these chemicals may cause irritation in other forms and may be stimulating the inner working by irritating from the inside. This is the nanocosmetic secret to anti aging and anti-wrinkle skin care products. While the beneficial aspects of the nanomaterials are well visioned, several reports have suggested the negative impact of nanomaterials on living cells. Moreover, there are several scientific evidences that many types of nanoparticles can be toxic.

Small Wonder: Nanotechnology in Cosmetics, published in November 2008, uncovered the significant use of nano in sunscreens. UV filters titanium dioxide and zinc oxide used in their nano form make the cream transparent, rather than white and retain much of their UV-A and UV-B protection. Companies have claimed these are more effective, but EU experts have asked for more safety tests, to investigate their effect on sunburnt or other damaged skin. Recent research shows that nanoparticles of titanium dioxide, one of the most commonly used cosmetic ingredients, can move across the placenta of pregnant mice, resulting in brain damage and reduced sperm production in male offspring. An earlier mice study shows that carbon fullerenes also move across the placenta and damage developing embryos. Test tube studies have shown that nanoparticles commonly used in cosmetics and sunscreens can damage DNA and cause serious cellular damage.

It's been claimed that these processes result from interaction with sunlight, which is, of course, the purpose of sunscreen. The big names in the cosmetic world - L'Oreal, Unilever, Nivea, Avon, Boots, Body Shop, Korres and Green People - use nanoparticulate titanium dioxide (and, in some cases, nanoparticulate zinc oxide). There is a lot more data about nanoscale titanium dioxide, and the evidence that these particular nanoparticles aren't able to penetrate healthy skin looks reasonably convincing. They deliver an unquestionable consumer benefit, in terms of screening out harmful UV rays, and the alternatives - organic small molecule sunscreens - are far from being above suspicion. But, as pointed out by the EU's Scientific Committee on Consumer Products (SCCP), there does remain uncertainty about the effect of titanium dioxide nanoparticles on damaged and sun-burned skin.

Another issue recently highlighted by Andrew Maynard is the issue of the degree to which the action of light on TiO_2 nanoparticles causes reactive and potentially damaging free radicals to be generated. This photocatalytic activity can be suppressed by the choice of crystalline structure (the rutile form of titanium dioxide should be used, rather than anatase), the introduction of dopants, and coating the surface of the nanoparticles. The research cited by Maynard makes it clear that not all sunscreens use grades of titanium dioxide that do completely suppress photocatalytic activity.

Further, a study published in 2005 found that titanium dioxide could be toxic even in the absence of light. Titanium dioxide in the nanometer range has been tested extensively for applications in cosmetics. A Research into the question of whether TiO_2 in its nanoscaled form will penetrate the skin and cause a systemic exposure came to the following conclusion: "Summing up, we do not expect any health effects for the topical application of sunscreens containing TiO_2 nanoparticles (especially when coated) on healthy skin which are related to particulate state." However, in the SCCP opinion on the safety of nanomaterials in cosmetic products it is stated that: "…the SCCP considers it necessary to review the safety of nanosized TiO_2 in the light of recent information and to consider the influence of physiologically abnormal skin and the possible impact of mechanical action on skin penetration" The question of whether/not nanoparticles can penetrate the healthy stratum corneum skin barrier in-vivo remains largely unanswered. Furthermore, no systematic studies so far have examined the impact of factors affecting the nanoparticles skin penetration. Yet it is precisely the

unique nanoparticulate properties of zinc and titanium oxides of which manufacturers seek to take advantage.

Georgia Miller-an Environmental Scientist of Friends of the Earth, says we could be sacrificing our health for beauty. "If you take aluminium and grind it down to nano size, you put it in foundation and concealers, suddenly you find it diffuses light and can help camouflage wrinkles. Our concern is that these very tiny scales, these particles pose serious new health risks. We could be sacrificing safety for beauty and millions of women could unknowingly be putting nanoparticles on their face every day. The early signs are that these ingredients could increase the risk of skin cancer, could even potentially lead to birth defects. Production of free radicals increases and this can damage DNA and even kill cells." In a test tube study, US researchers found that nanoparticles of aluminium oxide and iron oxide were almost as toxic to cells as chrysotile asbestos. Other US test tube studies found that aluminium oxide nanoparticles produced free radicals and demonstrated a potential carcinogenic effect, caused dose-dependent stem cell toxicity, caused inflammation that could lead to diseases such as atherosclerosis, disrupted the blood-brain barrier and were directly toxic to brain blood vessel cells.

Zelens is marketing an entire line of creams based on the use of carbon fullerenes (the sixty carbon soccer balls). It attempts to take advantage of the antioxidant properties of these nanoparticles. Of course, it does not mention that these caused brain damage in fish at high doses. Moreover, these buckyballs, used in some facial creams and moisturizers, have also been found to kill water fleas and bacteria (bear in mind that some bacteria are good). The cosmetics industry argues that risks for consumers are low, as there is no evidence that nanoparticles in cosmetics penetrate healthy, intact adult skin. The latter point is true for most nanoparticles, although it's also true that there is still little published skin penetration research; CSIRO and others are engaged in ongoing studies. However it is important to recognize that many nanoparticles are used in moisturizers and anti-ageing creams which contain penetration enhancers specifically designed to increase skin uptake of product ingredients. Thus cosmetics have been, and will continue to be, a domain in which potentially unsafe products can reach consumers.

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Wellness, Fitness & Exercise

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Physical fitness has been defined as a set of attributes or characteristics that people have or achieve that relates to the ability to perform physical activity. An alternative definition by Howley and Frank that provides additional descriptive information is: Physical fitness is a state of well-being with low risk of premature health problems and energy to participate in a variety of physical activities. While either is a good definition, most experts agree that physical fitness is both multidimensional and hierarchical.

"Physical fitness is the ability to function effectively throughout your workday, perform your usual other activities and still have enough energy left over to handle any extra stresses or emergencies which may arise. The components of physical fitness include Cardiorespiratory (CR) endurance – the efficiency with which the body delivers oxygen and nutrients needed."

The importance of physical fitness cannot be emphasized enough. In today's society that is moving towards a more sedentary lifestyle, there is a greater need than ever to increase the daily activity level to maintain both cardiovascular fitness and body weight. Staying active means keeping your body functioning at a high level. Regular exercise will maintain the performance of your lungs and heart to most efficiently burn off excess calories and keep your weight under control. Exercise will also improve muscle strength, increase joint flexibility and improve endurance. Another main benefit of physical activity is that it decreases the risk of heart disease, the leading cause of death in America. Additionally, it can decrease your risk of stroke, colon cancer, diabetes and high blood pressure. Regular exercise has been long associated with a fewer visits to the doctor, hospitalization and medication.

Exercising does not have to be something boring and dreaded. It can be something that you enjoy that helps to increase the overall happiness in your life, as well as relieve symptoms of stress, depression and anxiety. Try to find some activities that give you pleasure, or even a buddy to do them with so that exercise is a fun and enjoyable activity (and one that you continue on a regular basis because it adds something good to your life).

It is not what you are doing, as much as it is whether or not you are doing something. Any type of moderate activity like walking, swimming, biking or organized sports can contribute to your physical fitness. Explore your fitness options at your local gym, community center or community college for courses and organized activities that may suit your lifestyle and interests. To get the most benefit, you should begin by warming up for 5 to 10 minutes to increase your blood flow and prepare your body for activity. Follow the warm up with several minutes of stretches to increase your flexibility and lower your risk for injury. Complete your selected exercise or activity for 20 to 30 minutes and conclude the workout with 5 to 10 minutes of cool down and stretching.

Who Needs Physical Fitness?

Everyone! It is important for all people to stay active throughout their lives. Because of busy work and home lives, more than 60% of Americans do not get the recommended amount of physical fitness daily and these numbers generally increase with age. Throughout adulthood is one of the most important times to maintain an exercise regimen. This is the ideal time to maintain your weight, build strong bones and prevent many chronic health problems like high blood pressure, heart disease and diabetes. Many adults do too much exercise at once. After a long work-week, many people try to fit lots of activity into the weekend and push their bodies excessively. This sudden increase in activity can raise the risk of injury which would then stop activity for weeks. Experts recommend working out several times over the course of a week with varying exercises for the most benefit to your health.

Health and exercise are the two sides of the same coin, absolutely inseparable from each other. Let us analyze what health is. Health is, in common understanding, the name given to the correct well adjusted working of the physical system of man's body. This involves the efficient working of all the systems of the body i.e. the nervous system, circulatory system, digestive system etc. If all these systems are working efficiently in a man's body, the man is called healthy. Now, let us consider as to what makes these systems work efficiently? The human body is very intricate and there are so many internal organs all working as singular bodies and also coordinating the functions of all together. It is on the good and efficient working of all its organs that the health of a human body depends.

Since many important organs are internal organs and cannot be seen from outside, or can they be touched with the hand, so, the problem is, how to keep so many internal organs work efficiently and keep them trim and healthy. It is for this problem of maintaining these internal organs that, there are certain norms which, if man follows with immunity, he will remain healthy with all these organs working well and efficiently. It is to deal with these unseen organs that are vital to man's health that exercise is said to be the best tonic, and energizer. With a detailed plan of exercises, man can give all his organs a befitting rejuvenation on a daily basis. Exercise tones up our movements, keeps the spine straight and fit, and the digestive system perfect. The blood circulates through the body reaching out to all the parts of the body.

Asides this, when the exercise gives the heart a chance to pump faster its capacity to pump blood faster is proportionately increased. Thus, with an exercise format regularly followed, man can help keep all his organs, internal and external geared up and in absolute fitness. Exercise also tones the muscles and keeps man active. Thus, with exercise, man provides for himself a good and perfect and sound health. Exercise and health are absolutely inseparable and are always seen going hand in hand. Exercise is also one neat and sure way of avoiding health hazards and medication. Exercise could well be called a tonic for all times, for all people and for all ages. Once this tonic is consumed regularly on a daily basis, no other medication may ever be required

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Fitness Development by Change in Living Style

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In modern age everyone want to slim, trim and healthy in look wise. However to be healthy and to be smart in look wise are two side of same coin of physical fitness. Without good health and fitness the ability to perform well and effective work at house, at office or somewhere else may not be possible. A person is physically fit if they are capable to complete her work in time (as fast as possible) effectively without getting tired, recover from fatigue as soon as possible and to enjoy her leisure time. For fitness and good health it is necessary to do some work out or exercise daily, so many person spend lot of time in gym, aerobic classes or appoint physical trainer for their fitness programme but this is not possible for every person to do so because these are not available everywhere and it is difficult for a working person and busy house maker to take 1 hour off from their schedule for exercising or fitness program and difficult to make balance between home and work. If the persons make some adjustment in their working schedule they burn the same amount of calories that you would have burned in a workout and no need to sweat out in a gym or aerobic classes to stay fit. The following tips will show how to incorporate physical fitness into your busy day. 30 to 60 min work out in a day is sufficient for general fitness. If you do not have time to do work out continuously for 60 min. on the basis of availability and requirement split the whole time into small blocks of time from 5 to 10 min for simple workout throughout the day. Do some exercise when you get the time in your busy schedule because nothing is better than something?

When you are trying to improve your fitness, you chose those activities in which you enjoy, easy to perform and you like it. There are huge amount of activity for fitness program that can be performed in little space and few minutes like walking, jogging, running on spot, rope jumping, dancing, stretching exercise and etc. For general fitness, do not select a single activity use various types of activities. Change your exercise day by day. By doing same exercise every day it may cause boring or after some time your body is adaptable for this activity and it may not be improve your fitness. It is a fun activity and it can be done alone in a few spaces. In this activity we use own body weight as a resistance, which help to improve the fitness as well as leg strength, coordination. Slowly start the skipping and gradually increase the speed, after reaching to the maximum gradually slow down the speed and stop skipping. Duration, number of sets and overall speed was increased time to time according to your capacity. In the morning, if you have no time to go outside for walking/ jogging. You can do spot running inside the house, when you get the time. In this activity you may run/ jog at the spot and get the same benefit of running and jogging. In this activity you lift your thigh up to the level of west or you kick your booty/ hips. The way of doing the exercise is as same as skipping.

30 min walking in a day is the best activity for physical fitness, brisk walking is more effective than the slow walking. The difference between walking, jogging and brisk walking is in term of only speed and hand movement. In brisk walking the speed and swing movements of hand was higher than walking and lower than the jogging. When you get time you may walk either in the evening or morning. It may not necessary to walk on road or park, wherever you get space you may walk, it may be inside your house, on rooftop, back yard or in the lawn. As a house maker and in your office you may be doing a lot of walking throughout the day. Just turn your walking into brisk walking. It will help you to burn more calories than the slow walking. Here are some ways that can increase your opportunity to walk more-

Try to park your vehicle at next block to maximize the walking distance; If you take public transport, try to get off one stop before your destination point; During lunch time or coffee break don't opt for delivery, walk down to the food stall and get what you need; Go to the hall and say hello to everyone this may strengthen your friendship also; Instead of using vehicle do your nearby work by walk' Instead of asking the office peon to fetch you a glass of water, get up and get it yourself; Instead of sending the message or call, deliver your message in person to a work colleague.

If you are in shopping supermarket for light items, carry a basket instead of using a trolley. During shopping you select the different products and put on the basket. When you are lifting the basket up & down it work as a dumbbells and this may help to strengthen your upper arms muscles. When you are waiting at the checkout counter, raises your calf muscles in standing position. In this exercise you lift your body by raising your heels off the floor and lower them back down. This may help to strengthen your leg muscles. Use stairs instead of using elevator or lift at different places. It is an effective exercise for legs and improves cardiovascular efficiency; it can be done at living place as well as at working place. It burns a lot of calories (fat) and improves fitness. In supermarket, use stairs in place of elevator and lift. If your living room or office was on the top floor, you climb the stairs up to some floor and then use lift or elevator. Whenever you get a few minutes off from your work, you can start going up and down the stairs. Bicycling is also a best exercise to improve fitness, leg strength and endurance. In cycling you use your own body weight as a resistance. If you are unable to drive bicycle, use stationary bicycling it has less chance of falling and it might be done in the room also. The benefits of both type of bicycling are same. Slowly start the cycling and gradually increase the speed, after reaching to the maximum gradually slow down the speed and stop the activity. Duration and speed was increased time to time according to your capacity.

If you travelled by private transport for a short distance. You travel by standing instead of sitting. An average person burns around 140 calories an hour while standing as opposed to 100 calories an hour while sitting. This difference was very less but in long time this difference was increased. This is very helpful if you are in a sedentary job and have been seated all day. Some time get off one stop before your destination point and cover the remaining distance by walking. This may help in burning the extra fat and improve fitness. When you are free from your work, turn on your favorite music and dance. You may dance alone or with any partner or you may accompany your child. Dancing is not only fun activity, it is also a best exercise to sweet out, burn extra fat and calories. It helps to improve your fitness, balance, posture and coordinative ability. When you get chance in any party to dance, enjoy it with full energy and spent maximum time on dancing floor. This may help in improving the capacity of working for long time and increase flexibility which

help in minimizing the joint injury or muscle strain due to over stretching.

In the present time most of peoples use mobile phone and cordless phone in their office and house. They can talk approximately 30 to 45 minutes per day and some time they talk continuously for 5 to 10 minute in whole day. So, whenever you talk on mobile or cordless phone you can walk instead of sitting on the chair. This may help in burning extra fat or calories. If you have a child, he can help you in developing fitness. When you take her child to the park or playground give company in playing and sweet out, don't sit on the bench and just watch the activity. If you accompany your child this helps you in developing the good relationship with her and improves your fitness. After long sitting when you get the time, stand and relax yourself by doing some stretching exercise for example, stretch your both hands above the head in the air and hold this position for few seconds. Slowly bend your upper body backward, sideward & then forward and try to touch your toes without bending your knees. It might be difficult in the beginning but gradually your flexible will increased, you will be able to do this with easy. There are lot of stretching exercise, which are easy to perform and very effective for maintaining the flexibility.

In the present time we use machines and appoint a servant for domestic works. Do the domestic work by self; definitely it will improve the fitness and no need to join the gym classes. There are few example of domestic work which helps in improving the fitness-

a) Washing and wringing of light cloth by hand is an excellent exercise for hand muscles, finger and finger joints. b) It is better to do your work by self in house, instead of asking the other family member to complete the work. For example, don't ask the other to give you a glass of water, it is better to get up and take water. c) Sweep the floor in quadruped position is more beneficial than the biped position. Quadruped position helps in improving the flexibility of back muscles and reduces the abdominal fat. d) Grinding of spice by hand instead of using the grinder. It improves the strength of hands. e) While you are waiting for boiling milk or something else, do some stretching exercise, wall push-ups, spot running and other exercise to improve your fitness. f) Preparation and cooking of food in the kitchen will also help to improve the strength and load bearing capacity of hands. During cooking job, you stand regular for some time which burns more calories. For picking some items you stretch your body upward and come on the toes which help to improve the leg strength and fallibility. Sometime you pick weighted items and put it again to the same place this may strengthen your hand muscles.

Whensoever's you are conscious for your fitness, you need to follow the some basic rules. By avoiding these you can't achieve your goals. For developing the fitness you need to make continuity in your program. Discontinuity in the program may break the rhythm for developing the fitness. After a break your fitness level was reached to the initial position. Break of 2 to 5 days is considerable but break of more days may affect the fitness. So whatever you do it must be continuous. For developing the fitness you need to increase the load gradually time to time. When the body was habitual for previous load, you need to increase the load. This load was increased by increasing the duration of activity, speed of activity, repetition of activity or by introducing some more activity. If you are not increase the load your fitness may not be increase. Always avoid the condition of over load because it is harmful for fitness.

While planning for your program you need to take sufficient rest for recovery from fatigue. In between the two activities, you need sufficient rest and sufficient rest was also needed at the end of day, so you feel freshness for next day activities. You planed your fitness program for maximum 6 days in a week. One day in a week is reserved for full rest. You need proper diet during the program. Over diet and under diet both will affect your fitness. Over diet may increase the obesity and under diet may cause the weakness. During fitness program you take as usual diet, do not increase or decrease your diet. It is very necessary to make balance between intake and outtake of calories. When you want to improve your fitness, always avoid the injuries because injuries break the rhythm. Whenever you feel pain during any activity, stop it immediately and consult to your doctor. If his advice to start than you may continue the activity otherwise stop the activity and select some other activity. Do not perform the same exercise every time day; make some variation in your activity. Doing same type of exercise over and over again not only cause boredom, but it can even make that exercise less effective because the body eventually gets used to that type of exercise. 3 to 5 repetitions of any exercise are sufficient for fitness more repetitions of same exercise beyond your capacity may cause injury. In the present time it is not a difficult task for women to improve their fitness. If they make some adjustment in their working schedule and fallow the general rules, they no need to join the gym for their fitness and may not be depend on other. They select the activity by own choice.

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Increasing Acidity of Oceans

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The oceans are becoming more acidic at faster rate than for 65 million years as a result of climate change, a report warns. The Marine Climate Change Impacts Partnership (MCCIP) report card stated the increasing acidity of the oceans caused by carbon dioxide (CO_2) could affect the climate further and hit wildlife. The "ecosystem linkages" report, which looked at the links between different impacts of climate change, also stated there had been large reductions in Arctic sea ice and declines in some seabirds as a result of changes to the seas around UK. It wanted climate change could increase the likelihood of non-native species thriving in the UK's marine environment, while coastal communities faced threats such as flooding and opportunities faced threats including tourism in the future. The different impacts of a changing climate our seas are magnified because of their links to one another, the report stated, and a "bigger picture" apposite is needed to address the problems. The oceans are a huge store of CO_2, which dissolve in the water, and therefore play a significant role in maintaining stability in the environment.

The absorption of more CO_2 from the atmosphere as a result of higher emissions makes the sea more acidic, and in the last 200 years ocean acidity has increased by 30 per cent. The increase at is at a rate much faster than any time in the past 65 million years, the report warned. The increase in CO_2 in the ocean will lead to a slowdown in its ability to absorb the greenhouse gas, leaving more in the atmosphere. Rising acidity will also hit marine creatures including plankton and shellfish, damaging their ability to grow and reproduce, and in the case of organisms such as corals reduce their capacity to build shells. The report stated that in the UK, the growing acidity could hit multi-million pound fisheries and aquaculture, while the global value of corals – through food, tourism and shore protection – has been estimated at some 30 billion US dollars (£21 billion). UK overseas territories are among those which could be affected by threats to corals.

In response to the threat, the Government announced an £11 million, five-year project to investigate the effects of acidification on biodiversity, habitats, species and wider economic and social impacts in the north east Atlantic, Antarctic and Arctic oceans. The report also warned that Arctic sea-ice was disappearing with impacts on ecosystems, the climate, shipping routes and across to oil and gas under the Arctic. In the last decade there has been a 35 per cent decrease in summer sea ice, and a 15 per cent reduction in winter ice cover, leading to changes in habitats and wildlife which could have knock-on effects in the UK.

The waters around the UK have also seen changes in the food chain in recent years, including shifts in plankton and fish distribution as a result of warming seas. The changes have contributed to decline in species such as sandeels, when have hit seabirds including terns, black-legged kittiwakes and skuas – a trend which could continue as the sea warm. But non-native species may find it easier to establish themselves in UK waters as a result of warming temperatures, leading to impacts on aquaculture such as poisoning of farmed animals and clogging of nets. Coastal economies and communities face a whole range of challenge including declines in traditional fisheries and increased flood and erosion risks, as well as opportunities including new fisheries and increased flood and erosion risks, as well as opportunities including new fisheries and tourism, the study stated.

The report was produced by five groups of experts for the MCCIP, a coalition of researchers, the Government and devolved administrations, agencies and charities. Environment Minister Huw Irranca-Davis said: "Climate change is happening now, and its impact on the marine environment affects all of us." The fight against climate change and protection of the natural environment are inextricably linked, and we are witnessing unprecedented effects on our seas." And Hua said: "Oceans acidification will be one of the biggest environmental concerns of this century, with major and far-reaching impacts, "We need to understand much more about the scale and nature of the effect of CO_2 is having on our oceans and marine life." (Courtesy: Maheshwari, R. K. Department of Chemistry, MDSU's Government PG College, Nagaur, Rajasthan].

Mosquito Borne Diseases and Their Control by Botanical Insecticide

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Mosquitoes have threatened human health and survival since time immemorial with more than 3,200 species belonging to 34 genera. Apart being a part of our folk-tales and folk-lore, they are associated with a number of health hazards. These diseases have changed the course of history, helping bring to an end the ancient Roman and Greek civilization and halting the advances of the Crusades and conquests of Alexander, the Great (Keith and Kramer, 2002).

Malaria, transmitted by *Anopheles species*, is most ancient and prominent epidemic. Originated, probably, in Africa it is now widespread with massive resurgence to over hundred countries by affecting more than 500 million people and killing at least 2 million people annually. In the Indian scenario, almost the entire country is endemic to it due to favourable ecological, climatic and biological factors. Next to malaria is encephalitis, another deadly health scourge spread by *Culex* mosquito. It is common to American and Pacific region and now increasing in incidence in various forms throughout the globe. Though sporadic in India, encephalitis incidences have been recorded from West Bengal, Uttar Pradesh, Bihar, Assam, Karnataka, Andhra Pradesh, Tamil Nadu and Goa. Another mosquito epidemic, the yellow fever in urban and some rural areas is transmitted by *Aedes aegypti*. With 400 years of history in Africa and America, it has become more prevalent over the past decade. Every year about 200,000 cases occurs with 30,000 deaths in 33 countries. Asian countries including India are at risk of introduction of the disease due to abundance of the vector and the suitable primate host. Dengue is another serious arbo-viral disease spread by *Aedes* mosquito. Primarily a disease of the tropics, it is increasingly becoming a plague of global proportions and may soon eclipse malaria, both in frequency and mortality. India is struggling with recent outbreaks of this deadly fever along with another mosquito borne viral infection, chikangunya. After about three decades of dormancy, chikngunya outbreaks have been ongoing since last year in India and some of the Indian Ocean islands and transmission can still occur to all tropical and subtropical realms.

One of the efforts to banish these diseases can be an attempt to alter evolved relationships among the pathogen and its victim. To try to banish disease by killing its insect vector carries the process of intervention in the natural order, a step further. The purpose of vector control is essentially to keep the density of the vector or the longevity of vector in given area at a level where disease transmission is interrupted or reduced to a bare minimum. Since mass elimination of the pathogenic organisms in the human population as well as in the reservoir of infection is not in the realm of practicability, almost all attempts to eradication strategies of vector-born disease are mainly based on the measures undertaken against vectors. The control of disease vectors as in the war against mosquitoes, by making the world less fit for their habitation, is to engage on grand scale a kind of environmental manipulation that has been characteristic of mans approach to his inexplicably flawed but perfectible world.

The measures employed for the mosquito control have been changing from time to time based upon the overall epidemiological knowledge of the vector-born disease as well as the knowledge and experience gained in vector control methodologies. Before the establishment of exact role of mosquitoes in the transmission of diseases, the main emphasis on control was by adopting overall environmental sanitation or abandoning human habitations. However, the discovery of involvement of mosquito in disease transmission revolutionized the whole concept of management of vector-born disease and vector control practices in true sense started taking their shape right from the beginning of 19th century with the introduction and application of various chemical insecticides. These synthetic insecticides have been constantly used all over the world for more than five decades. In spite of the effectiveness of modern synthetic insecticides, their application is discouraged on account of their non-target specific nature, non-biodegradable and environmental detriment. Further, it has led to the series of problems of precipitation of resistance in the vector population jeopardizing all important vector control programmes in the world. One hundred thirty six vectors have developed resistance against various chemical pesticides including fifty anopheline and forty culicine resistant *sp*. against common pesticides like organophosphates, dieldrin, BHC and carbamates (WHO, 1986). In India the most important malaria vector, *Anopheles* species has become resistant to DDT in most part of the country and BHC in the some areas (Tyagi, 1994).

The danger of environmental contamination with persistence and high toxicity of these insecticides has necessitated the need for search of newer methodologies in mosquito control programmes. The recent advances in the mosquito control programme have, therefore, been employed towards minimizing the use of persistent toxic insecticides and propagating the idea of using ecofriendly means to achieve the interruption of related epidemics and botanical products are one of the option. Herbal products such as nicotine, anabasine, lupinine, rotenone, pyrethrums have been as insecticide, long before the discovery and introduction of conventional synthetic organic insecticides. In search of the same entomologists, the world over, are once again exploring bioactive allelo-chemicals present in diverse floral wealth of temperate and tropical regions for developing ecofriendly and cost effective insecticide. There is a wide scope for investigation of unexplored newer bioactive compounds which may act as eco-friendly supplement to the existing pesticides.. Phytochemicals obtained from insecticidal plants with proven mosquito control potential can be used as an alternative to synthetic insecticides. Phytoproducts can act as general toxicants, repellent, chemosterlant, attractant or as synergist and can play an important role in the interruption of the transmission of mosquito borne diseases. The plant products, in general, possess low mammalian toxicity and thus constitute least health hazards and environmental pollution and there is practically no risk of developing pest resistance to these products, when used in natural forms. Further, these cause less hazards to non-target organisms and pest resurgence has not been reported except synthetic pyrethrins. Moreover, botanical insecticides are less expensive and easily available because of their natural occurrence especially in oriental countries.

A large number of phytoextracts have been tested and screened for mosquitocidal activity including *Azardirachta, Eclipta, Eucalyptus, Cympogon*, ect. and extensive research is in progress in various laboratories. However, there is need

for considering, perfecting and bringing the use of botanicals at community and individual level to bring the environmental deterioration to minimal and combat ever increasing problem of resistance in various mosquito species.

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Use of Diatoms as Biological Indicators for Assessment of Water Quality

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Water is a very important natural resource of the earth but with the increased population and other anthropogenic activities, it is depleting very fast. The rapid industrialization and urbanization in the last few decades have deteriorated the water quality at a very large scale. Though assessment of pollutants and water quality parameters are continuously monitored by analytical techniques but in recent decades, a significant effort has been put forth all over the world to assess water quality attending to biological indicators. Water quality evaluation based on physical, chemical and bacteriological measurements commonly form the basis of monitoring as they have been known to provide a complete spectrum of information for proper water management. However, physical and chemical methods restrain the assessment of water conditions to that particular moment when the measurements are taken and thus do not provide an integrated reflection of the water quality. In addition, even continuous chemical monitoring and data logging can miss events that might seriously impact key members of biological communities. It is also difficult to predict the interactive or synergistic influences of combinations of chemicals on aquatic biota. Moreover, increase in the diversity of pollutants in aquatic bodies has augmented the complexity in water quality monitoring and management strategies, rendering the assessment of every potential pollutant, impractical. Thus monitoring aquatic ecosystems by biological communities becomes indispensible.

Diatoms as a monitoring tool

Acknowledging the constraints of conventional analytical methods, biological monitoring is being increasingly employed in evaluating the water quality status of rivers and lakes in India and efforts are being made to develop biomonitoring tools. Phytoplankton, zooplankton particularly rotifers and benthic macroinvertebrates are being examined for their biomonitoring potential. Amongst all the diatoms are considered to be the best monitoring tool for many reasons. Diatoms occur in relatively diverse assemblages, and most species, especially the common ones, are relatively easily distinguished when compared to other algae and invertebrates that also have diverse assemblages. Diatoms are readily distinguished to species and subspecies levels based on unique morphological features, whereas many other algal classes have more than one stage in a life cycle and some of those stages are either highly variable ontogenically (e.g. blue-green algae), cannot be distinguished without special reproductive structures (e.g. Zygnematales), or cannot be distinguished without culturing (many unicellular green algae). As compared to fish and macroinvertebrates, diatoms have shorter generation time. They reproduce and respond rapidly to environmental change, thereby providing early warning indicators of both pollution increases and habitat restoration success. Indices based on diatom composition give more accurate and valid predictions than benthic macroinvertebrates, as they react directly to pollutants. Macrophytes, invertebrate assemblages and fish may better reflect the impact of changes in the physical habitat in addition to certain chemical changes. Even, the combined costs of sampling and sample assay are relatively low when compared to other organisms. Further, the samples can be easily archived for long periods of time for future analysis and long-term records. It is of additional advantage that the taxonomy of diatoms is generally well-documented where species identifications are largely based on frustule morphology.

Why Diatoms are preferred as biological or pollution indicators

Diatoms are algae that have a shell, called frustules that are composed of non-crystalline silica. As with other algae, they may grow in bodies of water or in moist soil. They are characterized by shape and sculpturing elements.

1. Diatoms are highly sensitive to the acidity of water. Most algae and diatoms disappear completely in water below the pH 5.8. Presence of filamentous algae normally indicates the increase in the acidity of water in the primarily stage. However, high levels of water acidity due to industrial pollution and other anthropogenic activity decrease the planktonic algae in the water body followed by its disappearance.
2. Diatoms are highly responsive to pH, the species changes with the change in the pH level of water. Different species survived at different pH levels in water. This specific characteristic of diatoms helps and changes in the species composition of diatoms very accurately indicate the pH level of the water body.
3. The water blooms formed due to increase in nutrient mainly composed of planktonic algae like *Microcystis, Scendensmus, Hydrodictyon* and *Chlorella* indicate pollution of water body due to excessive addition of organic matter, nitrates or phosphates.
4. Algae like *Cladophora* and *Stigeoclonium* indicates the heavy metal pollution in a water body. Their affinity for heavy metals increases their production rate leading to excessive growth of these algal communities. .
5. Similarly, Excessive growth of algae like *Duniella tertiolacta, Skeletonema costatum, Cricosphaera carterae, Amphidium carterae, Cyclotella cryptica* and *Pavlova lutheri* indicate oil pollution of water bodies.

Rivers are among the most endangered ecosystems of the world and there are urgent demands for comprehensive methodological approaches to evaluate the actual health of these ecosystems and to monitor their rate of changes. Compared to traditional techniques, biomonitoring (by using diatoms) integrates and reflects the effects of chemical and physical disturbances that occur over extended periods of time. These communities provide a holistic and an integrated measure of the integrity or health of the river as a whole.

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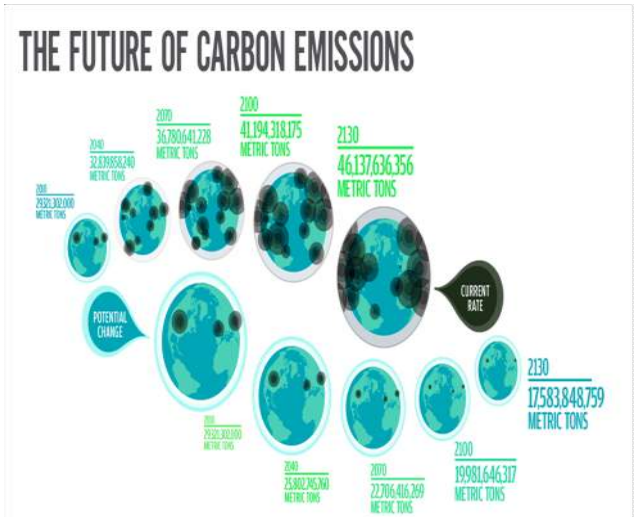

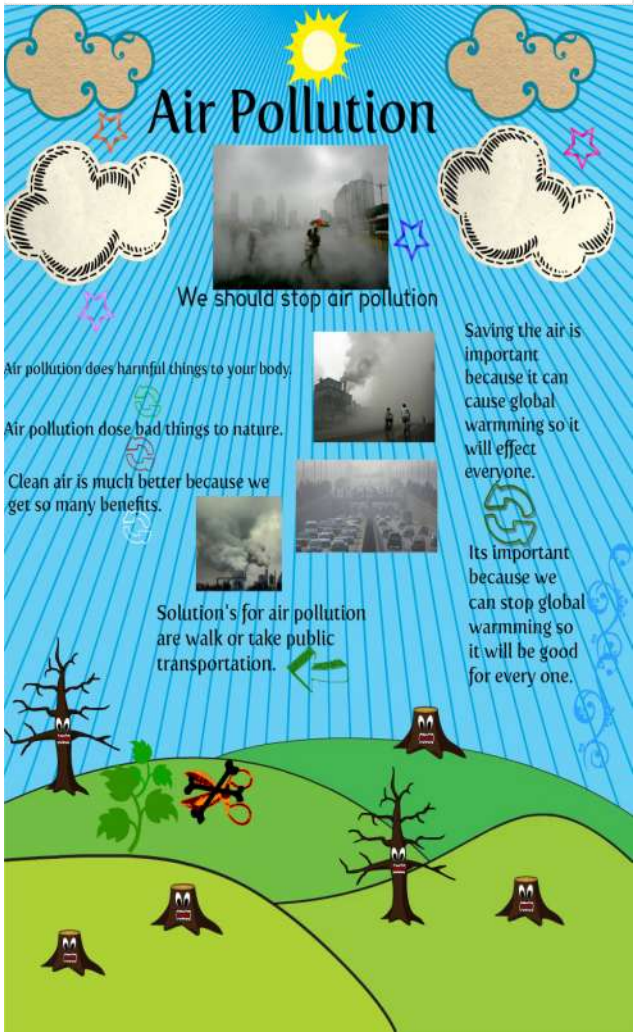

Instruction to Authors

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[A Monthly International Science Newsletter]
[Published By: Society of Education]
[ISO 9001: 2008 Certified Organization]

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Wed -- A Oceanic Plunge

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[Think Globally, Act Locally on World Environment Day]

The World Environment Day celebration (WED) began in 1972 and has grown to become one of the main vehicles through which the United Nations stimulates worldwide awareness of the environment and encourages political attention and action. Through World Environment Day, the United Nations Environment Programme is able to personalize environmental issues and enable everyone to realize not only their responsibility, but also their power to become agents for change in support of sustainable and equitable development. World Environment Day is also a day for people from all walks of life to come together to ensure a cleaner, greener and brighter outlook for themselves and future generations. Everyone counts in this initiative and World Environment Day relies on you to make it happen! We call for action — organize a neighborhood clean-up, stop using plastic bags and get your community to do the same, stop food waste, walk to work, start a recycling drive . . . the possibilities are endless.

June 5 has always been a day of hectic activity, primarily for environmentalists, heads of governments, policy-makers and a few corporate bodies the worldover. However, the common wo/man's absence of participation in World Environment Day activities, especially in developing countries, is noticeable. A majority of people in less developed countries (LDCs) hardly know, or care, about these much-touted events. They are obsessed with topics like this year's Budget, the political situation and inflation. Not surprising, since nearly 40 per cent of this population lives below the poverty line. Even the media in the Asian continent makes a passing reference to this day.

Whatever the case be, one fact remains that `Life on Earth without water is simply unthinkable'. Three-fourths of the Earth is occupied by this `Universal Solvent'. Human beings are made up of about 70 per cent of water (is this why the full moon affects some of us?). Yet, water threatens to become the 21st century's most burning issue. Wars are expected to break out in the name of sharing of river and ocean waters, India being a case in point. Entrepreneurs such as the Canadian-based Nova group found itself in hot waters when it attempted to export 600 million litres of water from Lake Superior to some drought-stricken areas in Asia.

Whatever the case, waters always hold a fascination for human beings. And the ocean (seas), especially have been the theme for many blockbuster movies -- `Water World', `Doctor do Little', `The Titanic', `Free Willy' and `20000 Leagues under the Sea', to name a few. Conservationists down the decades have been cautioning us that polluting the seas and oceans will not only kill marine life and food, once considered to be an unlimited resource, but also deprive us of fresh water.

The ocean floor is a natural archive of information on how our planet works, and has worked for millions of years. The composition and structure of seafloor sediment and underlying basement crust yield important clues to the evolution of life, ocean-atmosphere dynamics, and the tectonic processes that shaped the Earth's continents and ocean basins as we know them today.

Earth is a dynamic system and understanding how it works helps us locate vital mineral resources, make better use of renewable ocean resources, predict climate change, plan for environmental impacts on society, and conversely be better stewards in minimizing adverse effects of society on the environment.

The Ocean is vital to life on earth. From the life-giving rain that nourishes crops, to life-saving medicines; from the fish that come from the ocean floor, to the goods that are transported on the sea's surface -- the ocean plays a role in your life in some way every day. In recognition of the importance of the marine environment, this year's theme of World Environment Day is `For Life on Earth: Save Our Seas'.

World Environment Day was established by the United Nations General Assembly in 1972 to mark the opening of the Stockholm Conference on the Human Environment. Another resolution, adopted by the General Assembly the same day, led to the creation of UNEP. While the theme of the 1974 World Environment Day was `Only one Earth', last year's theme was `For life on Earth'.

World Environment Day 1998 is special. Each year, UNEP, the agency responsible for coordinating World Environment Day activities, selects a city as the main venue for the international celebrations, and this year, for the first time since the inception of this event, the venue will be Moscow in Eastern Europe -- a region of dramatic change. "The rapid economic, social and political changes which have taken place in Eastern Europe over the past few years, have greatly influenced the lifestyle of the people in the region," said Mr Klaus Topfer, UNEP Executive Director.

As the host of World Environment Day 1998, the City of Moscow and the Russian Federation have made a concerted effort to promote environmental awareness and action nationally, regionally and internationally, by organizing a series of important events. The main event to be held on 5 June will culminate with the presentation of UNEP's Global 500 Awards to 23 individuals and organizations from 19 countries who have made outstanding contributions to the protection of the environment.

In many countries, this annual event is used to enhance political attention and action. Heads of state, prime ministers and ministers of environment deliver statements and commit themselves to care for the Earth. More serious pledges are made which lead to the establishment of permanent governmental structures dealing with environmental management and economic planning. This observance also provides an opportunity to sign or ratify international environmental conventions.

Points to ponder

As humanity moves toward the 21st century, we are left with no choice but to redefine the values and principles that underlie our relationship with the Earth. Clearly, a new approach is required.

Creating a Spiritual Culture: The industrial civilisation has brought about an abundance of goods and services to humankind, but also an obsession for materialism and a distortion of human values.

Achieving Environmental Equity: Planet Earth is the common home for all of us. We must all strive to share equitably the benefits and burdens resulting from the use of the environment.

Greening Science and Technology: Science and technology have played a critical role in the development of human history and will be one of the key determining factors in shap-

ing a sustainable future. However, the impacts of technological development and their applications have also become so serious that they threaten the stability of the ecosystem and human society.

Sharing Responsibilities: All members of human society are responsible for maintaining the integrity of the environment as a Whole-Life-System. Individual efforts can be enhanced through building networks within and among all levels of civil society and government, industry and business, and non-governmental organizations (NGOs).

Environmental Education: Education, especially at an early age, has a significant effect on how people form attitudes toward the environment, and is thus crucial. Educational programmes designed to enhance awareness of environmental issues and ethics must be developed and applied at all levels of society through all available and practical means.

International Cooperation: Nations share common responsibilities for preserving Earth's environment. This amounts to active involvement in regional and international cooperative efforts and joint implementation of environmentally-sound policies, while faithfully complying with established multilateral agreements.

Environmentally-Sound Lifestyle: All members of society must cultivate a lifestyle that accepts and is consistent with sufficiency rather than greed and excess. Bearing in mind that Earth's resources are limited, each person must avoid a culture of extravagant material consumption and pursue ways to preserve the planet by improving consumption patterns.

Active Involvement: Individuals are encouraged to participate both morally and politically in all levels in the decision-making process of environmental policies in order to improve the quality of decision-making, avoid corruption, and ensure that their interests can be properly represented.

Role of "Watchdog" and Liaison: NGOs must serve the role of "watchdog" and must be prepared to assess and evaluate policy decisions, and where necessary, propose alternative environmental and development policies.

Environmentally-Friendly Business Practices: The industrial sector must actively apply eco-efficiency principles in order to use less energy and materials for the same amount of output and to reduce emissions and waste. This requires the widespread adoption of environmentally-friendly production technologies, an increased use of recycled materials, and a greater emphasis on substituting goods with services. The financial and insurance sectors must also increasingly direct investment toward environmentally-sound projects.

Interdisciplinary Approach: Science and technology alone cannot resolve the impending environmental crisis. An interdisciplinary approach, which includes other branches of academic endeavors such as the humanities and social sciences, is needed to develop active research programs for a better understanding of the increasingly complicated environmental problems. The key is to recognise that humans and the natural environment are interdependent and part of a larger entity, the "Whole-Life-System."

The 2013 theme for World Environment Day is Think. Eat. Save., with host country Mongolia. Think.Eat.Save is an anti-food waste and food loss campaign that encourages you to reduce your foodprint. According to the UN Food and Agriculture Organization (FAO), every year 1.3 billion tons of food is wasted. This is equivalent to the same amount produced in the whole of sub-Saharan Africa. At the same time, 1 in every 7 people in the world go to bed hungry and more than 20,000 children under the age of 5 die daily from hunger, Given this enormous imbalance in lifestyles and the resultant devastating effects on the environment, this year's theme – Think. Eat. Save – encourages you to become more aware of the environmental impact of the food choices you make and empowers you to make informed decisions.

While the planet is struggling to provide us with enough resources to sustain its 7 billion people (growing to 9 billion by 2050), FAO estimates that a third of global food production is either wasted or lost. Food waste is an enormous drain on natural resources and a contributor to negative environmental impacts. This year's campaign rallies you to take action from your home and then witness the power of collective decisions you and others have made to reduce food waste, save money, minimize the environmental impact of food production and force food production processes to become more efficient.

If food is wasted, it means that all the resources and inputs used in the production of all the food are also lost. For example, it takes about 1,000 liters of water to produce 1 liter of milk and about 16,000 liters goes into a cow's food to make a hamburger. The resulting greenhouse gas emissions from the cows themselves, and throughout the food supply chain, all end up in vain when we waste food. In fact, the global food production occupies 25% of all habitable land and is responsible for 70% of fresh water consumption, 80% of deforestation, and 30% of greenhouse gas emissions. It is the largest single driver of biodiversity loss and land-use change. Making informed decision therefore means, for example, that you purposefully select foods that have less of an environmental impact, such as organic foods that do not use chemicals in the production process. Choosing to buy locally can also mean that foods are not flown halfway across the world and therefore limit emissions.

"Although individual decisions may seem small in the face of global threats and trends, when billions of people join forces in common purpose, we can make a tremendous difference."

UN Secretary-General Ban Ki-Moon

Sustainability of Green Computing for Future Perspectives

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ABSTRACT
Green computing is the art of utilizing computing resources in an efficient and eco-friendly manner. In recent years, this practice has drawn serious attention both from environmental organizations and corporate world. In the current trend, "going green" becomes an agenda for the IT industries in terms of public relations and reduced costs. Green computing focuses on the triple bottom line of economic viability, social responsibility, and environmental impact. It differs from traditional business practices that focus mainly on economic viability of a computing solution. Green computing is one of the latest fads in the digital domain. Often, it's dressed up as corporate responsibility and used as a marketing tool. Corporate computer-users may talk about reducing their "carbon-footprints" to slow global warming, but what they really mean is finding a way to slash their electricity bills. The term "Green Computing" came into existence after the "Energy Star Programme" by the US Environmental Protection Agency (EPA), in the year 1992. It was a voluntary labelling program, designated to promote energy efficiency in hardware of all kinds. A similar program was also conducted in Europe and Asia later on. The manufacturing industries contribute directly to pollution, where as the IT industries have a hidden impact on environmental pollution caused by unconscious consumption of power (electricity) and inefficient use of hardware devices. Hence, the supreme motto of green computing is to explore the reasons and find the solution of this indirect adverse effect on environment.
Keywords: CRT, Emissions, EPEAT, Recycling, RoHSD, Solar computing

REGULATIONS & INDUSTRY INITIATIVES

Government: Different governmental agencies have implemented standards and regulations that encourage green computing. Some of the acts and regulations are:

i. The USEPA's "Energy Star Program", which was launched in 1992, was revised in October 2006 to include stricter efficiency requirements for computer equipment, and a tiered ranking system for approved products.

ii. The Swedish Confederation of Professional Employees certifies PCs, monitors and other office equipments to meet the ergonomics, energy, usage, emissions and hazardous substances requirements.

iii. In 2003, the California State Senate enacted the Electronic Waste Recycling Act, which establishes a statewide recycling program for obsolete computer and consumer electronic equipment.

Industry:

i. The Green Electronic Council offers the Electronic Products Environmental Assessment Tool (EPEAT) to assist in the purchase of "green" computing systems. The council evaluates computing equipment on 28 criteria that measure a product's efficiency and sustainability attributes.

ii. In May 2007, IBM launched project Big Green, a 1-billion USD per-year effort to design and promote energy efficiency in corporate data centers.

iii. In 2007, Google Inc. And Intel Corporation officially launched the Climate Savers Computing Initiative, with the goal being to reduce the electric power consumption of PCs in active and inactive states.

APPROACHES TO GREEN COMPUTING

Several methods can be adopted in order to reduce the environmental impact of a computing system.

Power generation: Every physical attribute of a computing system requires electrical power to operate. In the context, Green Computing aims at usage of power from eco-friendly and impact sources like windmills and hydroelectric mills, solar power and power produced by nuclear power plants.

Virtualization: This is the process of making two more computer systems to run on one set of physical hardware in order to reduce power and cooling consumption. Several commercial companies and open-source projects now offer software packages to enable a transition to virtual computing.

Power Management: This suggests directly controlling the power saving aspects of the hardware. To become more energy conscious, the Advanced Configuration and Power Interface (ACPI) provides a standard programming interface, which allows the hardware devices to be automatically turned-off after set periods of inactivity. There is also certain software package that allows the user to manually adjust the voltages supplied to the CPU, essentially reducing the amount of electricity used by the CPU while it's on and powered. Some CPUs from Intel and AMD use the technology called "speed step" which automatically adjusts the processor voltages depending on the workload. In 2007, Intel Corporation released a utility called power TOP, which measures and reports on a PC's power consumption. This utility is available only for PCs running a Linux operating system.

Newer Hardware: in 2007, computer vendors like Everex, Linutop, Systemax and Zonbu dedicated low power thin client PCs. The purpose of designing such systems is to reduce power consumption by decreasing the volume and size of the peripherals and low-voltage components. This design limits the computational performance in terms of computer gaming and video production. Nowadays, LCD monitors are also replaced by Light Emitting Diodes (LEDs) that reduce the amount of electricity used for the display. Desktop computer power supplies (PSUs) are generally about 70-75% efficient; to produce 75W of DC output they require 100W of Ac input and dissipate the remaining 25W as heat. An industry initiative called 80 PLUS certifies PSUs that are at last 80% efficient.

Over the last fifteen years computers have been playing a vital role in administrative and academic spheres. Computers and other hardware devices, when in use, produce heat and this heat must be compensated by incorporating cooling conditions for safety of the devices. This implies that more heat generation will cost more cooling consumption, adding to computer operating cost. For instance, when a 150W computer is left to operate for one year, it consumes a energy equivalent to 1000 pound pile of coal or over 100 gallon of oil, which costs around 130$ or more. This also requires an additional cost for cooling consumption. Since cooling consumption mechanism like ACs or cooler fans contribute directly to environmental pollution, worldwide consideration for minimizing computer-operating cost should be taken care of.

Materials Recycling: Recycling old computers has the benefit of keeping defunct systems and the harmful chemicals contained within, such as lead, mercury, hexavalent chromium, etc. it also facilitates e-waste management. According to a report, 80% of the post consumer e-waste collected for recycling is shipped to countries such as China, India and Pakistan where the electronic devices are manually broken apart

and shifted to collect precious metals, such as copper and gold.

ENERGY EFFICIENT COMPUTING

This is the practice of using computing devices with concerns for saving and productive utilization. Some such computing methodologies are:

- Turn of your computer and /or peripheral when they are not in use. Turning on and off will not harm the equipment.
- Don't run computers continuously unless they are in use continuously.
- Look for ways to reduce the amount of time your computer is on without adversely affecting your productivity.
- Unless you require immediate access to E-mail or other Internet services, break the habit of turning on all your computer equipment as soon as you enter the office each day.
- If practical, informally group your computer activities and try to do then during one or two parts of the day, leaving the computers off at other times.
- Avoid using the switch on a power strip to turn on all your equipment.
- if you use a laser printer, don't turn your printer on until you are ready to print.
- Turn off your entire computer system or at least your monitor and printer when you go for lunch or will be out of office for a meeting or an errand.
- For "computer servers" which must be on to serve network functions, explore ways to turn servers off at night.
- If monitors are not needed for "servers" to operate, keep server monitors off. If server monitor is needed during the day, at least turn off at night and weekends.

OTHER GREEN COMPUTING PRACTICES

Some other green computing practices include:

a) Reducing Paper Waste
b) Reusing and Recycling of Hardware Devices
c) Purchasing Recommendations
d) VIA Technology:
i. Carbon Free Computing
ii. Solar Computing
iii. Lead-free & RoHSD Computing

Reducing Paper Waste: Computer use has vastly increased paper consumption and paper waste. Here are some suggestions for reducing paper waste:

- Print as little as possible. Review and modify documents on the screen and use print preview. Minimize the number of hard copies and paper drafts you make. Instead of printing, save information to disks.
- Recycle waste paper.
- Save E-mail whenever possible and avoid needless printing of E-mail messages.
- Use E-mail instead of faxes or send faxes directly from your computer to eliminate the need for a hard copy.
- On larger documents, use smaller font sizes to save paper.
- When documents are printed or copied, use double-sided printing and copying. If possible, use the multiple pages per sheet option on printer properties.
- When general information-type documents must be shared within an office, try circulating them instead of making an individual copy of each person. This can also be done by E-mail.
- Reusing and Recycling of Hardware Devices: This is one of the most important aspects of Green Computing that revolves around e-waste management. It involves making unused and old hardware devices or computing resources reusable through the process of recycling, for example, inkjet cartridges, batteries, and diskettes can be recycled for further use. Several institutional initiatives are being taken in this regard.

Purchasing Recommendations: Environmentally responsible computer use implies not buying new equipments unless there is a demonstrated need. Here are some suggestions:

Buy only "Energy Star" computers, monitors and printers. Flat panel monitors use about half of the electricity of a CRT (Cathode-Ray-Tube) display.

Buy a monitor as larger as you really need. A 17-inch CRT monitor uses 30% more energy than a 15-inch one when each is an active mode.

Buy inkjet printers. These use 80%-90% less energy than laser printers and print quality can be excellent.

Once they are available, consider buying "Green Computers".

Buy non-petroleum based ink. These printer inks are made from renewable resources, require fewer hazardous solvents, which translates to fewer air emissions, an in many cases produce brighter, cleaner colours.

VIA Technology: This technology incorporates the philosophy of power efficiency throughout the design and manufacturing process of its products. It includes:

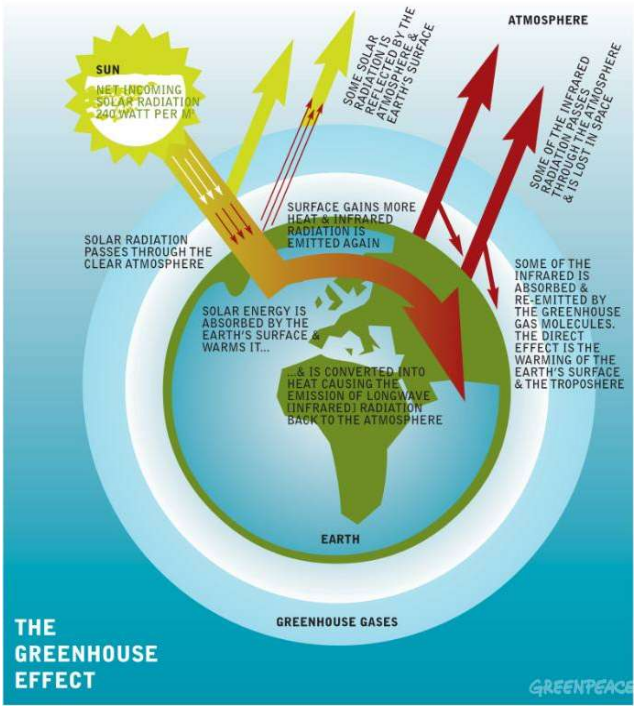
i. **Carbon Free Computing:** It aims at reducing "Carbon Footprints" of users. Carbon Footprint refers to the amount of GHGs (Greenhouse Gases) produced measured in units of carbon dioxide. An increase in the GHGs leads to severe floods, droughts and rising sea level, affecting both life and the world's economy. So VIA aims to offer the world's first PC products certified carbon free, taking responsibility for the amounts of carbon dioxide they emit.

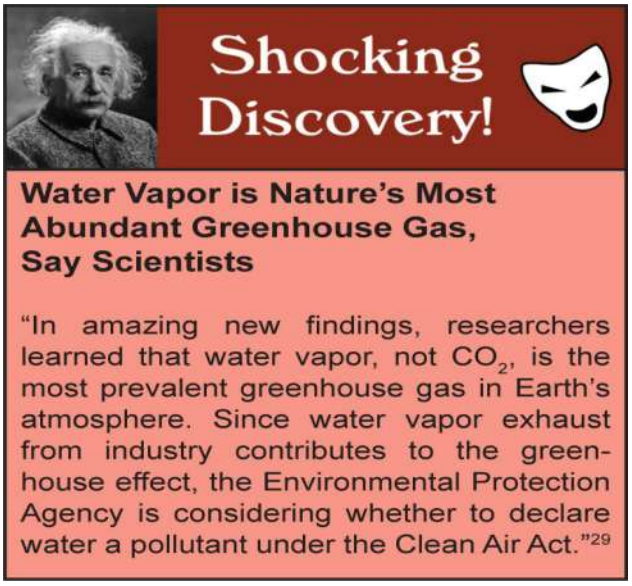
ii. **Solar Computing:** Amid the international race towards alternative-energy sources, VIA is setting its eyes on the sun, and the company's Solar Computing initiative is a significant part of its green-computing projects. For that purpose, VIA partnered with Motech Industries, one of the largest producers of solar cells worldwide. A solar cell fit VIA's power-efficient silicon, platform, and system technologies and enable the company to develop fully solar-powered devices that are non-polluting, silent, and highly reliable. Solar cells require very little maintenance throughout their lifetime, and once initial installation costs are covered, they provide energy at virtually no cost. Worldwide production of solar cells has increased rapidly over the last few years; and as more governments begin to recognize the benefits of solar power, and the development of photovoltaic technologies goes on, costs are expected to continue to decline.

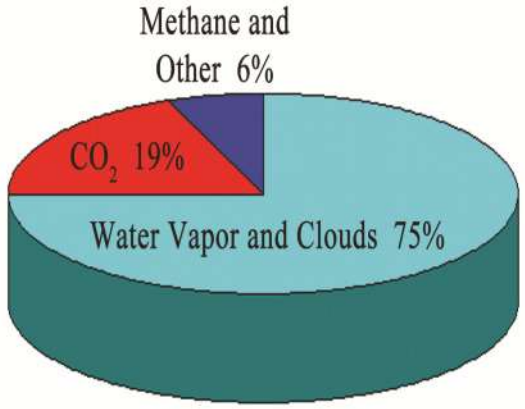
iii. Lead-free & RoHSD Computing: In February 2003, the European Union (EU) adopted the Restriction of Hazardous Substances Directive (RoHSD). The legislation restricts the use of six hazardous materials in the manufacture of various types of electronic and electrical equipment.VIA implemented a set of internal regulations in order to develop products that are compliant with these accepted policies, including the use of hazardous materials in its production of chipsets, processors, and companion chips. In 2001, they focused on lead-free manufacturing, introducing the Enhanced Ball Grid Array (EBGA) package for power efficient VIA processors and the Heat Sink Ball Grid Array (HSBGA) package for their chipsets. In traditional manufacturing processes, lead is used to attach the silicon core to the inside of the package and to facilitate integration onto the motherland through tiny solder balls on the underside of the package. VIA's lead-free manufacturing technologies do not require a lead bead, and the solder balls now consist of a tin,

silver, and copper composites.

It is clear that the mushrooming growth of IT industries worldwide is slowly poisoning the environment. This grave threat requires immediate attention. Societies need to become more energy conscious. The need of the hour is for both government and the corporate world to join hands to usher in more green computing solutions to be able to build a green-globe. *(Courtesy: Panda, L. K., Research Scholar, Department of Environmental Science, FMU, Balasore-19, Orissa; Sahoo, S. P., MBA Scholar, FMU, Balasore-19, Orissa; Pradhan, D. Sr Science Teacher, GGHS, Bhuban, Orissa; Panda, R. B., Reader in Environmental Sciences, FMU, Balasore-19, Orissa)*







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