



ONLY NEWS PAPER PUBLISHED IN INDIA FOR SCIENTIFIC COMMUNITIES

NESA NEWSLETTER

NATIONAL ENVIRONMENTAL SCIENCE ACADEMY

Vol. 23 Issue - 05 (MONTHLY)

May 2020



22 MAY 2020

**INTERNATIONAL DAY FOR
BIOLOGICAL DIVERSITY**

Our solutions are in nature



8 June
World Oceans Day

**17 June, World Day to
Combat Desertification**



NESA Annual Award 2020 Notification No. 2

APPLICATIONS ARE INVITED

date is extended to

31st July 2020

(1) NESA FELLOWSHIP AWARD

AGE 45 and above. The recipients shall get Citation, Certificate, Memento and a Gold plated medal, and can suffix F.N.E.S.A. after their names.

(2) NESA EMINENT SCIENTIST AWARD

AGE 40 and above. The recipient shall get Citation, Certificate, Memento and a Gold plated medal.

(3) NESA SCIENTIST OF THE YEAR AWARD

AGE 35 and above. The recipient shall get Citation, Certificate, Memento and a Gold plated medal.

(4) NESA ENVIRONMENTALIST AWARD

AGE Up to 35 and above. The recipients shall get Citation, Certificate, Memento and a Gold plated medal.

(5) NESA GREEN TECHNOLOGY INNOVATIVE AWARD

AGE 35 and above. The recipients shall get Citation, Certificate, Memento and a Gold plated medal.

(6) NESA YOUNG SCIENTIST AWARD

AGE : Up to 35. The recipients shall get Citation, Certificate, Memento and a Gold plated medal.

(7) NESA JUNIOR SCIENTIST AWARD

AGE : Below 35. The recipients shall get Citation, Certificate, Memento and a Gold plated medal. a Gold plated medal.

PRESCRIBED APPLICATION FORMS

The application forms could be downloaded from www.nesa-india.org

Separate application form should be submitted for separate awards. The application forms are non-transferable and it can also be obtained by sending a bank draft of **Rs. 1000/- only** (per form). Drawn in favour of **NATIONAL ENVIRONMENTAL SCIENCE ACADEMY** payable at NEW DELHI.

***Please log on to
our website for Guidelines.**

GENERAL SECRETARY

NATIONAL ENVIRONMENTAL SCIENCE ACADEMY

206, Raj Tower-I, Alaknanda Community Centre,
New Delhi - 110 019 • Tel.: 011-2602 3614

E-mail: infonesa88@gmail.com

Website: www.nesa-india.org

WORLD BIODIVERSITY DAY

R. S. Tomar¹, Sushma Tiwari² and AK Pandey¹

¹College of Horticulture and Forestry, RLBCAU, Jhansi, U.P.

²Plant Molecular Biology and Biotechnology, RVSKVV, Gwalior, M.P.

Email: rsstomar@rediffmail.com; sushma2540@gmail.com

The World Biodiversity Day was celebrated on December 29, the day of its creation by the Second Committee of the UN General Assembly in 1993 until 2000. The day was recognized as the Convention on Biological Diversity went into effect. However, on December 2000, the date was shifted to commemorate the adoption of the Convention on May 22, 1992 at the Rio Earth Summit. This was done to avoid many other holidays that occur in late December. Since then it is celebrated on May 22, by UN-sanctioned international holiday for the promotion of biodiversity issues.

Biodiversity is the variety and variability of life on Earth. It involves variation at different levels like at the genetic, species, and ecosystem. 'Biological diversity' is the number and types of plants and animals that exist in a particular region or in the world. Biological diversity or biodiversity can be defined as is that part of nature which includes the differences in genes among the individuals of a species, the variety and richness of all the plant and animal species at different scales in space, locally, in a region, in the country and the world, and various types of ecosystems, both terrestrial and aquatic, within a defined area. Terrestrial or land biodiversity is greater near the equator because of the warm climate and high productivity. Biodiversity is not same at every part of the Earth, and is richest in the tropical region. However, these tropical forest ecosystems cover less than 10 percent of earth's surface, and contain about 90 percent of the world's species. Marine biodiversity is usually highest along coasts in the Western Pacific, where sea surface temperature is highest, and in the mid-latitudinal band in all oceans. Biodiversity generally tends to cluster in hotspots areas and has been increasing with time but likely to slow down in the future as predicted by the great researchers and scientists. We are fortunate that our country is one of the 12-mega diverse countries of the world. With only 2.5% of the land area, it accounts for 7.8% of the global recorded species.

The Convention on Biological Diversity (CBD), known informally as the Biodiversity Convention, is a multilateral treaty with three main goals including: the conservation of biological diversity (or biodiversity); the sustainable use of its components; and the fair and equitable sharing of benefits arising from genetic resources. Its objective is to develop national strategies for the conservation and sustainable use of biological diversity. It is often seen as the key document regarding sustainable development. The Convention was opened for signature at the Earth Summit in Rio de Janeiro on 5 June 1992 and entered into force on 29 December 1993. India is a Party to the Convention on Biological Diversity (1992). Article 8(j) of the Convention on Biological Diversity recognizes contributions of local and indigenous communities to the conservation and sustainable utilization of biological resources through traditional knowledge, practices and innovations and provides for equitable sharing of benefits with such people arising from the utilization of their knowledge, practices and innovations. In exercise of the powers conferred by Sub-Section (1) (4) of Section 8 of the Biological Diversity Act,



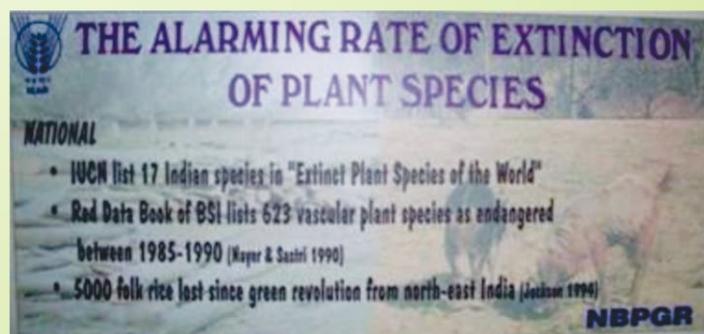
2002 (18 of 2003), the Central Government has established a body called the National Biodiversity Authority at Chennai. It is established on and from the 1st day of October, 2003.

Biodiversity is a multi-disciplinary involving diverse activities and actions. The stakeholders in biological diversity include the Central Government, State Governments, Institutions of local self-governmental organizations, industry, local people etc. After an extensive and intensive consultation process involving the stakeholders, the Central Government has brought Biological Diversity Act, 2002 with the following salient features:

1. To regulate access to biological resources of the country with the purpose of securing equitable share in benefits arising out of the use of biological resources; and associated knowledge relating to biological resources;
2. to conserve and sustainably use biological diversity;
3. to respect and protect knowledge of local communities related to biodiversity;
4. to secure sharing of benefits with local people as conservers of biological resources and holders of knowledge and information relating to the use of biological resources;
5. conservation and development of areas of importance from the standpoint of biological diversity by declaring them as biological diversity heritage sites;
6. protection and rehabilitation of threatened species; involvement of institutions of state governments in the broad scheme of the implementation of the Biological Diversity Act through constitution of committees.

The Millennium Ecosystem Assessment (MA) survey indicated that climate change is likely to become the dominant direct driver of biodiversity loss by the end of the century. Current climate change estimates predict increases in temperatures of 1.4°C to 5.8°C by 2100. This will affect species in several ways such as: changes in distribution; increased extinction rates; changes in reproduction timings; and changes in length of growing seasons for plants. The rich variety of life on Earth has always had to deal with a changing climate. However, the unprecedented pace of change we are presently experiencing is so rapid that a great number of species cannot adapt fast enough to the new conditions, or move to regions more suited for their survival due to habitat fragmentation. In fact, recent estimates show that up to a million species may become extinct as a result of climate change.

On the positive side, biodiversity can help to reduce the effects of climate change on the world's population and ecosystems. Indeed, the links between biodiversity and climate change run both ways: biodiversity is threatened by climate change, but biodiversity resources can reduce the impacts of climate change. It is therefore crucial to conserve biodiversity that is especially sensitive to climate change, preserve habitats so as to facilitate the long-term adaptation of biodiversity, improve our understanding of climate change and biodiversity linkages, and fully integrate biodiversity considerations into mitigation and adaptation improved. If the threats of biodiversity loss and climate change are tackled together, the prospects for successfully adapting to the challenges of the coming decades can be met. It is also the theme for this year's celebration of the International Day for Biological Diversity.



BIODIVERSITY: UNDERSTANDING VALUES, THREATS AND CONSERVATION

Resham Bhalla

Associate professor

LVH Arts, Science & Commerce College, Nashik

E-mail: dr.resham.bhalla@gmail.com

Introduction:

Biodiversity" is a measure of variation of all forms of life, at the genetic, species, and ecosystem level. Though the study of environment and ecology is quite old, the term biodiversity has been introduced by Walter Rosen in 1986. This definition was first given in a paper by Bruce A. Wilcox commissioned by the International Union for the Conservation of Nature and Natural Resources (IUCN). The 1982 World National Parks Conference defined "Biological diversity is the variety of life forms at all levels of biological systems i.e., molecular, organismic, population, species and ecosystem. The 1992 United Nations Earth Summit defined "biological diversity" as "the variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes showing diversity within species, between species and of ecosystems.

Biodiversity Day:

Originally, Biological Diversity Day was proclaimed on December 29. In December 2000, however, the UN General Assembly changed the date to May 22 to increase understanding and awareness of biodiversity issues including desertification, land degradation and drought and water and sanitation. This was partly meant to commemorate the adoption of the Convention at the Rio Earth Summit in 1992 and partly to avoid clashing with the various international holidays that occur in late December. Despite all technological advances we are completely dependent on healthy and vibrant ecosystems for our health, water, food, medicines, clothes, fuel, shelter and energy. The slogan "Our solutions are in nature" emphasises hope, solidarity and the importance of working together at all levels to build a future of life in harmony with nature. This slogan brings both Nature-Based Solutions with biodiversity safeguards and the biodiversity/nature aspect together in a way that is easy to grasp. It also shows that people are part of nature rather than separate from nature. This slogan is compatible with different calls to action which include Ecosystem-based solutions for biodiversity loss, climate change land degradation and Mainstreaming biodiversity in economic sectors.

Importance of Biodiversity:

The diversity provided by our natural systems is more suitable for human existence and well-being on earth, while contributing to other sustainable development goals, including climate change mitigation and adaptation, ecosystems restoration, cleaner water and zero hunger, among others. This diversity is often understood in terms of the wide variety of plants, animals and microorganisms which are vital to keep the world's many ecosystems healthy, balanced and thriving. Biodiversity is "essential for the welfare of current and future generations. "Biodiversity is not evenly distributed, rather it varies greatly across the globe as well as within regions and is richest in the tropics. The tropical forest ecosystems cover less than 10 percent of earth's surface, and contain about 90 percent of the world's species. Terrestrial biodiversity is thought to be up to 25 times greater than ocean biodiversity Marine biodiversity is usually highest along coasts in the Western Pacific, where sea surface temperature is highest. Rain forests that having wet climates for a long time are rich in biodiversity. Temperature, precipitation,

altitude, soils, geography, the presence of other species and other factors determining factors of the biodiversity. Biodiversity is important to the survival and welfare of human populations. Biodiversity is the basis of sustainable development



challenges from nature-based solutions to climate, to food and water security and sustainable livelihoods. Biodiversity plays a major role in many ecosystem services such as replenishing oxygen through photosynthesis, pollination through bees, regulation of global climate, control of flood, and soil erosion, nutrient cycling", microbial waste treatment, biological control of pests.

Types of Diversity:

Species diversity, Genetic diversity and Ecological diversity are the three main types of Biodiversity. Species diversity refers to the 'variety and abundance of different types of individuals of a species in a given area'. The regions rich in nutrients, moderate temperature, proper light and adequate rainfall, show high degree of species diversity are also called hotspots of biodiversity.

Genetic diversity pertains to the range of diversity in the genetic resources of the organisms which is essential for healthy breeding population of all species and the reduction in genetic variability can lead to extinction of species. Genetic biodiversity includes genetic differences within each species, between varieties of crops and breeds of livestock. Chromosomes, genes and DNA- the building blocks of life determine the uniqueness of each individual and each species. The biotechnology manipulates the genetic materials of different species through various genetic recombination to evolve better varieties of crops and domestic animals.

Ecological diversity is the 'variability among the species of plants and animals living together indifferent ecological complexes. Ecological diversity represents varied life forms and dynamic interactions with ecosystems like grasslands, forests, semi-arid, deserts, marine, freshwater, wetland, swamp, marshlands etc. The loss of an ecosystem means the loss of the interactions between species and the loss of biological productivity.

There are three mathematical ways to measure biodiversity. Alpha diversity is the number of species within a community. Beta diversity is the change in the composition of the species with reference to the changes in the environment. Gamma diversity is the overall diversity and is applied to larger areas in which both alpha and beta diversity are measured.

Loss and Threats to Biodiversity:

The loss of biodiversity has increased in the 20th century. Identified anthropogenic drivers influencing the loss of biodiversity are land conversion, exploitation, fragmentation, water extraction, pollution, eutrophication and climate change. Although climate is a slow changing factor, studies on the impacts of climate change concluded that climate change is already affecting species distributions all over the world and will impact nature to a considerable amount in the 21st century. The main threats to our biodiversity loss are, fragmentation and degradation of habitat, the spread of invasive species, unsustainable use of natural resources, climate change, inappropriate fire regimes, changes to the aquatic environment and water flows

The current decline in biodiversity is largely the result of human activity and represents a serious threat to human development. Despite mounting efforts over the past 20 years, the loss of the

world's biological diversity, mainly from habitat destruction, over-harvesting, pollution and the inappropriate introduction of foreign plants and animals, has continued. Our planet is on the verge of a climate crisis due to our endless production of greenhouse gases including carbon dioxide and methane. Our oceans are becoming choked with plastic waste which is killing millions of animals, from sea turtles to whales. Monocultures are increasingly susceptible to disease while widespread pesticide use destroys insect populations indiscriminately. Livestock farming is contributing to more climate emissions than the entire transport sector and is the biggest cause of deforestation. Runoff from farms pollutes water bodies and causes harmful algal blooms and the collapse of fish stocks.

Habitat Loss and Deforestation is due to Agricultural activities, Urbanization, desertification of land, Mining, Forest fires are leading towards the Climate Imbalance, Global warming, Floods, and more towards the wild life extinction. The loss of biodiversity threatens our food supplies, opportunities for recreation and tourism, and sources of wood, medicines and energy. It also interferes with essential ecological functions. The current decline in biodiversity is largely the result of human activity and represents a serious threat to human development. Environmental changes caused by both natural processes and human activity lead to extinction of species and reduction of biodiversity. Despite mounting efforts over the past 20 years, the loss of the world's biological diversity, mainly from habitat destruction, over-harvesting, pollution and the inappropriate introduction of foreign plants and animals, has continued. Biological resources constitute a capital asset with great potential for yielding sustainable benefits.

Global Warming is one aspect towards Ocean acidification refers to a reduction in the pH of the ocean over an extended period of time, caused by uptake of carbon dioxide (CO₂) from the atmosphere, ocean, burning fossil fuels, waste disposal, industrialization, improper land management and many more.

FOREST FIRE: CAUSES, TYPES, IMPACT AND ITS MANAGEMENT

S. Shenbagavalli

Dept. of Soil Science and Agricultural Chemistry
AC&RI, Killikulam-628252, Tamil Nadu
E-mail: shenhello@gmail.com

The most common hazard in forests is forest fire. Forest fires are as old as the forests themselves. They pose a threat not only to the forest wealth but also to the entire regime to fauna and flora seriously disturbing the bio-diversity and the ecology and environment of a region. During summer, when there is no rain for months, the forests become littered with dry senescent leaves and twigs, which could burst into flames ignited by the slightest spark. The Himalayan forests, particularly, Garhwal Himalayas have been burning regularly during the last few summers, with colossal loss of vegetation cover of that region. Forest fire causes imbalances in nature and endangers biodiversity by reducing faunal and floral wealth. Traditional methods of fire prevention are not proving effective and it is now essential to raise public awareness on the matter, particularly among those people who live close to or in forested areas.

CAUSES OF FOREST FIRE

Natural causes - Many forest fires start from natural causes such as lightning which set trees on fire. However, rain extinguishes such fires without causing much damage. High atmospheric temperatures and dryness (low humidity) offer favorable circumstance for a fire to start.

The effect of ocean acidification may be quite worst in terms of increase in the carbon dioxide concentration in the ocean which may lead towards Loss of aquatic life, food shortage, impact on the reefs, impact on human health etc.

Environmental Pollution is causing continued harm to the biosphere by releasing and depositing toxic chemicals into the atmospheric, terrestrial and marine systems and disrupting the Earth's ecosystems. Pollution has also depleted ozone levels, created dead zones in marine habitats due to toxicity and acid rains, altered species feeding and breeding habits and even caused the death of many species due to oil spills or the consumption of plastic and other toxic substances.

Invasive species, the non-native species invade normal and healthy ecosystems and threaten the survival of the native species either by attacking them or competing for the habitat's resources disturbing the native biota and ecosystems leading the extinctions and massive threats to biodiversity.

Biodiversity Conservation and its Importance:

The importance of biodiversity conservation should be understood in terms of economic growth and poverty reduction, to support the continuity of ecosystems globally, for its aesthetic value, ecological balance and ethical value of all forms of life in the environment. It can be conserved by adopting different methods like protection against degradation and destruction of natural ecosystems, to maintain, restore and increase ecological systems while promoting the implementation of better conservation practices and identification and protection of endangered species and establishing buffer zones to prevent any deviation in the balance of natural ecosystem. Therefore, in today's scenario an urgent and decisive action is needed to conserve and maintain genes, species and ecosystems, with a view for the sustainable management and use of biological resources because conservation always leads to a prosperous life. The primary goal of conservation is that every mankind must know the value and importance of resources.

Man made causes- Fire is caused when a source of fire like naked flame, cigarette or bidi, electric spark or any source of ignition comes into contact with inflammable material.

Traditionally Indian forests have been affected by fires. Threat has been aggravated with rising human and cattle population and the consequent increase in demand for Forest products by individuals and communities. Causes of forest fires can be divided into two broad categories: environmental (which are beyond control) and human related (which are controllable).

Environmental causes - are largely related to climatic conditions such as temperature, wind speed and direction, level of moisture in soil and atmosphere and duration of dry spells. Other natural causes are the friction of bamboos swaying due to high wind velocity and rolling stones that result in sparks setting off fires in highly inflammable leaf litter on the forest floor.

Human related causes - result from human activity as well as methods of forest management. These can be intentional or unintentional, for example:

- ❖ graziers and gatherers of various forest products starting small fires to obtain good grazing grass as well as to facilitate gathering of minor forest produce like flowers of *Madhuca indica* and leaves of *Diospyros melanoxylon*.
- ❖ the centuries old practice of shifting cultivation (especially in the North-Eastern region of India and parts of the States of Orissa and Andhra Pradesh).

- ❖ the use of fires by villagers to ward off wild animals
- ❖ fires lit intentionally by people living around forests for recreation
- ❖ fires started accidentally by careless visitors to forests who discard cigarette butts.

The causes of forest fire have been increasing rapidly. The problem has been accentuated by the growing human and cattle population. People enter forests ever more frequently to graze cattle, collect fuelwood, timber and other minor forest produce. It has been estimated that 90% of forest fires in India are man-made

Classification of Forest Fire: Forest fire can broadly be classified into three categories;

- ❖ Natural or controlled forest fire.
- ❖ Forest fires caused by heat generated in the litter and other biomes in summer through carelessness of people (human neglect) and
- ❖ Forest fires purposely caused by local inhabitants.

Types of Forest Fire: There are two types of forest fire i) Surface Fire and ii) Crown Fire

Surface Fire: forest fire may burn primarily as a surface fire, spreading along the ground as the surface litter (senescent leaves and twigs and dry grasses etc) on the forest floor and is engulfed by the spreading flames.

Crown Fire: The other type of forest fire is a crown fire in which the crown of trees and shrubs burn, often sustained by a surface fire. A crown fire is particularly very dangerous in a coniferous forest because resinous material given off burning logs burn furiously. On hill slopes, if the fire starts downhill, it spreads up fast as heated air adjacent to a slope tends to flow up the slope spreading flames along with it. If the fire starts uphill, there is less likelihood of it spreading downwards.



EFFECT OF FOREST FIRE

Fires are a major cause of forest degradation and have wide ranging adverse ecological, economic and social impacts, including:

- ❖ loss of valuable timber resources
- ❖ degradation of catchment areas
- ❖ loss of biodiversity and extinction of plants and animals
- ❖ loss of wildlife habitat and depletion of wildlife
- ❖ loss of natural regeneration and reduction in forest cover
- ❖ global warming
- ❖ loss of carbon sink resource and increase in percentage of CO₂ in atmosphere

- ❖ change in the microclimate of the area with unhealthy living conditions
- ❖ soil erosion affecting productivity of soils and production
- ❖ ozone layer depletion
- ❖ health problems leading to diseases
- ❖ loss of livelihood for tribal people and the rural poor, as approximately 300 million people are directly dependent upon collection of non-timber forest products from forest areas for their livelihood.

The needs of the fire management

The incidence of forest fires in the country is on the increase and more area is burned each year. The major cause of this failure is the piecemeal approach to the problem. Both the national focus and the technical resources required for sustaining a systematic forest fire management programme are lacking in the country. Important forest fire management elements like strategic fire centres, coordination among Ministries, funding, human resource development, fire research, fire management, and extension programmes are missing. Taking into consideration the serious nature of the problem, it is necessary to make some major improvements in the forest fire management strategy for the country. The Ministry of Environment and Forests, Government of India, has prepared a National Master Plan for Forest Fire Control. This plan proposes to introduce a well-coordinated and integrated fire-management programme that includes the following components:

- ❖ Prevention of human-caused fires through education and environmental modification. It will include silvicultural activities, engineering works, people participation, and education and enforcement. It is proposed that more emphasis be given to people participation through Joint Forest Fire Management for fire prevention.
- ❖ Prompt detection of fires through a well coordinated network of observation points, efficient ground patrolling, and communication networks. Remote sensing technology is to be given due importance in fire detection. For successful fire management and administration, a National Fire Danger Rating System (NFDRS) and Fire Forecasting System are to be developed in the country.
- ❖ Fast initial attack measures.
- ❖ Vigorous follow up action.
- ❖ Introducing a forest fuel modification system at strategic points.
- ❖ Firefighting resources.

Each of the above components plays an important role in the success of the entire system of fire management. Special emphasis is to be given to research, training, and development

Integrated forest protection

The main objective of this scheme is to control forest fires and strengthen the forest protection in Tamilnadu. The work like fireline clearing, assistance to Joint Forest Management committees, creating water bodies, purchase of vehicles and communication equipments, purchase of fire fighting tools, etc., are being undertaken.

NESA members are requested to share more articles related to environment, water, ocean, forest, agriculture, biodiversity and other related sciences to publish in the e-newsletter. The suggestions and messages for the betterment of the society can be shared with others. Academy has more than 2000 life members and very few publish the articles. We hope that members will contribute more articles and send their suggestions/comments for the betterment of the Academy. Editor- NESA Newsletter.

RELEVANCE OF TRADITIONAL WATER BODIES IN THE PRESENT TECHNOLOGICAL ERA

Anup Kumar

Haryana Space Applications Centre (HARSAC),
Front Office-HARSAC, DST,Bays 35-38,Sector-2,
Panchkula-134112, Haryana
Email: anup0106@yahoo.com

Water bodies like ponds and lakes are very important for local biodiversity. These traditional water bodies act as a base for initiation of local biodiversity. Village ponds are very important for fulfilling local needs of water for day to day works. In the present days these water bodies are under negligence because of available modern sources of exploration of water for day to day uses. But it is clear that traditional water bodies sustaining from ancient times and fulfilling the needs of human and other living beings and still these are relevant. The need of the hour is to save and manage these water bodies for wellbeing of livings. There are number of significances of traditional water bodies, few of them are given below:

- **Biodiversity spot:** Water bodies are biodiversity spot where plants, birds, animals and human beings interact each other and maintain an ecological balance in the area.
- **Recreation site:** Water bodies are recreational sites for human, birds, animals and aquatic organisms.
- **Fishing:** Water bodies can be used for fish culture which maintains ecological balance and cleaning of water bodies.
- **Food (aquaculture):** Besides fishing water bodies can be used for other aquatic foods likes prawns and food plants (singhara).
- **Recharging of groundwater:** Water stored in water bodies can recharge groundwater which maintain groundwater level in nearby wells as well as soil moisture.
- **Rainwater harvesting site:** Rainwater can be harvested in water bodies which can be used in lean period for day to day work.

- **Manure:** Mud of the water bodies is a source of many nutrients that can be used as manure in the agriculture fields.
- **Religious importance:** Water bodies have religious importance in many festivals and water bodies are worshipped.
- **Carbon dioxide absorber:** Water bodies are absorber of carbon dioxide, thus, reducing carbon dioxide in the environment.
- **Habitat of birds/amphibians/aquatic plants/aquatic small organisms:** Water bodies are the home of many birds/amphibians/aquatic plants/aquatic small organisms which maintain ecological setup in the area.
- **Micro-climate controller:** Water bodies maintain temperature and air conditions, thus, control micro-climate in the area which maintains local biodiversity.
- **Medicinal plants:** Many medicinal plants grows nearby water bodies which can be used for treatment of diseases.
- **Migratory bird's habitat:** Water bodies are habitats of many migratory birds which help in breeding and sustaining ecological setup.
- **Irrigation source:** Water bodies can be used for irrigation in low water consuming crops/ horticulture.
- **Source of Local needs:** Water bodies can act as a source of water for fulfilling local needs like animal drinking water, bathing, cloth washing and construction work.
- **Interface between fresh and saline water:** In saline groundwater areas water bodies act as interface between fresh and saline groundwater and thus, providing fresh water in wells nearby the water bodies.
- **Employment:** Local people can earn livings by activities like fishing/water crops/desilting/recreation/boating/swimming in the water bodies.

These above mentioned little significance of traditional water bodies indicate that these water bodies are still relevant in the present technological era and their role cannot be ignored in sustaining water resoucrs but the need is to save these water bodies.



Acknowledgements: Google

CAN MONOCLONAL ANTIBODIES BE USED FOR TREATING CORONAVIRUS?

Prakhar Mathur, Christine Jeyaseelan

Amity Institute of Applied Sciences, Amity University, Noida.
Email: cjeyaseelan@amity.edu

Monoclonal antibodies are lab produced molecules used as a substitute for antibodies. These antibodies have previously been used in fighting diseases like rheumatoid arthritis and some cancer also. These mAbs are used to boost up immunity and hence are suggested to be most effective for coronavirus.

The viral particles enter the body through nose, mouth or eyes. Breathing, carries these particles to the respiratory tract, where protein of coronavirus locks into epithelial cells that line the respiratory tracts as well as those in air sacs in the lungs. When entered, they take over cell they reproduce and multiply and thus infect other cells. This leads the immune system to generate antibodies. The generated signals trigger chemicals *i.e.* cytokines and chemokines.

The inflammation generated produces mucus in nose to trap the virus particle. But in the case of coronavirus, it has more penetrating power. Hence the inflammation produces fluid which gets collected in lungs, and hence dry cough, a symptom of coronavirus. As air sacs get infected, it becomes hard for the lungs to extract oxygen, thus breathing problems.

Monoclonal antibodies are the best to be used for neutralizing the virus because of blocking ability and their specificity for antigens. Hence identifying and cloning followed by blocking mAbs that

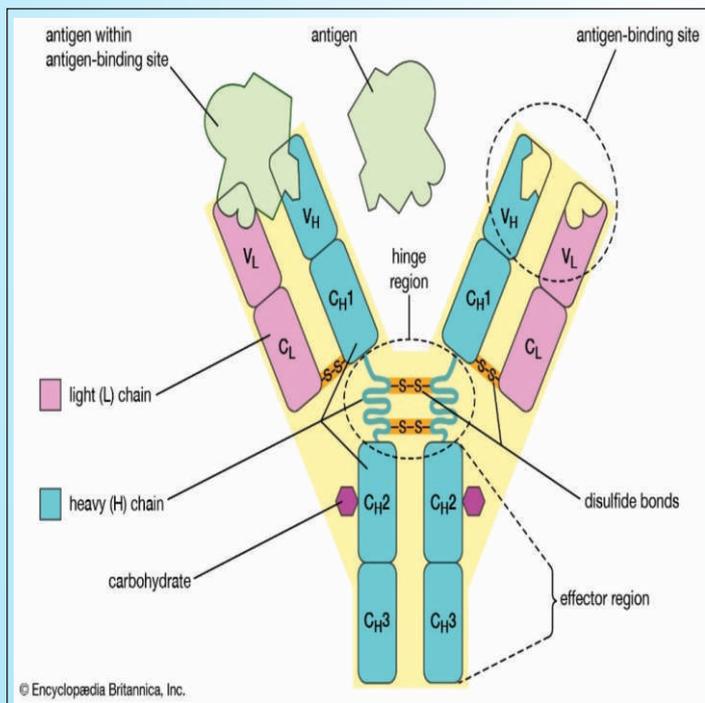


Image from Encyclopedia Britannica

can particularly target viral proteins to block the virus entry to host cells leads to preventing Covid-19.

The patients recovered from the disease may have developed immunity against the SARS-CoV-2 with the help of which an Anti

SARS-CoV-2 is developed. This can help the mAbs to target the virus. Some mAbs work by target therapy in which they have a specific target on which they aim, and attack. But some other mAbs act like immunotherapy because they make the immune system better to respond to allow the body to find and attack the virus.

There is a drug named Xolair (omalizumab) which is a recombinant DNA – derived humanized IgG1k monoclonal antibody that specifically binds to human immunoglobulin. The Omalizumab injection is used to decrease the number of asthma attacks in people with allergic asthma. When dust particles, pollens etc are breathed in, the body generates IgE (immunoglobulin E). This IgE attaches to the allergen and to the inflammatory cells, which leads to inflammation in the air sacs which leads to asthma. Hence, Xolair binds to IgE preventing it from binding to the inflammatory cell. Thus Xolair helps in reducing asthma attack. Similarly, the drug can also be used in case of coronavirus, by preventing it from binding instead Xolair binds with IgE.

This drug might be useful in curing coronavirus as in asthma also there is excess of mucus which makes breathing difficult and dry cough. Same thing happens in case of coronavirus and hence it might be useful with Covid -19

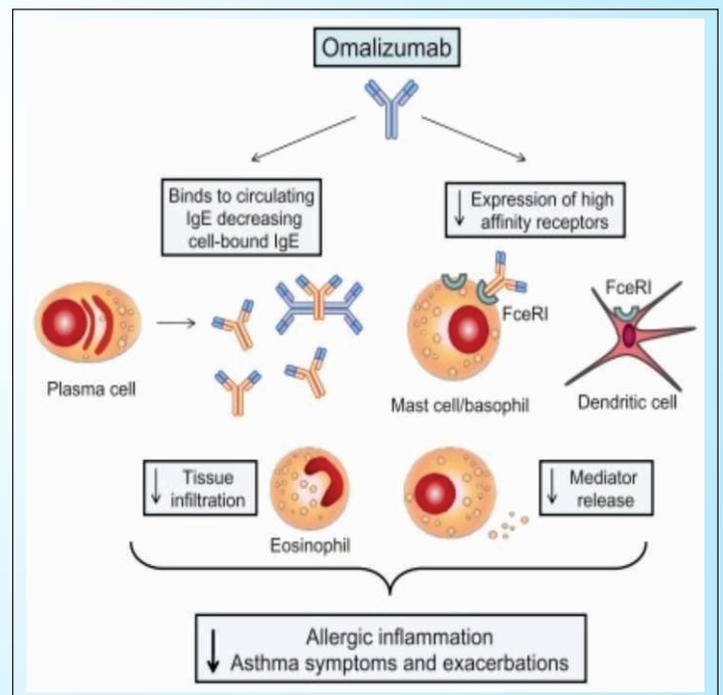


Image: Pelaia G et al, Journal of Asthma and Allergy, 4, 49(2011)

APPEAL TO LIFE MEMBERS

In the month of June articles are invited on the following special and important days viz., 5th June World Environment Day 8 June World Ocean day and 17 June World Day to Combat Desertification (This year the theme of World Environment Day 2020 is “Celebrate Biodiversity”. “With 1 million species facing extinction, there has never been a more important time to focus on biodiversity.” The articles for June edition can be submitted to nesapublications@gmail.com before 10th June, 2020.

Dr. R.S. Tomar
Editor-in-Chief, NESA E-newsletter

MEDICAL GEOLOGY: PUBLIC HEALTH IMPLICATIONS

V. Sunitha

Department of Geology, Yogi Vemana University

Kadapa, A.P, 516005

Email: Vangalasunitha@gmail.com

Introduction

Medical geology is an emerging discipline that, broadly defined, examines the public health impacts of geologic materials and geologic processes. The scope and range of medical geology include: (1) identifying and characterizing natural and anthropogenic sources of harmful materials in the environment; (2) learning how to predict the movement and alteration of chemical, infectious, and other disease-causing agents over time and space; and (3) understanding how people are exposed to such materials and what can be done to minimize or prevent such exposure. Emerging diseases can present the medical community with many difficult problems. However, emerging disciplines may offer the medical community new opportunities to address a range of health problems including emerging diseases. One such emerging discipline is Medical Geology. Medical Geology is a rapidly growing discipline that has the potential of helping the medical community in the Asia Pacific Region and elsewhere to pursue a wide range of environmental health issues. In this article we provide an overview of some of the health problems being addressed by practitioners of this emerging discipline. While the juxtaposition of the terms may be new, medical geology is really a re-emerging field.

In ancient China and India, minerals were understood to have healing as well as potentially deleterious properties. But the 20th century celebrated reductionist science, and now the term "medical geology" strikes many as novel. The definition of medical geology as the scientific discipline that examines the impacts that geologic materials and processes have on human and ecosystem health includes both natural and anthropogenic sources of potential health problems, and implies that wildlife and plant diseases are included. In contrast to the emphasis on treatment and cure that the term "medical" implies, work in this field is more accurately described as "public health" because of its focus on prevention. The consensus reached at a recent conference was that linguistic precision should be compromised in favor of a less burdensome and complex term than proposed alternates. The most accurately descriptive term for this field of research, hydro, biogeo, chemo, epidemio, pathoecology will not be used for obvious reasons.

NATURALLY OCCURRING DUSTS

Exposure to mineral dust can cause a wide range of respiratory problems. The dust can be generated by mining rocks or coal, sandblasting, and smoke plumes from fires (both natural and man-made) or simply from the wind dispersing fine-grained minerals from the earth's surface. Asbestos is a diverse group of minerals with several common properties; separation into long thin fibers, heat resistance, and chemically inertness. In the 1980s the U.S. medical community recognized that exposure to respirable asbestos fibers can cause severe health problems including mesothelioma, lung cancer, and asbestosis. Hence, many commercial asbestos mines were closed and a concerted effort was made to remove asbestos from schools, work places, and public buildings. Unfortunately, the problem did not end there. Recently, it was found that small amounts of asbestos

associated with commercial deposits of vermiculite, a micaceous mineral used for insulation, packaging, kitty litter, and other applications, has caused significant health problems in the mining community of Libby, Montana, USA. Lung abnormalities (such as pleural thickening or scarring) occurred in about 18 percent of the adults tested.

DISEASES DUE TO TRACE ELEMENT DEFICIENCIES

Iodine

The connection between geologic materials and trace element deficiency is well documented for iodine. Iodine Deficiency Disorders (IDD) includes goiter (enlargement of the thyroid gland), cretinism (mental retardation with physical deformities), reduced IQ, miscarriages, and birth defects. In ancient China, Greece and Egypt as well as among the Incas, people affected by goiter, were given seaweed to provide the needed iodine. Goiter is still a serious disease in many parts of the world. China alone has 425 million people (40% of the world's population) at risk of IDD. In all, more than a billion people, mostly living in the developing countries, are at risk of IDD. In all the places where the risk of IDD is high, the content of iodine in drinking water is very low because of low concentrations of iodine in bedrock.

Selenium

Selenium is an essential trace element having antioxidant protective functions as well as redox and thyroid hormone regulation properties. However, selenium deficiency (due to soils low in selenium), has been shown to cause severe physiological impairment and organ damage such as a juvenile cardiomyopathy (Keshan disease) and muscular abnormalities in adults (Kashin-Beck disease). In the 1960s scientists suspected that these diseases were of geological origin, and in the 1970s the probable solution was found. These diseases were always located in areas with low selenium soils. The use of dietary selenium in the prevention and treatment of these diseases has been a great success. The occurrence of low selenium is thought to contribute to other illnesses including impaired reproduction, various cancers, infectious diseases, and, due to its antioxidant properties, rapid aging. Also, metabolic selenium combined with other trace elements appears to promote good health. For example, the ratio of selenium to arsenic in the body can modulate the toxic effects of either element alone. The effects of Se intake on as methylation have only been recently studied in epidemiologic studies of As exposed individuals

Fluoride

Over-exposure to trace elements in geologic materials is responsible for toxicity effects in humans and animals. One of the most studied trace elements in this regard is fluorine. The fluoride ion (F⁻) stimulates bone formation and also reduces dental caries at doses of at least 0.7 mg/L in drinking water. However, excess fluoride (>1 mg/L) exposure can cause fluorosis of the enamel (mottling of the teeth) and bone (skeletal fluorosis).

Dental Fluorosis:

Generally ingestion of water having a fluoride concentration above 1.5 – 2.0 mg/l may lead to dental mottling, an early sign of dental fluorosis which is characterized by opaque white patches on teeth. In advanced stages of dental fluorosis, teeth display brown to black staining followed by pitting of teeth surfaces. Dental fluorosis produced considerable added dental costs (tooth deterioration) and significant physiological stress for affected population. Dental fluorosis is endemic in 14 states and 1, 50,000 villages in India. The problems are most pronounced in the states

of A.P., Bihar, Gujarat, M.P., Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh Types of mottling are shown in Figure 1.

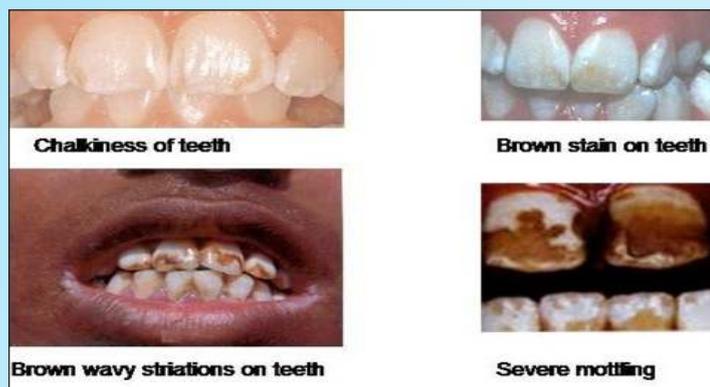


Figure 1: Types of Mottling.

Skeletal Fluorosis:

Skeletal fluorosis may occur when fluoride concentrations in drinking water exceed 4-8 mg/l, which leads to increase in bone density, calcification of ligaments rheumatic or arthritic pain in joints and muscles along with stiffness and rigidity of the joints, bending of the vertebral column and excessive bone formation or osteosclerosis, a basis symptom of skeletal Fluorosis. Crippling skeletal fluorosis can occur when a water supply contains more than 10 mg/l is shown in Figure-2.



Figure 1: Types of Mottling.

Asbestos

Asbestos is the name for a group of naturally occurring silicate minerals that can be separated into fibres. The fibres are strong, durable, and resistant to heat and fire. There are several types of asbestos fibres, of which three have been used for commercial applications: Chrysotile, or white asbestos, comes mainly from Canada, and has been very widely used in the U.S. It is white-gray in colour and found in serpentine rock. Amosite, or brown asbestos, comes from southern Africa. Crocidolite, or blue asbestos, comes from southern Africa and Australia. We selected “asbestos” as a whole, since it has been studied as a key mineral for its properties as a dangerous fibrous silicates. Dusts from other silicates show similar occupational health impacts, but have not achieved the notoriety of asbestos. Asbestos mining internationally has been found to create occupational health risks for miners and mineworkers in related processing industries.

CONCLUSION

The objectives of Medical Geology are to identify harmful geologic agents, determine the conditions of exposure that promote deteriorating health conditions, and develop sound principles, strategies, programs and approaches necessary to eliminate or minimize health risks. Interaction and communication is necessary between the geosciences, biomedical, and public health communities to protect human health from the damaging

effects of physical, chemical and biological agents in the environment. We recommend that Medical geology be included in higher education curricula so that students will be aware of the connection between geology and health and encouraged to pursue a career in Medical Geology.



Figure 3: Chrysotile Asbestos

The rapidly emerging scientific discipline of Medical Geology holds promise for increasing our environmental health knowledge base, and contributing to substantial tangible improvements in the well-being of the global community. An important task is to foster acceptance of the sub discipline medical geology. This may facilitate support for research by raising awareness among funding agencies and decision-makers. The general public must be educated on the value of this field, not only for its promise of finding practical, effective solutions to serious public health problems, but because people can encourage their elected leaders to champion this important cause.

**National Environmental Science Academy
Publishing's Response to COVID-19**

14 May 2020

Like many of you and other organizations, National Environmental Science Academy Publishing Team is also closely monitoring the progression of the COVID-19 pandemic. We are following the instructions of our public health authorities to help slow the spread of COVID-19, and all our staff is now practicing social distancing by working from home. We are continuing our core operations and taking the necessary steps to meet the needs of our global network of authors, customers, and stakeholders to the extent that is within our control. As of now it is not clear what long-term impacts of COVID-19 will have on universities, libraries, and our content users, we are committed to working with them through these difficult times to ensure that the science in our journals continues to be disseminated to those who depend on it.

We are encouraged by the compassionate support among the research, staff and publishing teams. Our aim and vision of a world where everyone is empowered by science feels true at this time and we remain committed to protecting and instilling trust in scholarly research.

Please do not hesitate in providing suggestions and improving our publication strategies.

On behalf of everyone at National Environmental Science Academy our heartfelt thoughts go out to all those impacted by COVID-19.

Please take care of yourselves and each other.

Sincerely,

RS Tomar and Sushma Tiwari
Editorial Board, NESA

Gian Kashyap
Publication Head, NESA

Prof. Javed Ahmad
President, NESA

CEREMONIAL USE OF HONEY OF STINGLESS BEES (HIMENOPTERA: MELIPONINI) IN THE YUCATAN PENINSULA, MEXICO

J.F. Martínez-Puc^{1,2}, W. Cetzal-Ix^{2*}, S.K. Basu³, and M.A. Magaña-Magaña¹

¹Tecnológico Nacional de México/Instituto Tecnológico de Conkal, Yucatán, México. ²Tecnológico Nacional de México/Instituto Tecnológico de Chiná, Campeche, México.

³PS, Lethbridge AB Canada. *rolito22@hotmail.com



In Mexico there are four areas where the stingless bees (SB) were cultivated (meliponiculture) in the 16th and 17th centuries; 1) the Yucatan Peninsula (YP), 2) the Gulf of Mexico Coast, 3) the Pacific coast, and 4) the Balsas River Basin in the states of Guerrero and Michoacán. However, meliponiculture

developed mainly in the YP, with the Mayan culture, because they established interesting management processes such as nests housed inside logs known locally as “jobones”. The Mayans in the YP preferably used for the production of honey and wax the bees *Melipona beecheii* and *Scaptotrigona mexicana*. The honey and wax produced was marketed to other regions, such as Guatemala and Honduras, since this product was part of the sociocultural, food, medicinal, ritualistic and commercial customs of many indigenous peoples.

Currently, three Mayan codices are preserved, known by the name of the city where they are protected: Dresden (Germany), Paris (France) and Madrid (Spain). The Madrid codex, also called Tro-Cortesianus, contains a section related to meliponiculture, exhibits clear scenes on how to cultivate and reproduce bees, according to how the Mayans practiced it (stylized images of bees and gods); this deals with bees *M. beecheii*, honey, the gods of the bees, instead of

this deals with bees *M. beecheii*, honey, the gods of the bees, their nests and their jobs appear, represented with forty-seven glyphs of bees and queen bees and with little differences between them. The cultivation of SBs was very intense in the past in the region, in such a way that there were guardian and protective gods of these bees such as Ah-Mucen-Cab, whose image of the god can still be seen in the buildings of archaeological sites in Tulum and Cozumel in Quintana Roo, Mexico.

The cosmogonic remnants that surround the ritual practices dedicated to SBs in Mexico, are particularly documented from the YP. Some examples are the ceremony of the *U Jaanlikab* (the food of the bees) and the *U jeetsluumilkab* (the ideal conditions for the production of honey). Both rituals are performed in order to promote good weather and good blooms in the field for the following honey harvest season. Likewise, there were ceremonies where the Mayans asked for protection and care of the cornfield. The rituals are accompanied by offerings of drinks such as the “*sakab*” (drink made with corn and honey from *M. beecheii*), and *báalche* (fermented drink from honey from *M. beecheii* and the bark of the *balché* tree (*Lonchocarpus longystilus*)).

Finally, with the Spanish conquest in Mexico, they demanded the delivery of honey and other products of the SBs as tribute, the Mayan production system underwent gradual changes as it displaced labor from traditional activities to new ones. More recently, the introduction of extensive livestock farming also started a gradual process of disappearance of the forests, which increased with the appearance of monoculture of henequen and sugar cane; with the disappearance of the jungle, the nesting spaces and food sources of the SBs also became scarce, thus affecting their populations. For this reason, it is important to rescue the cultural wealth of the Mayans in the YP, since it is an important part of our history and culture, and it is necessary to foster breeding and generational replacement of meliponiculture.

Acknowledgement

Project FORDECYT (304952) “Consolidación de la Unidad de Conservación de Flora Nativa de la Península de Yucatán: estrategia para integrar y promover el conocimiento etnobotánico con fines de investigación, formación de recursos humanos, conservación, uso y manejo sustentable”.



COVID-19 AND CLIMATE CHANGE

Malti Goel

President, Climate Change Research Institute

S-83 Panchshila Park, New Delhi 110017

E-mail: maltigoel2008@gmail.com

The whole world is taken aback by COVID-19. The new coronavirus case at Wuhan, China was first reported by World Health Organization (WHO) on 31st December 2019. In India first case was reported in Kerala on 30th January 2020. The WHO acknowledged it a health emergency and on 11th March[1], declared it a pandemic. The new coronavirus disease named as COVID-19 is a zoonotic disease. Zoonotic diseases already comprise roughly 70 percent of all human infections. In 2007 WHO had warned that emerging infectious diseases are becoming a growing threat in the face of increasing urbanization, antimicrobial resistance and climate change. In 2003 outbreak of SARS-CoV – Severe Acute Respiratory Syndrome coronavirus created havoc. Middle East Respiratory Syndrome (MERS) virus and Zika virus, a mosquito-borne virus caused other epidemics invaded Middle East and many Asian countries in 2015-16.

A lot has changed with the new coronavirus SARS-CoV2 leading to COVID-19. Lockdown across the world and social distancing are the ways to stay safe. All mobility came to a stop. With 212 countries under the grip of virus, More than three lakhs deaths have been reported in last four months. It is shown that about 80% of infected people get mild to moderate disease, while 14% have severe symptoms and 6% have life threatening episodes of respiratory failure or organ failure. Among the vulnerable population children made up of 2% of the cases, not got severely ill, but aged population above 80 were affected the highest 22%.

A number of studies are appearing about investigating climate change relationship with COVID-19. In this article we examine the atmospheric science and climate change linkages with this global COVID-19 epidemic. The three pronged approach of nexus between COVID-19 and climate could be in terms of (i) Environment, (ii) Weather & climate and (iii) Climate change.

(i) Linkage with Environment

Most attention grabbing finding about the environment linkage is that as a result of stay home with the pandemic COVID-19 outbreak; the streets, water bodies and the air all are much cleaner than what we can imagine in our dreams. This year water quality of the rivers *Ganges* and *Yamuna* has improved at an incredible level. Himalayan Ranges are visible from a distance of 200 km. More emphasis has been given to air quality in the world's most polluted and busiest cities and it is seen that pollution has dropped like never before. Many cities that had high pollution level are seeing remarkably less air pollution and are breathing clean air. Urban Tree leaves are green and no longer laden with dust and pollution.

NASA pictures released in early March clearly showed that according to the calculations made by the Center for Research on Energy and Clean Air the greenhouse gas emissions in the atmosphere had come down by 25% in the month of February when COVID-19 was at the peak in Wuhan, in comparison to the same period last year. At the same time is no coincidence that NCR of Delhi in India has suffered three earthquakes, though of low intensity, during this period.

Good news about lock down is about energy saving. With closure of offices and industry, the electricity 'peak demand' had fallen by

25% on average after March 22 in India, the day India began fight against COVID-19 with *Janta Curfew*. The NTPC has recently reported that the demand for power has reduced by as much as 45%. By stopping the use of personal cars and other transport means, oil consumption has fallen significantly. Oil is the energy resource which our country imports as much as 85% to meet mainly transport needs. We can save on our imports bill, by investing in renewable energy and avoiding unnecessary travels.

(ii) Weather and Climate and COVID-19

The second is, its connection with weather & climate that might be having a role in the growth of virus. Although the origin of corona virus is yet to be ascertained and whether it is natural or man-made, is a topic of high debate, it was believed that with the coming of summer, COVID-19 might also stop, as is the case with many other viruses, including the common cold, bird flu or influenza occurring during the colder months. Cold weather and humidity are favored by the viruses and as the minimum temperature starts rising above 25-26°C, it starts becoming ineffective. But nothing is proven yet for the new corona virus.

(iii) COVID-19 and Climate Change

Are COVID-19 and climate change impacts linked in any way? The climate change and COVID-19 may not have same origin, but both are global crises and have produced disaster over Homo sapiens. One line of thought is that climate change has led to many wildlife species migrating toward higher altitudes. This potentially is putting animals in contact with new diseases to which they haven't evolved resistance. The change in migratory patterns of the animals could lead to a lower respiratory system in animals. With the environmental devastation these microorganisms which animals host are now being transferred to humans. Bat has been associated with the cause of new coronavirus.

Another theory is that according to findings of Ohio State University scientists from a study of two ice cores extracted from Guliya Ice Cap, northwestern Tibetan Plateau, China and using gene-sharing network is that melting of glaciers giving rise new species of viruses[2]. They found that the microbes differed significantly across the two ice cores, presumably representing the very different climate conditions at the time of deposition. These viruses and bacteria trapped from thousands of years and are still present in the glaciers although in a dormant state. As global temperature raises the re-emergence of ancient viruses threatens present day species lacking immunity to these old world pathogens.

To conclude, with the ongoing debate on whether COVID-19 is natural or man-made, one thing is for sure that in addition to non-communicable diseases and vector borne diseases, viral outbreaks of similar nature would become more common in future with the progression of the climate crisis.

References

1. **Cucinotta D, Vanelli M.** WHO Declares COVID-19 a Pandemic, *Acta Biomed.* 2020 Mar 19;91(1):157-160. doi: 10.23750/abm.v91i1.9397.
2. **Zhi-Ping Zhonga, et. al.,** Glacier ice archives fifteen-thousand-year-old viruses, Jan 2020, <https://www.biorxiv.org/content/10.1101/2020.01.03.894675v1.full.pdf>, Preprint accessed on 11.3.2020

From the Editor's

Dear Readers,

I wish my warm wishes!!

In May issue, we recount the articles published from authors from diverse field to recount the status on various activities related to International Biodiversity Day. This issue includes Annual awards by Academy for its members actively involved in their field or events and activities organised by the Academy. NESA is well known for its environmental awareness activities.

I express my sincere and huge thank to all the persons who contributed writing the wonderful and inspiring articles, without which there wouldn't have been this newsletter issue. Please continue sharing such articles and share with your friends also. I would like to thank President and General Secretary, NESA, New Delhi, and the Editorial team including Print, Designer and Publication committee for their nonstop support and efforts throughout this edition.

The month of May witnessed special days i.e. May 11, National Technology Day; May 15, National Endangered Species Day; May 18, World AIDS Vaccine Day; May 22, International Day for Biological Diversity (The theme for 2020 is "Our Solutions are in Nature". The theme aims to show that biodiversity remains the answer to several sustainable development challenges that the world faces) and May 31, Anti-Tobacco Day.

We hope this edition makes an interesting read. Please feel free to offer any suggestions for improvement.

Dr. Sushma Tiwari
Associate Editor

Dr. R. S. Tomar
Editor-in-Chief

**HERO DOCTORS AND NURSES
HEALING THE WORLD STAY SAFE
INFECTIOUS PREVENTION
STAY HOME SAVE LIVES**



To, _____

Vol. 23 Issue - 05 (Monthly)

May 2020

From
NATIONAL ENVIRONMENTAL SCIENCE ACADEMY
206 Raj Tower -1, Alaknanda Community Centre,
New Delhi -110019. Ph.: 011-2602 3614
E-mails: nesapublications@gmail.com; nesapub@yahoo.co.in



INVITATION OF RESEARCH ARTICLES for PUBLICATION in NESA Journals

INTERNATIONAL JOURNAL ON AGRICULTURAL SCIENCES

ISSN NO. 0976-450X | NAAS RATING 2.60

INTERNATIONAL JOURNAL ON ENVIRONMENTAL SCIENCES

ISSN NO. 0976-4534 | NAAS RATING 3.06

INTERNATIONAL JOURNAL ON BIOLOGICAL SCIENCES

ISSN NO. 0976-4518 | NAAS RATING 3.14

INTERNATIONAL JOURNAL ON CHEMICAL SCIENCES

ISSN NO. 0976-4526

INTERNATIONAL JOURNAL ON PHYSICAL SCIENCES

ISSN NO. 2230-9683

INDIAN JOURNAL OF UNANI MEDICINE

ISSN NO. 0974-6056

These JOURNALS ON DIFFERENT SUBJECTS are being published by this Academy. Send your manuscripts for peer-review by e-mail. **THE AUTHORS MUST MENTION ADDRESS, Contact Nos. and E-MAIL ID** in their forwarding letter. Proof will be sent for correction before publishing. A pledge for originality will be signed by the authors. Five sets of reprints will be dispatched within 30 days after the receipt of the PROCESSING FEE. alongwith a press print soft copy of final version of manuscript. All remittances are to be sent by a crossed Bank Draft in favour of **NATIONAL ENVIRONMENTAL SCIENCE ACADEMY** payable at **NEW DELHI**.

For further details and **NOTES FOR AUTHORS**,
please contact Academy at
nesapublications@gmail.com nesapub@yahoo.co.in