PROCEEDINGS
OF THE

107TH INDIAN SCIENCE CONGRESS

Bangalore, 2020

PART II
SECTION OF ENVIORNMENTAL SCIENCES

President: Dr. Ranbeer Singh Rawal

CONTENTS

107TH INDIAN SCIENCE CONGRESS

January 3-7, 2020, Bangalore

I

PRESIDENTIAL ADDRESS

President: Dr. Ranbeer Singh Rawal

PRESIDENTIAL ADDRESS

A01: INTEGRATING SCIENCE & TECHNOLOGY IN RURAL TRANSFORMATION -CASE IN POINT INDIAN HIMALAYAN REGION

Ranbeer S. Rawal

Director, G.B. Pant National Institute of Himalayan Environment & Sustainable Development (GBPNIHESD), Kosi-Katarmal, Almora 263 643, Uttarakhand
Email: psdir@gbpihed.nic.in

Dignitaries, colleagues, dear students, ladies and gentlemen, on behalf of the Environmental Sciences Section, thank you for taking the time and effort to join us here in this 107th session of Indian Science Congress. Am privileged and honoured to deliver this presidential address to make a justice with the purpose that has attracted all of us here. My attempt here is not to take a deep-dive in science and technology that is the domain of you all, rather I wish to emphasize upon possibilities of integrating S&T for Rural Transformation. I admit, this address does not include any new idea, but it attempts to highlight that path for improved quality of life of India's rural people passes through S&T interventions. As my area of operation is in Himalaya, a predominantly rural landscape, the specific examples cited herein have been drawn from this region only.

Ladies and gentlemen, in spite of unprecedented rate of urbanization in recent decades, India still remains a predominantly rural society. Census 2011 has revealed 68.8% of country's population and 72.4% of workforce inhabits rural areas. However, the urban population in the country grew at the rate of 2.76% per annum during 2001-2011. Over the years, the urbanization has increased from 25.7% in 1991 to 31.14% in 2011. Therefore, India with large population and rapid urbanization rate is blamed as major contributor to urban explosion in Asia, and thereby affecting Asian development in the 21st century (Kundu, 2011).

Further, accelerated but unplanned rural to urban migration in search of better livelihoods is often held responsible for (i) growing pressure on urban amenities, and (ii) forcing huge number of youth from rural areas to live in unhygienic and deprived conditions of urban slums. Therefore, need to effectively reduce migration from rural to urban areas is being felt. This would require improving socio economic conditions of rural populace by way of creating employment opportunities in rural areas. The improvement in economic conditions of rural households is also essential for reducing the disparity in per capita rural and urban income, which has remained persistently high. This calls for rural transformation across the country.

Rural transformation is a proactive and positive process of change and development of rural communities in the context of national and global social and economic changes (Long, Zou, Pykett, & Li, 2011; Wang, Khan, & Zhang, 2013). It involves bringing features of urban environments into rural settings, changes to systems and processes that favourably impact rural people's standard of living and livelihoods. Rural transformation is a more dynamic concept than rural development as it embodies a transformation in people's perspective on life (Shaw, 2011). It is usually characterised by changes in civic amenities, female literacy, gender ratio, employment structure, agricultural intensity, crop selection pattern, farm income, labour productivity and major improvements in rural housing and economic and social conditions resulting from industrialisation and urbanisation (Kurien, 1980; Ravallion & Datt, 2002) Rural transformation is a proactive and positive process of change and development of rural communities in the context of national and global social and economic changes (Long, Zou, Pykett, & Li, 2011; Wang, Khan, & Zhang, 2013). It involves bringing features of urban environments into rural settings, changes to systems and processes that favourably impact rural people's standard of living and livelihoods. Rural transformation is a more dynamic concept than rural *Ladies and gentlemen,* in spite of unprecedented rate of urbanization in recent decades, India still remains a predominantly rural society. Census 2011 has revealed 68.8% of country's population and 72.4% of workforce inhabits rural areas. However, the urban population in the country grew at the rate of 2.76% per annum during 2001-2011. Over the years, the urbanization has increased from 25.7% in 1991 to 31.14% in 2011. Therefore, India with large population and rapid urbanization rate is blamed as major contributor to urban explosion in Asia, and thereby affecting Asian development in the 21st century (Kundu, 2011).

Further, accelerated but unplanned rural to urban migration in search of better livelihoods is often held responsible for (i) growing pressure on urban amenities, and (ii) forcing huge number of youth from rural areas to live in unhygienic and deprived conditions of urban slums. Therefore, need to effectively reduce migration from rural to urban areas is being felt. This would require improving socio economic conditions of rural populace by way of creating employment opportunities in rural areas. The improvement in economic conditions of rural households is also essential for reducing the disparity in per capita rural and urban income, which has remained persistently high. This calls for rural transformation across the country.

Rural transformation is a proactive and positive process of development that favourably impacts quality of life of rural people. It is usually characterised by changes in civic amenities, female literacy, gender ratio, employment structure, agricultural intensity, crop selection pattern, farm income, labour productivity and major improvements in rural housing and economic and social conditions resulting from industrialisation and urbanisation (Ohlan, 2016). While agriculture and related informal sector activities form major employment for rural people, they are also characterised by a disproportionately low share (both receive and contribution) in gross domestic product and poor ranking in various development indicators. For instance, human development index and life expectancy in Indian states decreases with increase in rural population. Likewise, infant mortality, unsafe delivery, population below the poverty line and hunger index are directly and proportionally related to increasing rural intensity (Ohlan, 2016).

Despite being one of the fastest growing global economies, India is still home to the largest concentration of poor people in the world. Most of them live in the rural areas with poor access to education, health, roads and electricity. This is resulting in increased rural distress which is a reflection of (i) growing inequality associated with the fast pace of growth, and (ii) lack of opportunities in rural areas. Rural distress is both a cause and effect of India's structural transformation and fast pace of growth. Over 40% of total employment in India still comes from the agriculture sector as compared to <20% in China, and <2% in the US. People in rural areas depend on agriculture because of poorly available alternative employment opportunities. There is room for improving agricultural productivity, but this is not a substitute for a faster pace of rural structural transformation that India needs to improve the quality of

life (Ghani, 2019). Declining importance of agriculture in development is an integral part of an inclusive growth process. This is evident, during last four decades, Indian rural output has increased by almost seven times (Rs. 3,199 billion to Rs. 21,107 billion at 2004–05 prices) but the share of agriculture in rural income has reduced from 72.4% to 39.2% (Chand, Srivastava & Singh, 2017). Traditionally, the pathways from agriculture to nutrition have largely assumed farming as the most important means to access food in rural economies. However, greater shares of households in rural India now rely on markets to access food. Evidences suggest that 88% of farming households rely on some form of non-farm income sources to sustain their livelihoods (Chandrasekhar & Mehrotra, 2016). Therefore, the issue of rural transformation requires to be looked into with more balanced view of finding ways through (i) the most prominent and traditional sector of rural employment - the agriculture, and (ii) alternative opportunities of employment/livelihoods through non-farm activities.

India's Initiatives for Rural Transformation

Realizing the need, Government of India in recent years has taken several initiatives towards fostering socio-economic changes for quality of life improvement in rural areas. Notable among these include:

- *National Rurban Mission (NRuM)*, which follows the vision of "Development of a cluster of villages that preserve and nurture the essence of rural community life with focus on equity and inclusiveness without compromising with the facilities perceived to be essentially urban in nature, thus creating a cluster of "Rurban Villages". The envisaged outcomes include: (i) Bridging the rural-urban divide-viz: economic, technological and those related to facilities and services; (ii) Stimulating local economic development with emphasis on reduction of poverty and unemployment in rural areas; (iii) Spreading development in the region; and (iv) Attracting investment in rural areas.

- *National Rural Livelihoods Mission (NRLM) - Aajeevika*. The Mission aims at creating efficient and effective institutional platforms of the rural poor, enabling them

to increase household income through sustainable livelihood enhancements and improved access to financial services. NRLM set out with an agenda to cover 7 Crore rural poor households, across 600 districts, 6000 blocks, 2.5 lakh Gram Panchayats and 6 lakh villages in the country through self-managed Self Help Groups (SHGs) and federated institutions and support them for livelihoods collectives in a period of 8-10 years.

- *Pradhan Mantri Gram Sarak Yojana (PMGSY)*. Considering that rural road connectivity and its sustained availability is a key component of rural development as it assures continued access to economic and social services and thereby generate sustained increase in agricultural income and productive employment opportunity, the government of India has launched this scheme. Phase III of PMGSY envisages consolidation of existing Rural-Road Network by up-gradation of existing Thorough Routes and Major Rural Links that connect habitation to: Gramin Agricultural Markets, Higher secondary schools and hospitals.

- *Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY)*. The vision is "Transform rural poor youth into an economically independent and globally relevant workforce". It is tasked with the dual objectives of adding diversity to the incomes of rural poor families and cater to the career aspirations of rural youth. As a part of the Skill India campaign, it plays an instrumental role in supporting the social and economic programs of the government like the Make In India, Digital India, Smart Cities and Start-Up India, Stand-Up India campaigns.

- *Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA).* An Act to provide for the enhancement of livelihood security of the households in rural areas of the country by providing at least one hundred days of guaranteed wage employment in every financial year to every household whose adult members volunteer to do unskilled manual work and for matters connected therewith or incidental thereto.

(Source- Ministry of Rural Development, GoI; https://rural.nic.in/)

The success of all these initiatives, however, requires interventions of science and technology. For example, the vision of "Rurban Villages" calls for developing a cluster of villages in a way to preserve and nurture the essence of rural community life without compromising with the facilities that are urban in nature. Achieving this vision is not possible without effective use of science and technology. While on one hand the essence of village life, which includes social relationships, self reliance, and harmonious linkages with surrounding natural resources, needs to be retained. On the other, it would require bringing urban amenities to these villages. Balancing this combination would depend on meticulous planning and implementation. Wherein science and technology would play increasing role.

In this context, the fast emerging Smart Villages concept in European Union (EU) can be cited as a possible best fit model. It refers to rural areas and communities which build on their existing strengths and assets as well as on developing new opportunities. In Smart Villages traditional and new networks and services are enhanced by means of digital, telecommunication technologies, innovations and the better use of knowledge, for the benefit of inhabitants and businesses. Digital technologies and innovations may support quality of life, higher standard of living, public services for citizens, better use of resources, less impact on the environment, and new opportunities for rural value chains in terms of products and improved processes. The concept of Smart Villages is territorially sensitive, based on the needs and potentials of the respective territory and strategy-led, supported by new or existing territorial strategies. (https://ec.europa.eu/agriculture/sites/agriculture/files/rural-development-2014-2020/looking-ahead/rur-dev-small-villages_en.pdf).

Derived from Mahatma Gandhi's vision of Adarsh Gram (ideal village), the Smart Village concept is frequently adopted by national, state and local governments of India as an initiative focused on holistic rural development. For instance, Sansad Adarsh Gram Yojana (SAGY), is a rural development programme broadly focusing upon the development in the villages that includes social development, cultural development and spreads motivation among the people on social mobilization of the village community. However, in most cases, due to poor integration of science and technology, this scheme is yet to achieve its objectives.

Another example can be drawn from the flagship programme MGNREGA. Creation of durable assets and strengthening of livelihood resource base of the rural poor is an important

objective of the scheme. In this context, the basic input required in selection of work site, designing, planning, layout, execution and maintenance of works, which can be ensured through effective use of available technology, such as Remote Sensing, Global Positioning System, and Geographical Information System (GIS). Likewise, the Natural Resource Management (NRM) activities under MNREGA need to take benefit of the existing scientific information on status, quality and accessibility of resource.

Kiran Karnik (2008) opined that science and technology need not to be spoken in the same breath. Technology generally (though not always) derives and draws from science, and often manifests itself in physical form. Science, on the other hand, is knowledge. In rural India, there is a dire inadequacy of both. Crop yields are, therefore, far lower than what they are in demonstration farms, where science and technology are adequately applied.

Realizing that agriculture is the mainstay of rural India, a new national policy to double farmers' income by 2022 has been launched. It targets poverty reduction, food security and climate change, which is hurting agriculture with rising temperatures, increasingly frequent floods and droughts, and a greater incidence of pests and diseases. In this context the Ministry of Agriculture & Farmers Welfare has launched a national scheme called Pradhan Mantri Krishi Sinchai Yojana (PMKSY) with the aim of irrigating every Indian farm and improving water-use efficiency. However, success of this initiative would largely depend how efficiently the knowledge and technologies are integrated.

The Himalayan Context

With slightly more than 16% of India's geographical coverage, the Himalaya is considered vital for ecological and economic security of India. This mountain has a special identity among mountains across the world. Especially the unparallel vertical gradient accompanied by its geo-dynamism makes the Himalaya most complex and highly variable. It covers nearly 0.75 million km^2 area (spanning over 3000 km in length, and 250-300 km in width, and rising from below 300 to above 8000m asl), that ranges from northern Pakistan on the west to northeastern regions of India. The region has a discrete geographic and ecological entity. It produces a distinctive climate of its own and influences the climate of much of Asia (Zobel & Singh, 1997). However, the variations in topographical features along three dimensional

frame work (i.e., latitudinal: South-North; longitudinal: East-West; altitudinal: Low-High) have resulted in enormous diversity in climate and habitats within the region (Palni & Rawal, 2013). The region is recognized one amongst the global Biodiversity Hotspots.

With geographical coverage of over 0.53 million km^2 area, the Indian Himalayan Region (IHR) constitutes a large proportion of the Himalayan Biodiversity Hotspot. The region represents nearly 4% of total human population of the country and exhibits diversity of ethnic groups (171 out of a total 573 reported scheduled tribes in India). The diversity of biophysical features in IHR is adequately represented through of 3 bio-geographical zones and 9 bio-geographic provinces. While considering economic development in mountains, it poses special problems on account of their inaccessibility and environmental sensitivity of their resources. This is much more true in case of Himalaya on account of its relatively younger age and consequent fragility that leads to high environmental and human risks that result from an indiscriminate use of its natural resources. Developmental models in vogue are mostly based on the plain landscape with settled ecological conditions and uniform resources base. Any variations on this model practiced in mountain areas are found only as a result of indigenous knowledge and practices and local adaptation by mountain communities and not of the efforts of planners and development policy-makers who have mostly failed to incorporate mountain specificities in their plans and programmes (Papola, 2014). In view of the uniqueness and sensitivity of Himalayan bio-physical and socio-cultural systems there is a need for integration of science and technology in a way to ensure both environmental conservation and sustainable development.

The IHR, predominantly a rural landscape, in recent decades has experienced unprecedented demographic changes with wide ranging ecological and economic consequences. The region has very unequal distribution of population with 80% of its area having negligible population and remaining 20% area has human population pressure beyond carrying capacity. Decadal growth rate indicates while population in IHR grew 28.3% during 1991-2001 (21.34% in India), the percentage sharply came down to 17.64% during 2001-2011 (17.34% India). Some districts in States like Uttarakhand, Himachal Pradesh and Nagaland have even shown negative growth. The another feature of demography in IHR is fast increasing urban population. As per 2011 census, the urban population has grown by 48.4% between 2001 to 2011 as

compared to 31.8% in India. During this period the rural population grew by 10.5% only. Urban population in some of the states likes Sikkim (153.4%); Tripura (76.1%); Nagaland (67.4%); Manipur (42.7%); Uttarakhand (41.9%) has grown exceptionally high compared to the national average growth. This is causing an alarming situation both for: (i) managing the boom of urbanization when proper Infrastructure and planning is not in place, and (ii) depopulating rural hamlets resulting in abandonment of agricultural lands.

As the present topic pertains to rural transformation, let me concentrate on the issue of depopulation of hill villages. The process of depopulation is rampant and requires immediate attention of all concerned. Take an example of Uttarakhand, where the severity of the situation can be gauged from the fact that 9 % of the villages of the state are virtually uninhabited. As per Census 2011, of 16,793 villages in Uttarakhand, 1,053 are not having any human population and another 405 have a population of less than 10 person. The number of such ghost villages has reportedly risen particularly after the earthquake and flash floods of 2013 (Venkatesh, 2016). In a recent study, Pathak et al. (2017) have concluded that (i) current extent of migration needs to be reduced in order to maintain the human-natural resource balance; (ii). rapid de-population has raised concerns about national security, loss of cultural heritage, maintenance of natural resources, unplanned rapid urbanization, etc.; and (iii) there is need for policy and programmes that not only meet the food requirements of the mountain population but also the health, education, employment and entertainment requirements. Another research in Nepal Himalaya (Paudel et al., 2018) has concluded that traditional farm focused land use practices have been changing towards tree dominated farm forestry systems in the rural landscape of Nepal wherein forests and tree cover has increased. Land use change was even pronounced in private lands where substantial areas under cultivation in 2000 were either converted into fallow land or partially covered by perennial plants, trees and bamboos in particular.

NITI Aayog (2018), Government of India, report has strongly advocated for new developmental narratives in the Himalaya wherein development must be fully embedded in the environmental, socio-cultural and sacred tenets. The report mentions, the uncontrolled demand-driven economic growth has led to haphazard urbanization, environmental degradation and increased risks and vulnerabilities, seriously compromising the unique values

of Himalayan ecosystems. The report also stresses that the roadmap for sustainable development of the Indian Himalaya needs to be in sync with the relevant Sustainable Development Goals (SDGs). Among others, the report underlines the significance of scientific research and innovative technologies for Himalayan development. It is emphasized that research and technologies need to focus on opportunities offered by mountain specificities. One key area where research needs to be strengthened is the blending of traditional knowledge on resource management and use with state-of-the-art science and technology.

The Himalayan development thus (i) has emerged as a priority, (ii) requires to be planned and implemented systematically, and (iv) needs to effectively integrate science and technology. In following pages, the possibilities and potential of science and technology towards rural transformation in the Indian Himalaya has been illustrated with some of the examples, largely based on the work conducted at author's organization.

(a) Agriculture and allied sector - In the Himalaya, subsistence agriculture remains the core of household economy. Food consumption is, therefore, both driving force as well as outcome of mountain livelihood systems and social organization. Given the alternative source of income, Himalayan communities remain essentially agricultural and farming systems, therefore, are the key determinants of household food security. What people eat depends largely on what they grow and raise in their surroundings. Seasonality of agriculture production affects local food availability and consumption. The traditional farming system in the region, especially in rainfed conditions, represents a true model of organic farming. Integration of livestock and diversity of crops is a major attribute of hill farming. The farmers ensure adequate supply of organic inputs to their fields from the surrounding forests. This system of nature based farming has evolved and flourished over millennia following trial and error approach.

As per the census of India 2011, nearly 15% of India's total rural population lives in the IHR states, which contribute to 8.7% of the country's total agricultural land and 15.7% of total number of estimated agricultural households. The major crops of IHR states are rice, wheat, potato, maize, onion, coarse cereals, bajra, *etc*., with the average food grain yield of 1680.58 kg/ha, much lower than the country's average (2984 kg/ha). IHR states cover 17.2% of total country's horticultural area and contribute for 18.6% of the country's total horticultural production including fruits, vegetables, flowers, aromatics, spices, plantations and honey.

These states respectively contribute 6.5% (milk), 9.1% (egg), 24.1% (wool) and 15.8% (meat) in the country's total production, respectively. Interestingly 20.4% of India's total fish production is from the IHR (Pandey & Arunachalam, 2020).

However, in recent times, hill farming system is in transition. Especially in response to diverse kind of changes, including climate, land use and the changing lifestyles, a range of modifications in traditional farming systems have taken place. All this has severely threatened the sustainability of hill farming and thereby compelling farm communities either to abandon agriculture or migrate to urban or peri-urban areas to seek off-farm job. This trend has raised serious concerns for the region. Among others, this phenomenon has resulted in considerable loss of genetic diversity that was prevalent in the form of land races. This scenario, therefore, calls for sincere efforts to conserve traditional agro-biodiversity based hill farming, which would require creation of new incentives, institutional arrangements, human capacity building and greater engagement of local people. In this context, there is a great scope to popularize and upscale the potential of traditional organic farming as a means of improving livelihoods, income and nutritional security of the hill farming communities. In this context, the role of science and technology can be gauged from the following examples:

- A global study by Garbaldi et al. (2016), wherein representative crops from three Indian Himalayan States - Sikkim (large cardamom), Uttarakhand (mustard), Himachal Pradesh (apple) were also included, revealed that the improvement of crop yield through enhancement of biodiversity may be a sustainable pathway towards greater food supplies. Such sustainable increases may be especially important for the 2 billon global people reliant on small farms, many of which are undernourished. In particular the study found that yield gaps could be closed by a median of 24% for fields less than 2 hectares through higher flower visitor density; this situation of small farm holders is prevalent across Himalaya. However, the efficacy of this approach is little known.

- The Himalayan mountains are known to be storehouse of many traditional and un-utilized crops. As the traditional crop diversity holds key to food security and sustainable agricultural development it is prudent to state that with enormous diversity

of traditional crops and their varieties, the Himalayan region holds key for sustainable agriculture development not only for the region but for the country as well. The credit goes to local farming communities who have been protecting this diversity since time immemorial. Even an investigation in a small watershed, such as Kuloor watershed in west Himalaya (Bungla et al., 2019), has provided enough evidences to establish that the traditional farming has contributed greatly for maintenance of enormous genetic diversity. However, the knowledge on such genetic diversity and its present and future value is grossly lacking across the Himalaya. Therefore, great scope exists for extensive research and knowledge generation in this aspect. In this context, the first ever Hindu Kush Himalayan assessment (Wester et al., 2019) underlined that with the shift of agricultural patterns from traditional multi-cropping to the commercialized mono-cropping of high-value commodities, the preservation of neglected and underutilized food crops (such as millet and buckwheat) can maintain genetic variety and increase food and nutrition security by offering higher resilience to climate change. Such efforts are vital, given increased climate risks and persistent malnutrition.

- The IHR is rich in medicinal plant diversity. Till date most of the raw material is coming from the wild. However, with changing laws and protection regimes accompanied by increasing global demand there is a need to bring these plants in cultivation. While efforts are on, there are big gap areas. This creates great opportunity for both science and technological interventions. For instance, propagation packages developed by various R&D organizations for high value medicinal plants now need to be transferred to farmer's field for cultivation packages development. The research being conducted on chemical and genetic constituents of Himalayan medicinal plants can prove greatly beneficial. A few examples are being cited here. Effects of genetic diversity and population structure on phenolic compounds accumulation in *Hedychium spicatum* have been explore by Rawat et al (2017). This study has opened a new doorway for genetic improvement and conservation priorities. Another study by Rawat et al (2016) on anti oxidant anti-microbial properties of some ethno-therapeutically important medicinal plants of IHR suggest that extract of these species can be used as natural anti-oxidant to reduce free radical mediated disorders and as alternative for food preserves. Likewise, the study on essential oil composition

and antioxidant activity in *Valeriana jatamansi* Jones (Rawat et al., 2016) recommends winter season for maximum essential oild yield and spring season for anti-oxidant activity. All such knowledge generated through research needs to be taken-up for effective use in farmer's field.

- Another least explored but highly potential group is wild edible plant diversity. Availability of over 1000 edible plants across the Indian Himalaya provides a great opportunity for widening the food base. More importantly the fast growing market of Nutraceutical and functional food can be effectively harnessed for benefit of rural populace. A study by Bhatt et al (2017) on nutraceutical potential of selected wild edible fruits in the Indian Himalayan region suggests that these species can be promoted as a natural source of antioxidants/nutraceuticals so as to use these antioxidants for supplementing dietary foods of mountain people. Likewise the study by Rawat et al (2014) on nutritional and antioxidant potential of selected vitality strengthening Himalayan plants has highlighted the possibilities of harnessing potential of such plants. An assessment of antioxidant properties in fruits of *Myrica esculenta* reveals that the consumption of this wild edible fruit helps in reducing free radicles. Therefore, this wild edible species deserves promotion in the region through horticulture and forestry interventions (Rawat et al 2010).

- Under the changing climate scenario, and when impacts being projected high in the Himalaya, the agriculture becomes the most vulnerable profession and faces a lot of challenges. Therefore, it is very important to make the Himalayan farmers' climate resilient (Arunachalam, 2014). The Task Force on Himalayan Agriculture led by the Indian Council of Agricultural Research (ICAR) has identified a few potential technologies for introduction in the Himalayan villages under the National Mission for Sustaining the Himalayan Ecosystem (NMSHE). A total of 14 such technologies/interventions have been recommended - Climate resilient crop/fruit varieties; Improved livestock, piggery, poultry and fish; Integrated farming system (IFS) models; *Jhum* improvement; *Jalkunds* and water harvesting structures; Water conveyance system; Raised and sunken bed technology (RSB); Live fish

transportation device; Azolla tanks; Superior quality endemic landraces; Zero till vegetable cultivation; Backyard poultry rearing; Climate resilient low-cost deep litter pig shelter; Vermi-composting tank (Pandey & Arunachalam, 2020).

- Many organizations have been promoting technological interventions for improving quality of life of hill farmers. Among others, it is pertinent to mention efforts of G.B. Pant National Institute of Himalayan Environment & Sustainable Development (GBPNIHESD) through its Rural Technology Centers (RTCs). These centers, across various establishments of the Institute, are functioning as major service centers to built the capacity of rural populace in adopting simple and eco-friendly technologies. These technologies are grouped under 4 major sectors: (i) Yield improving - polyhouse, poly-pit, poly tunnel, bio-compost, vermi-compost, drip irrigation, etc.; (ii) Income generating - cash crops, seasonal and off season vegetable cultivation, integrated fish farming, mushroom cultivation, bee keepng, waste land development, floriculture, nursery development, etc.; (iii) Livelihoods development - fodder and silvi-pasture development, multipurpose species plantations, agro forestry, bio fencing, alpana making, knitting and weaving, etc.; (iv) Other support technologies - water harvesting, bio-briquette and bio globules, zero energy cold chamber, PRA trainings, biomass based art promotion, etc.

(b) Non Farm Sector: Continual decline in agriculture's share in total output and employment over time has been experienced across country and Himalaya is no exception. As people move out of agriculture, household income and access to non-farm economic opportunities—rather than just farm-level production diversity or farm incomes—become equally important predictors of household food and nutrition security. This is driven by the fact that, as agricultural systems modernize and markets develop, there is an increasing separation between the production and consumption decisions of households (Pingali et al., 2019). With the non-farm sector is increasingly becoming more important for Indian rural economy, the country has begun to acknowledge rural employment as more than cultivation and agricultural labor. In the Himalaya, fragility of ecosystem, resource distribution in inaccessible areas and environmentally sensitive resource base severely limits the scope of a large scale industrialisation and widespread diversification of economy. Inadequate infrastructure, market linkages and lack of modern science based inputs and technology, insufficient entrepreneurship capability and risk bearing capacity among the local people further adds to this. All this calls

for finding opportunities beyond farming sector. Various options are available. My focus here is on sustainable rural tourism.

- The Himalaya is globally recognized destination for various kind of tourism activities. It provides valuable economic and business opportunities and jobs for local people. While there is great potential to harness the tourism assets of the region, there is an increasing realization that the tourism development pathway going forward needs to be different and build on sustainable development principles. NITI Aayog (2018), among others, has highlighted the role of research and technology in developing sustainable tourism in IHR (Box 1).

- However, while considering tourism as a potential sector for rural development, it is important to focus on promoting rural tourism especially surrounding the destinations over crowded with increasing mass tourism and religious tourism. For an example, pilgrimage tourism in Uttarakhand, in its present form, is impacting the local environment and posing several fundamental questions related to local employment, local economy, and overall-socio economic development of the area. In this context, as an effort by GBPNIHESD, the concept of rural tourism promoted targeting the whole rural landscape of upper Kedar valley having scenic beauty, lush green forests, alpine meadows and lofty snow clad peaks (Maikhuri et al., 2019). This form of tourism implies that village community has substantial control and involvement in management of all kinds of activities and programmes, and that the major portion of the benefits remains in hands of rural community itself. Home-stays in villages, nature treks, traditional food, local art and folk culture, farm activities and processed value added food items, etc., become the major ingredient of rural tourism development. All these activities require strong scientific and cultural knowledge base and appropriate technology interventions.

Finally, it is concluded that the opportunities of rural transformation through science and technology intervention are immense. We need to find out the appropriate interventions by way of contextualizing them to specificities and needs at different locations, and making efforts for engaging rural people. This would require integration of adequate awareness, training and skill building components. All this, falls within the priorities of Government. Therefore, making best use of opportunities available under Government of India initiatives is the best way-forward.

Box 1: Research/science and technology for Sustainable Tourism in IHR

1. Prepare Tourism Satellite Accounts for IHR: The TSA should show all aspects and types of databases and their collection procedures that show number and types of visitors and their contribution to the State's development through their expenditures. Subsequently a "One window On-line Information" on number of hotels, rooms available, tourist sites, parking places, traffic surveillance, quantum of waste, number of tour guides, and tour operators could be collated. Similarly, information on expenditures made on promoting sustainable tourism could be added (e.g. public schemes, private sector investments etc.).

2. A detailed survey of tourists should be carried out in the near future to elicit visitor perceptions on what services they are looking for and identifying the gap areas, which then becomes part of future planning and implementation plans for consumer/producer satisfaction.

3. Specific strategy for marketing off-season events and attracting year-round visitors should form a part of visitor services. Accordingly, demand-supply of natural resources can be planned.

4. Promote new opportunities and technologies to widen the spectrum of entrepreneurship and associated skills (digital technologies and local data management and use, agro-enterprise and link to tourism VC, waste management and local economy, local heritage conservation, destination carrying capacity, planning and monitoring, public safety and security during disasters and rapid reliefs and rescue, and community based ToT).

5. Support veterans from the Indian army, Assam Rifles and ITBP to establish adventure tourism based entrepreneurships. These veterans are specially trained to be deployed in difficult terrain (e.g. high altitude areas) and have specialized skills (e.g. mountaineering and jungle survival). These skills could help to promote safe adventure sports tourism in the country. 48 Sustainable Tourism in the Indian Himalayan Region

6. Document best practices on sustainable tourism especially from the aspects of sustained entrepreneurship, skill development and social security to develop or strengthen tourism circuits that focus on adventure sports, heritage, wildlife, religious/spiritual, wellness/ yoga/ aroma therapy/ naturopathy, handicrafts and handloom, and cultural festivals.

(Source: NITI Aayog, August 2018; Report of Working Group II Sustainable Tourism in the Indian Himalayan Region)

Acknowledgements: *Am thankful to ISCA for giving me this opportunity. The previous Presidents of Environment Sciences section, such as, Dr. M.G. Tewari, Dr. P.P. Dhyani, Dr Subrat Sharma, Dr. I.D. Bhatt, provided inspirational inputs. I thank them all. My sincere thanks are due to various sources from where the information has been freely drawn.*

References:

Anonymous (2018). A summary report contributing to sustainable development in the Indian Himalayan Region - key messages from five thematic reports and way forward. NITI Aayog, GoI, New Delhi.

Anonymous (2018). Report of working group II sustainable tourism in the Indian Himalayan Region. NITI Aayog, GoI, New Delhi.

Arunachalam, A. (2014). Climate resilience in Indian agriculture demands innovation and investment. Clim. Change Environ. Sustain. 2(1):67-68.

Bhatt, I.D., et al. (2017). Nutraceutical potential of selected wild edible fruits in the Indian Himalayan region. Food Chemistry 215:84-91.

Bungla, P.S., Rawal, R.S. & Tewari, L. (2018). Agri-diversity patterns and local food systems in Kuloor watershed of Kumaun, west Himalaya. Indu Book Services Pvt, Ltd., New Delhi.

Chand, R., Srivastava, S. K., & Singh, J. (2017). *Changing structure of rural economy of India implications for employment and growth*. New Delhi: NITI Aayog.

Chandrasekhar, S., & Mehrotra, N. (2016). Doubling farmers' incomes by 2022. *Economic & Political Weekly, 51*(18), 10–13.

Garbaldi, L.A., et al. (2016). Mutually beneficial pollinator diversity and crop yield outcomes in small and large farms. Science, 351: 388-391.

Ghani, E. (2019). Rural distress: why structural transformation is the only cure. Financial Express (Feb. 15, 2019), New Delhi.

Kiran Karnik (2008). Technology for Rural India. The Economic Times. (//economictimes.indiatimes.com/articleshow/2859967.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst).

Kundu, A. (2011). Trends and processes of urbanisation in India. IIED (London) and UNFPA (New York).

Maikhuri, R.K., et al. (2019). Promoting rural tourism in Kedar valley of Uttarakhand. GBPNIHESD Garhwal Regional Centre, Srinagar, Garhwal.

Mishra, S., & Rahman, A. (2019) Does non-farm income affect food security? Evidence from India. The Journal of Development Studies, 2019 - Taylor & Francis.

Ohlan, R. (2016). Rural Transformation in India in the Decade of Miraculous Economic Growth. Journal of Land and Rural Studies 4(2): 1–18.

Palni, L.M.S. & Rawal, R.S. (2013). The Himalayan biodiversity: richness, representativeness, uniqueness and life-support values. G. B. Pant Institute of Himalayan Environment and Development (GBPIHED), Almora.

Pandey, L. & Arunachalam, A. (2020). Potential technologies for climate resilient agriculture in Indian Himalayan Region. In P.S Goel et al (eds), Climate Change and the White World. Sprniger Nature Switzerland AG

Papola, T.S. (2014). Development of the Indian Himalayan states. 20th Pt. G.B. Pant Memorial Lecture, GBPIHED, Kosi-Katarmal, Almora.

Pathak, S, Pant, L., & Mahajan, A. (2017). De-population trends, patterns and effects in Uttarakhand, India – A gateway to Kailash Mansarovar. ICIMOD Working Paper 2017/22, Kathmandu, Nepal.

Paudel, M., et al. (2018). Linking land use and forestry transition with depopulation in rural Nepal. Banko Janakari, Special Issue No. 4

Pingali, P., et al. (2019). Transforming food systems for a rising India. Palgrave Studies in Agricultural Economics and Food Policy, https://doi.org/10.1007/978-3-030-14409-8_3

Rao, U.R (1994). Space for sustainable development with special emphasis on Himalayan Regions. 4th Pt GB Pant Memorial Lecture, GBPIHED, Kosi-Katarmal, Almora.

Rawat, S., et al (2010). Assessment of Antioxidant properties in fruits of *Myrica esclanta*: a popular wild edible species in Indian Himalayan Region. eCAM doi:10.1093/ecam/neq055.

Rawat, S., et al (2014). Assessmant of nutritional and antioxidant potential of selected vitality strengthening Himalayan plants. International Journal of Food Properties. 17: 703-712.

Rawat, S., et al. (2016). Anti oxidant anti-microbial properties of some ethno-theraputically important medicinal plants of Indian Himalayan Region. 3 Biotech 6: 154. DOI 10, 1007/s13205-016-0470-2.

Rawat, S., et al. (2016). Essential oil composition and antioxidant activity in *Valeriana jatamansi* Jones: influence of seasons and growing sources. Journal of Essential Oil Research. http://dx.doi.org/10.1080/10412905.2016.1189856

Rawat, S., et al. (2017). Effects of genetic diversity and population structure on phenolic compounds accumulation in *Hedychium spicatum*. Ecological Genetics & Genomics, 3-5: 25-33.

Venkatesh Shreeshan (2016). Why this abandoned village is a threat to Uttarakhand. Down to Earth

Zobal, D.B. & Singh, S.P. (1997). Himalayan forests and ecological generalizations. Bio Science, 47: 735-743.

107TH INDIAN SCIENCE CONGRESS

January 3-7, 2020, Bangalore

II

ABSTRACT OF

PLATINUM JUBILEE LECTURE

PLATINUM JUBILEE LECTURE

A02: NEW GENERATION SATELLITE REMOTE SENSING TECHNIQUES FOR VEGETATION SCIENCE

Hitendra Padalia

Head, Forestry and Ecology Department, Indian Institute of Remote Sensing (IIRS), ISRO, Dehradun

Email: hitendra@iirs.gov.in

Remote sensing includes the use of different wavelengths of electromagnetic spectrum to study vegetation properties. These wavelengths belonging to the optical, thermal and microwave region are being used to exploit information on the morphological, phenological, physiological and even genetic traits of vegetation through a range of proximal and distant active and passive remote sensing sensors. The most frequently derived information involves physiognomic and phenological types, greenness, leaf area, phytomass, productivity and, more lately, photosynthetic activity. The Indian Earth Observation Programme operates a variety of satellites, such as Resourcesat, Oceansat-2, Cartosat-3, RISAT-2B, HySIS to provide the required data with diverse spatial, spectral and temporal resolution of vegetation state monitoring (both terrestrial and aquatic) and quantitative retrieval of biophysical and biochemical parameters. Newer advances in microwave remote sensing sensors (NISAR-NASA-ISRO SAR mission, BIOMASS mission) will offers datasets suitable for estimation of higher levels of forest above ground biomass. LiDAR sensors *viz*., ICEsat-2 on-board satellite and GEDIon-board International Space Station (ISS) would provide high density LASER measurements for forest canopy height, structure and carbon stocks estimation. The recent advances in space-based spectrometers (GOME-2, OCO-2) provide data on Sun-Induced Fluorescence (SIF) with promising scope for early stress detection and productivity estimates.Similarly, sensors fitted with thermal channels such as EOSTRESS, VIIRS and the scheduled GISAT satellite are designed to improve forest fire surveillance and assessment.Advances in satellite remote sensing thus make it possible to derive Essential Climate Variables (ECVs) and Essential Biodiversity Variables (EBVs) from Earth observation data on the status of ecosystem and changes.

107TH INDIAN SCIENCE CONGRESS

January 3-7, 2020, Bangalore

III

ABSTRACTS OF SYMPOSIUM / INVITED LECTURES

KEYNOTE ADDRESSES

A03: ADVANCING SUSTAINABLE DEVELOPMENT GOALS BYRESTORING SOIL HEALTH OF INDIA'S AGROECOSYSTEMS

Rattan Lal

Carbon Management and Sequestration Center, The Ohio State University, Columbus, OH 43210 USA
Email: lal.1@osu.edu

With the present population of 1.35 billion and increasing at an annual rate of 17 million, the present per capita arable land area of India will decrease from 0.10 ha to <0.08 ha by 2050.Despite an impressive increase in food grain production from 50 million ton in 1950 to 285 million ton in 2018, 350 million people remain food-insecure and malnourished. The severe problem of soil degradation (i.e., erosion by water and wind, salinization, nutrient imbalance, and severe depletion of soil organic carbon concentration in the root zone) already affecting 147-174 Mha (45-53% of the total land area) is being exacerbated by the current and projected climate change. The finite cropland is also being diverted to non-agricultural uses including rapid urbanization, infra-structure development, industrialization, and brick making. India is also faced with the problems of environmental degradation characterized by the eutrophication and contamination of surface and ground waters, and pollution of air by industry and agricultural practices. The latter include unnecessary ploughing and puddling of fields, flood-based and wasteful irrigation, indiscriminate and inappropriate use of fertilizers and pesticides, in-field burning of crop residues, and use of agricultural residues as traditional biofuels rather than as soil amendments. Similar to the fate of the Millennium Development Goals, there are also severe challenges to accomplishing the Sustainable Development Goals. Rather than a problem, sustainable soil management and science-based agriculture must be the solution to addressing the perpetual problems of food and nutritional insecurity, soil degradation, water depletion and contamination, and air pollution. Replacing extractive farming by improved soil and water management practices can make agroecosystems a prominent sink of atmospheric CO_2 rather than source of greenhouse gases (CO_2, CH_4 and

N_2O).Restoring soil organic carbon concentration, from <0.1 % in the surface layer of many soils to the threshold level of 2% in the root zone, is also critical to advancing several Sustainable Development Goals (SDGs) of the United Nations. Important among those for which adoption of science-based soil management and improved agricultural practices are essential include SDG #2 (Zero Hunger), #6 (Clean Water and Sanitation),$13 (Climate Action) and #15 (Life on Land). Furthermore, farm income can be enhanced through payments to farmers for provisioning and strengthening of essential ecosystem services in accord with SDG #1 (End Poverty). Sequestration of atmospheric CO_2 as soil organic matter by retention of crop residues and recycling of biomass carbon is an important strategy to restore soil health and off-set anthropogenic emissions. Pertinent among improved agricultural practices which can restore soil health include conservation agriculture, cover cropping, integrated soil fertility management, drip sub fertigation, use of complex crop rotations and integration of crops with trees and live stocks .The strategy is to produce more from less by enhancing soil health that increases resource use efficiency and minimizes wastage .The average cereal yield of India can be easily doubled or even tripled by restoring soil health and increasing soil organic carbon sequestration.

A04: COMMUNITY ASSEMBLY OF SUBTROPICAL FORESTS AND ITS RESPONSE TO DISTURBANCES IN EASTERN CHINA

Yu Mingjian

College of Life Sciences, Zhejiang University China
Email: fishmj@zju.edu.cn

China alone possesses about 2.5 million square kilometers of subtropical zone caused by the uplift of the Himalayas and Qinghai-Tibetan Plateau. Subtropical forests formed under the subtropical monsoon climate harbor high biodiversity in the world, and are quite different from tropical and temperate forests. Natural or anthropogenic disturbances such as ice storm, typhoon, habitat loss and habitat fragmentation, can impact community assembly and biodiversity maintenance within this area. In 2005, my group and Chinese collaborators established a 24-ha primary evergreen broad-leaved forest (EBLF, the zonal vegetation in

subtropical China) dynamics plot in Gutianshan National Nature Reserve, eastern China. We found that the dispersal limitation and habitat heterogeneity jointly explained the species-area relationships of woody plants, and the species clustering spatial distribution patterns were shaped by both habitat heterogeneity and other clustering processes. Since 2011, we monitored the regeneration dynamics of seedlings in this plot in the canopy gaps formed by an ice storm in February 2008. We found that canopy gaps rather than topography favored the regeneration of deciduous broad-leaved species, and thus contributed to the species coexistence of evergreen and deciduous broad-leaved species in the EBLF. Most of China's old-growth forests persist in small, isolated fragments, from which many native species have disappeared. My group studies the effects of habitat fragmentation and island biogeography in fragmented forests in the Thousand Island Lake - a man-made reservoir with over 1,000 land-bridge islands formed by the damming of a river in 1959. We have been monitoring the woody plant community dynamics of secondary Masson pine forests in 12.7-ha of forest dynamics plots on 29 study islands since 2009. We found that the environmental filtering underpinned the island species-area relationship. After over 50 years of secondary succession, the forests on small islands remained low species richness, and few animal-dispersed and shade-tolerant plants. Beta diversity of small islands was higher than that of large islands, which was more likely due to the environmental heterogeneity.

SYMPOSIUM / INVITED LECTURES

SYMPOSIUM - I:

BALANCING ENVIRONMENTAL CONSERVATION AND SUSTAINABLE DEVELOPMENT IN INDIA

A05: ECO-FRIENDLY TECHNOLOGY, THE NEED OF INDUSTRY FOR SUSTAINABLE DEVELOPMENT

Amar P Garg

Shobhit Institute of Engineering & Technology (Deemed to-be-University), Modipuram, Meerut-250110, India
Email: amarprakashgarg@yahoo.com
vicechancellor@shobhituniversity.ac.in

More than 300 highly colored chlorinated organic compounds including small quantity of highly toxic dioxins are released from effluents of various industries. Pulp and paper industry is one of the most important enemies of clean environment where multistage use of chlorine based bleach technology is dangerous to the environment. It is commonly called as "Chlorine Bombs". Pre-treatment of pulps with cellulse free xylanases reduces 35-40% chlorine consumption without compromising with paper quality. We have developed activated carbon that can be used for filtration of polluted effluents of the industry. Further, the water may be treated with microbes that can absorb remaining toxic substances. A complete eco-friendly solution for pulp and paper, textile, leather and chemical based industry shall be discussed.

Key words: Eco-friendly; Enzyme; Effluents; Textile and leather industry.

A06: CLIMATE CHANGE THREAT ON INDIAN WATER RESOURCES

PM Natarajan

Canopy Lane, La Verne City, California State, USA
Email: natarajan_pm@yahoo.com

After the commencement of the industrial revolution, there has been a huge usage of fossil fuels almost in all courtiers. This human induced activity is raising the temperature of the Earth very drastically. As a result of this, there has been lot of changes in climate, environment, flora and fauna and on some natural resources in the Earth. Already almost all mountain and sea glaciers have started to retreat due to the present temperature rise. Now the climate change affects the resources of lithosphere, biospheres, hydrosphere and the atmosphere. Of all the threats of Climate Change, its impact on water resources is going to be the biggest threat and hence itwould affect the people and global economy very heavily, since water is used for domestic, industry, agriculture, energy etc. If the present climate changes affectsEarth further due to the uncontrolled emission, the hydrologic cycle of many countries and particularly India are likely to be affected and hence India will become a water scarcity country within a few decades. Asian Water Tower provides perennial water supply many nations and India also by the perennial rivers originating from Himalaya.If the temperature of the Asian Water Tower is increased above 2^0C, the Intergovernmental Panel on Climate Change and may many scientific organizations on environment afraid,that a huge quantity of glaciers in Himalaya is likely to be retreated earlier than 2050. In this scenario-Indus, Ganges, Brahmaputra, Irrawaddy, Salween and Mekong rivers which supply water to China, India, Nepal, Bhutan, Bangladesh, Pakistan, Vietnam, Myanmar/Burma, Cambodia, Laos and Thailand covering forty-six per cent of the world's population will be affected. Now, a huge quantity of fossil fuel is used to produce thermal power. This is the major source of greenhouse gases emission. As a result of this, carbon dioxide and other greenhouse gases are produced. Instead of generating energy from fossil fuels, if renewable green energies like hydropower, power from wind, sun, sea waves and geothermal are generated and used, it is possible to minimize the generation of greenhouse gases and arrest Climate Change to a maximum extent. In this

way it is possible to control the glacial retreat and protect the freshwater resource in the form of solid ice, snow and glaciers not only in the Himalaya but also in many nations and sea.

If the entire glacier in the Asian Water Tower is retreated due to the uncontrolled climate change, the value of loss of 3,737.84km^{3}water (131,999.95TMC),in terms of paddy cultivation is Rs. 69.96lakh lakh crores at Rs. 53 crores per Thousand Million Cufic feet (TMC) of water. This will be the case to the 24milliion km^3, 68.9% of freshwater in the form glacier both in land and sea in the Earth.

Key words: Climate Change threat– Indian water resources - Greenhouse gases- Green energy - Watermanagement paths

A07: HOW POTENT SATELLITE REMOTE SENSING IN MONITORING PLANT DIVERSITY?

MD Behera

Centre for Oceans, Rivers, Atmosphere and Land Sciences (CORAL), Indian Institute of Technology Kharagpur, India
*E-mail:*mailto:mdbehera@coral.iitkgp.ernet.in*mdbehera@coral.iitkgp.ac.in*

The satellite-derived biophysical proxies (surface reflectance-SR-645nm and SR-858nm, Enhanced Vegetation Index-EVI, NDVI-Normalized Difference Vegetation Index, FAPAR-Fraction of Photosynthetically Active Radiation, Leaf Area Index-LAI) that consider the variability in plant leaf traits, canopy structure, and phenology; are useful for retrieval of large scale ecological information. The congruence between plant diversity and satellite-derived biophysical proxies were analyzed using generalized linear model and multivariate adaptive regression splines, whichresulted in deriving FAPAR as the most suitable biophysical proxies for each biogeographic region. Utility of artificial neural network (ANN) with monthly FAPAR as proxy of plant richness; summarized a correlation maxima of R >0.5 between the model output and reference data. Dynamic habitat index (DHI), an indicator of environmental heterogeneity representing the changes in habitat heterogeneity was calculated using monthly

FAPAR, revealed excellent correlation with plant diversity ($R^2 = 0.90$, p-value < 0.001 with DHI-Cumulative). Congruence of plant diversity with satellite-derived biophysical proxies (attributed due to environmental heterogeneity), especially FAPAR has potential implication as an essential biodiversity variable (EBV) for rapid/ indicative monitoring of plant diversity, thereby achieving various International commitments.

Key words: India, Angiospermic plant, FAPAR, Regression, FAPAR, DHI

A08: BIOREMEDIATION TECHNOLOGY FOR AGRICULTURAL CONTAMINANTS: A SUSTAINABLE APPROACH FOR RURAL ECOSYSTEM

Bhawana Pathak

School of Environment and Sustainable Development,
Central University of Gujarat, Gandhinagar, 382030, India
Email: bhawana.pathak@cug.ac.in

Environmental pollution has been a major concern over the past few decades influencing the quality of life. Pesticides are very important and widely used to protect crops by pests. The use of pesticides is necessary for economical pest management as an important aspect of modern agriculture. Excessive use of pesticides results in deterioration of the environment. Over the last decade, an increasing amount of pesticides has been detected in both soils and waters. Pesticides are persistent long term in soil, water and food chains due to their recalcitrant nature. Biological treatment technologies are promising, cost effective, eco-friendly and produce less toxic compounds and an alternative method offers the possibility to destroy harmful contaminants with the help of natural biological activity for the removal of pesticides from agricultural ecosystem. Bioremediation and phytoremediation are the emerging areas to remediate the environmental contaminants. Rhizoremediation is the superior biodegradation technology for pesticide as an effective technology for *in situ* remediation. The present paper will highlight the developed technology in the laboratory and technology transferred from lab to land as a green and sustainable approach for rural development.

Key words: Environmental pollution, treatment technology, Rhizoremediation, technology transfer - lab to land

A09: IDENTIFICATION, PURIFICATION AND CHARACTERIZATION OF ALLERGENS FOR IMMUNOTHERAPEUTIC USE

Swati Gupta Bhattacharya

Division of Plant Biology, Bose Institute, 93/1 A.P.C. Road
Kolkata - 700 009
Email: kashinathb23@rediffmail.com

Respiratory allergy and asthma have become a major health problem worldwide with India being no exception. Currently, about 20-25% of the total Indian population is sensitized with various types of allergens originating from pollen grains, fungal spores, foods, insects and house dust mites. Based on hospitalization data from different parts of our country there are sharp increase in the prevalence IgE-mediated atopic diseases in the last few decades. India, being a land of diverse climates, vegetations, and food habits, has been reported to have a broad range of such allergens. The basic principle of allergen research is to identify the exact causative factor (protein/glycoprotein) of allergen. So the identification and characterization of allergenic protein or glycoprotein are found to be very important for (a) evaluating the significance of an allergic sensitization, (b) prescribing adequate medication, and (c) judging the consistency of an allergen eliminating programme (management). We have several reports on prevalent allergens from various parts of our country mostly based on preliminary detection and identification of the allergens. But a few of such allergen molecules have been characterized by molecular techniques such as recombinant technology and structural biology. The present paper illustrates the inclusive reports on the biochemical, immunological and molecular information on the various allergens vis-a-vis allergen specific immunotherapy testified from India.

Key words: Respiratory Allergy; Asthma; Allergen Biology; Immunotherapy; India

A10: TOWARDS NOVEL DIAGNOSTIC TOOLS FOR VIRAL DIAGNOSIS

Amit Pande, Ankur Saxena, Preeti Chaturvedi, Kiran Belwal and Ankita Chauhan

ICAR-Directorate of Coldwater Fisheries Research, Bhimtal, Nainital 263136, Uttrakhand
Email: Amit.Pande@icar.gov.in

Coldwater fisheries are an important livelihood of the people inhibiting the mountainous regions of the country. Popularization of rainbow trout culture, in the high altitudinal regions, of the country is fetching rich dividends to the local farmers. However, with the intensification of Coldwater fish farming, there is always a threat of diseases. Among them, viral diseases are of concern as they may lead to serious economic losses. Identification of a viral agent in Coldwater fishes can be a difficult and time-consuming process as it requires both technical skills and sophisticated infrastructure. Molecular and immunological methods although routinely employed in diagnosis can sometimes provide misleading results. In case of viruses infecting rainbow trout, one may need to observe the cells for at least ten days before the next passage. It has been observed that mixed viral infection can result in ambiguous cytopathic effect thatmay fade away in the subsequent passages. This results in loss of time and money with ambiguous results in hand. Thus, identification in cell culture becomes tricky and requires molecular techniques that depend on many assumptions and on many occasions they are wrong and a virus may get either unidentified or mis-identified. Cell based reporter systems can be important for the detection of endogenous immune or pathogen genes. Therefore, an attempt has been made to develop a novel transgenic cell line of fish whichwill unambiguously figure out the presence or absence of any virus in clinical samples from fish. Such a method would assist in studying not only the emerging viruses in the Coldwater sector but also the known ones that may go undiagnosed.

Key words: Coldwater fisheries; Viruses; Cell based reporter system; Transgenic cell line

A11: ZEOTYPE MATRIX COMPOSITES

Jyotsna S Meshram

Deptartment of Chemistry, Rashtrasant Tukadoji Maharaj, Nagpur University, Nagpur - 440033
Email: drjsmeshram@gmail.com

Fly ash (FA), a waste by product is generated plentifully by combustion of coal in thermal power stations. It is a mixture of oxides rich in silicon (SiO_2), iron (Fe_2O_3), and aluminum (Al_2O_3). Inorganic ordered porous material severe environmental hazard by contaminating the surrounding atmosphere and occupies enormous land area for its dumping. The consumption of fly ash as filler material in polymer composites is considered significant from both economic and commercial point of view fly ash is used as reinforcing filler in hydrophilic polymer to develop lightweight composites. Some studies have pointed to the tremendous compatibility between fly ash and polymers. Modification of microporous material accompanied by compatibilization leads to the substantial improvement to mechanical properties and thermal stability of the composites. Zeotype composites present important opportunities to basic science and technology posing significant challenges for future work in R &D field. Such zeotype filled polymer composites possess attractive versatile applications, mechanical, thermal, electrical properties, better dimensional stability and are cost effective. Even though intensive work on synthesis, properties and applications on zeotypes material has resulted in number of industrial applications, a further study in R &D will be developed in future, Effect of zeotype porous material as filler on various properties of HDPE/ composites and its use in catalysis has been discussed in this paper.

Key words: Fly ash; Environmental hazard; zeotype composites; Cost effective

A12: BALANCING FOREST CONSERVATION AND SUSTAINABLE DEVELOPMENT IN THE WESTERN HIMALAYAN REGION

GCS Negi

Centre for Biodiversity Conservation & Management
G.B. Pant National Institute of Himalayan Environment & Sustainable Development
Kosi-Katarmal, Almora (263 643), Uttarakhand
Email: negigcs@gmail.com

In the western Himalayan mountains forest ecosystems occupy over two-third of the landscape. People of the region largely depend upon a variety of ecosystem goods and services (ES) emanating from these forest ecosystems for their subsistence living. However, in the recent decades owing to changing livelihood avenues and increasing developmental aspirations the forested landscapes are facing landuse change for infrastructure development such as road network, hydro-projects and other activities. These activities along with unsustainable use of natural resources is leading to degradation of forests and decline in ES, jeopardizing forest-based livelihood of the rural people. Thus, rural society at large is facing confrontation between environmental conservation and developmental imperatives. Policy makers are looking for compensatory mechanisms in lieu of the bygone opportunity cost of forest land use conversion for developmental activities. The immediate challenge is how to take the intangible services of the forest ecosystems into account as valuation of ES and payment mechanism is still developing. This article depicts linkages among ecology, economy and society and figure out complexities and challenges in quantification and valuation of ES from the standpoint of both academic and policy making, and calls for ecologists and economists to work together to provide solutions for sustainable development of Himalayan mountains.

Key words: Forest ecosystem; Ecosystem services; Quantification and valuation; Methodological challenges; Western Himalaya

A13: TECHNOLOGY DEVELOPMENT FOR REMOVAL OF MERCURY(II) FROM INDUSTRIAL EFFLUENT

Srabanti Basu

Department of Biotechnology, Heritage Institute of Technology
Chowbaga Road, Anandapur, Kolkata 700107
Email: srabanti_b@yahoo.co.uk

Mercury (Hg) is a major pollutant occupying the third position in the priority list of the hazardous materials prepared by the Agency of Toxic Substances and Disease Registry (ATSDR). Hg exists is several chemical forms like Hg(0), Hg(II), organomercurials (R-Hg). Hg(II) is released in the environment by chloralkali plants, mining, smelting, coke ovens and several others. Since Hg (II) is a known toxic agent, it is essential to remove Hg(II) from industrial effluent before discharging. Technologies like filtration, precipitation, ion exchange and chelation are available for removal of metal ions, but they fail to reduce the Hg(II) level to meet the environmental regulations (0.001 mg/L, as recommended by WHO). The present study used papain, a proteolytic enzyme found in papaya, to develop an environment-friendly, cost-effective technology for removal of Hg(II) from industrial effluent.

Papain has several –SH groups which have high affinity for Hg(II). The present study exploited this property of papain for removal of Hg(II). Papain was immobilized in commercially available activated charcoal, charcoal prepared from citrus fruit peel and calcium alginate. Of these three systems, alginate-immobilized papain found to be the best system for removal of Hg(II) considering stability of the matrix, percent removal and recovery of Hg(II) and regeneration of the matrix. The optimum conditions for immobilization of papain in calcium alginate, as obtained by Response Surface Methodology (RSM), were 25.96 g/L sodium alginate, 20 g/L calcium chloride and 20 g/L papain and pH 7.0. Alginate-immobilized papain thus obtained under optimum conditions id termed as AIP. 98% Hg(II) was removed by AIP from 30 ml of mercuric chloride solution with 10 mg/L of initial concentration of Hg(II), 5 g of AIP and 7.0 pH. When tested with real-time effluent, the system was able to remove 93% Hg(II).

The work was in collaboration National Institute of Technology, Durgapur. Associated persons are Susmita Datta and Aparupa Bhattacharyya.

Key words: Mercury; Papain; Immobilization; Calcium alginate; RSM

A14: LOKTAK LAKE A LAKE OF INTERNATIONAL IMPORTANCE- PERSPECTIVES AND CONSERVATION AND MANAGEMENT

MG Tiwari and Tahellambam Memsana

Palamou Bhawan, Williams Tower, Deoghar
Email: mgt_sciencecongress@yahoo.co.in

Loktak Lake is one of the important wetland in the Indo-Burma hotspot present in Manipur. It is also the largest Ramsar site Known for its rich diversity and socio-economic importance. The characteristics phumdis (heterogeneous mass of soil, vegetation and organic matters at various stages of decomposition) float extensively over lake water. Changes in land-uses pattern in the catchment, deforestation and jhumming in the hills are responsible for an increased rate of soil erosion leading to siltation of the lake. With the construction of Ithai Barrage for the commissioning of the Loktak Hydro Electric Project in the year 1983, the water circulation pattern of the lake has been changed resulting in drastic and serious changes. The physico-chemical properties were studied from the selected sites, the analysis revealed very low concentration of dissolved oxygen at some sites, and high values of nutrients like phosphorus and nitrogen indicating the eutrophic nature of the lake. The results indicate that the input of the domestic wastes, fertilizers and pesticides from the agricultural fields and sewage discharge into the Nambul and Nambol rivers that fall finally to the lake are cause for such changes. The paper presents macrophyte diversity which is now being invaded by paragrass. *Brachira mutica*, reports algal species recorded from the sites and evaluates the seasonal physico-chemical characteristics of surface water. A list of problems confronting the conservation of biodiversity and water resource of the lake is presented along with some recommendations for management of this wetland of International importance.

Key words: Ramsar site; Diversity; Algal species; Water characteristics; Management

A15: COMMUNITY FOREST MANAGEMENT AND LIVELIHOOD IN THE INDIAN HIMALAYA: A CASE STUDY FROM UTTARAKHAND

RC Sundriyal, Deepa Bisht, P. Dhaila
G.B. Pant National Institute of Himalayan Environment &Sustainable Development,
Kosi-Katarmal, Almora-263643
Email:sundriyalrc@yahoo.com

Past four decades have witnessed considerable interest in decentralized forest governance by transferring ownership and management responsibilities to native forest user organizations. It is considered that local communities have greater stakes in their resources and have better knowledge of its management. Today, more than 62 countries across all regions claim to have transferred use and management rights to over >700 million hectares of forests to local users and communities. The decentralized forest governance outcomes vary from place to place in view of varied management influences with relation to site conditions, forest size, species composition and density, age structure, and goods and services being provided by forests. It is generally believed thatcommunity governance provides better environmental and socioeconomic outcomes compared to centralized management regimes.

Uttarakhand state of India holds a unique place amongst the various contemporary examples of decentralized forest governance approaches.Here, the village forests are managed by a legally recognized village institution (known as *Van Panchayats*), which came into existence in 1931, long before the time when the concept of decentralized forest governance became popular globally. This system is a product of villagers' movement that took place in the region during the early 1900s, agitating against the British policy of forest reservation. Presently, out of nearly 16000 villages in Uttarakhand state, 12089 have *VPs,* which formally manage nearly 16% (544964 hectares) of the forest area of the state. The forest area available with each VP varies from afew hectares to over 1000 hectares. The state forest and Revenue departments provide technical and administratively support to the VPs. Under this system, villagers are entitled to form a village level institution i.e. *Van Panchayat* (*VP*) that has the

task to manage a defined area of forest (known as *VP* forest) within the village boundary in a manner that does not lead to resource degradation while providing much needed forest produces, e.g. firewood, fodder, timber, etc. to the villagers. Each VP comprised a maximum of 9 members elected democratically by a village community through independent elections held in every 5 years. These *VPs,* with general consent of village members, execute *VP* forest management for monitoring, sanctioning and arbitration to resolve disputes within the local space. The powers and duties of *VPs* are, however, regulated by the government departments through *VP* Rules which were first enacted in 1931 and amended thereafter thrice in 1976, 2001 and 2005. However, changes of rules & regulations have impacted community-led forest management as more powers have been vested to Forest department. This study analyses implementation and effectiveness of VPs for past six-seven decades in ten VPs of Gairsain Block, Chamoli district, Uttarakhand. It presentsmode of decentralized governance, benefit-sharing mechanism, and effectiveness of VP institution in managing resource-quality and disputes. It also reportsas how the change in regulations is impacting decentralized forest governance. Finally, a possible approach that manages forest resource as well as benefit community and forest department has been suggested.

A16: GRASSLANDS OF NATIONAL PARK,MANIPUR-THREATS AND CHALLENGES OF A FLOATING WILDLIFE HABITAT

Asha Gupta

Deptt of Life Scirnces, Manipur University, Imphal
Email: ashaguptamu@gmail.com

Keibul Lamjao National Park –KLNP (Latitude $23^0$8 32†N to $25^0$862†N, Longitude $93^0$032†E – $93^0$782†E, the only natural abode of the endemic and endangered brow antlered deer RuCervuseldieldiMc Cleland locally known as Sangai, is characterised by 40 sq m continuous floating mat called phumdi. The annual submergence –emergency cycle of the floating mat that was experienced earlier in the park , has been ceased. Investigations on vegetational analysis and productivity of the grasslands of the park present on the floating

mat suggested that the inner sites revealed best performance of those life forms which through their adaptations could survive in adverse condition. The system transfer functions of KLNP indicated that most of the dry matter is channelised to roots and rhizomes indicating stressed conditions.The paper evaluate threats to the wildlife habitat and recommendations for management of floating park.

Key words: Floating Park; Cervuseldieldi; Endangered; Endemic; Threats; Management

A17: REGENERATION STATUS OF PROTECTED AND DISTURBED FORESTS OF RANIKHET, UTTARAKHAND (KUMAUN HIMALAYAS)

Prateek Verma, Uma Melkania

Department of Environmental Science, CBSH, G. B. Pant University of Agriculture and

Technology, Pantnagar, Uttarakhand 263145, India

Email: melkaniauma@yahoo.in

The present study was conducted in the forests of Ranikhet, a cantonment town in Almora district of Uttarakhand located at an altitude of 1,869 meters (6,132 ft) above mean sea level. The study area is located between 29.650 N and 79.420 E. The purpose of the study was to understand the growth behavior of tree species in the Cantonment protected and disturbed forests of Ranikhet in terms of dominance, diversity, regeneration dynamics and biomass at different altitude levels. Plot design was used to analyse quantitatively and qualitatively the tree, sapling and seedling vegetation. The entire forest regime reflected a dominance of Pine *(Pinus roxburghii)*, Oak *(Quercus leucotrichophora)* and Deodar *(Cedrus deodara)* trees. Other trees are Kafal (*Myrica esculenta*), Buransh (*Rhododendron arboreum*) and sub-alpine fir (*Abies pindrow*). The overall tree density in protected forest varied from 444 trees ha-1 (at hill top) to 346 trees ha-1 (at hill slope) to 255 trees ha-1 (at hill base) while in disturbed forest, it varied between 423 trees ha-1 (at

hill top) to 355 trees ha-1 (at hill slope) to 221 treesha-1 (at hill base). *Cedrus deodara* and *Myrica esculenta* exhibited good regeneration in protected forest while *Pinus roxburghii* was the only species having comparatively better regeneration in disturbed forest. The regeneration status was found comparatively good in the protected forest maintained by the cantonment board as compared to the disturbed forest as the anthropogenic activities such as fodder and fuel wood collection, frequent forest fire, overgrazing, activities like trekking, jungle safari, fire camping and rapidly growing tourism has resulted in poor regeneration of forest communities. The Forest Management department of Ranikhet has taken many initiatives to protect the forests. The study will discuss details on methodology, legal provisions and measures towards implentation of management plan in the protected forest. The study will be helpful in suggesting better management of forest ecosystem.

A18: SUSTAINABLE FOREST MANAGEMENT FOR BIODIVERSITY CONSERVATION AND SUSTAINED LIVELIHOOD OPTION FOR RURAL PEOPLE OF JHARKHAND

Sanjeev Kumar

Regional Chief Conservator of Forests, Hazaribagh, Jharkhand
E-mail id- sanjeevkumar201@gmail.com

Sustainable forest management (SFM) is a dynamic and evolving concept which aims to maintain and enhance the economic, social and environmental value of all types of forests, for the benefit of present and future generations.India is a megadiverse country having 7-8% of all recorded species of the world. As per India State Forest Report 2017, there is an increase of 8021 Sq.km. in total forest and tree cover of the country. It resulted into increased biodiversity also. Biodiversity underpins ecosystem services, productivity and resilience. Ecological processes such as tree growth, carbon sequestration, seed dispersal and nutrient cycling depend upon biodiversity. There is perceptible threat to biodiversity due to over exploitation of natural resources, climate change and land use changes.Of various

means, Traditional Knowledge (TK) has been determining factor for sustainable use and conservation of biodiversity. The present paper reflects trajectories of sustainable forest management , status of biodiversity and its conservation , associated aspects of livelihood and role of TK on these issues in India in general and Jharkhand in particular.

Key words: Biodiversity; Conservation; Ecosystem services; Jharkhand; SFM

A19: CHEMICAL COMPOSITION OF THE ESSENTIAL OIL FROM THE LEAVES OF *ENDOSTEMON OBTUSIFOLIUS* (E.MEY. EX BENTH.) N.E.BR.

Y Naidoo[1] and CT Sadashiva[2]

[1]*School of Life Sciences, University of KwaZulu-Natal, Private Bag X54001, Durban, South Africa* 4000
[2]*Star Hi Herbs Pvt Ltd, Plot No. 50, 3rd Road, 1st Phase, K. I. A. D. B. Industrial Area, Jigani, Bangalore - 560105, Karnataka, India.*
Email: Naidooy1@ukzn.ac.za

In this study, the chemical composition of the volatile oil from the leaves of *Endostemon obtusifolius* (E.Mey. ex Benth.) N. E. Br. was investigated. The composition of oils obtained by hydrodistillation followed by Gas Chromatography and Mass Spectrometry (GC-MS), yielded 50 compounds representing 99.8% of the oil. The major volatile components of the oil were phenol (26.92%), 1, 3, 6, 10-cyclotetradecatetraene, 3,7,11-trimethyl-14-(1-methylethyl)-, [S-(E,Z,E,E)]-(19.13%), acetic acid, 1,7,7-trimethyl-bicyclo [2.2.1] hept-2-yl ester (6.44%), cyclooctene (5.25%), 1H-cyclopropa[a]naphthalene, decahydro-1,1,3a-trimethyl-7-methylene-[1aS-1a.alpha., 3a.alpha.,7a.beta.,7b.alpha.)] - (4.98%), 3-cyclohexen-1-ol,4-methyl-1-(1-methylethyl) - (3.81%), cycloisolongifolene, 8,9-dehydro-(3.52%) and 1H-cycloprop[e]azulene, decahydro-1,1,7-trimethyl-4-methylene - (3.12%).

Key words: *Endostemon obtusifolius;* GCMS; Essential oils; Phenol.

A20: COMMUNITIES FOR CONSERVATION: LET THE WATER FLOW

Sanjay K Uniyal

CSIR-Institute of Himalayan Bioresource Technology, Palampur (HP)
Email: suniyal@ihbt.res.in

Degradation of habitats and natural resources often limit flow of ecosystem services emanating from them, thereby impacting livelihood and sustenance. Consequently, community involvement and payment of ecosystem services have evolved as means of conservation. I present here an example wherein involvement of local communities has resulted in rejuvenation of ecosystems in the Dhauladhar Mountains in Himachal Pradesh (HP) that has ensured flow of drinking water to the downstream communities of Palampur (HP). Palampur in Himachal Pradesh (HP) derives its name from "*Palum*" which locally means abundance of water. Ironically, the area started facing shortage of drinking water which was later attributed to the degradation of uphill forests in the Dhauladhar that acted as recharge zone of water supplied to Palampur. Excessive lopping for fuel wood, fodder and overgrazing in 1990's by the villages resulted in the degradation of forests. This led to paucity of resources for local people and reduction in the discharge of spring (from 8 litres/sec in 1950's to 2 litres/sec in 1990's). Today, spread of invasive species in the area is affecting flow of provisioning services such as fodder and fuel-wood availability for the local. How creation of Village Forest Development Society (VFDS) and their signing of MoU with the Palampur Municipal Council resulted in improvement in the status of forests, management of invasive species, increased fodder and fuel availability to the villagers and importantly renewed flow of water to the Palampur is the focus of my presentation.

Key words: Communities; Conservation; Ecosystem services; Himalaya.

A21: EXPLORING PROSPECT FOR DELINEATION OF FIELD MARGIN VEGETATION USING RS AND GIS

Sunil Nautiyal, Mrinalini Goswami

Centre for Ecological Economics and Natural Resources, Institute for Social and Economic Change (ISEC), Dr. VKRV Rao Road, Nagarabhavi, Bangalore 560072
Email: sunil@isec.ac.in

Field margin vegetation (FMV) is the interface between agricultural field and another land use land cover type, which can be natural, semi-natural or planted, and provides a wide range of ecosystem services. Although its significance in agroecosystem is immense, it has not been studied adequately as a separate entity. To acknowledge the significant role of FMV in the socioecological system and its contribution towards climate change mitigation and adaptation, it is essential to map and assess FMV. Scientific delineation of field margin vegetation has not been done because of difficulty in differentiating FMV from other vegetation as spectral responses of all the vegetation are similar. This research is first of its kind and preliminary attempt to develop an accurate method to map and quantify vegetation in field margins in a rural-urban interface of north Bengaluru using high resolution (0.3m×0.3 m) satellite imagery (WorldView 3) for a sample area of 2084.40ha, GIS and image processing technology. Considering neighbouring features of FMV such as crop land, built-up, waterbody, shadow of vegetation and other plantations, conditions for delineation are set using J-programming language which are used for testing three methods. It was found that setting conditions on a square and radial neighbourhood of the pixels, it is possible to differentiate the FMV pixels from crop-fields and other vegetation. Third algorithm is used to reclassify the vegetation to delineate FMV from other vegetation in the classified image using Maximum Likelihood method. Further accuracy assessment has been done by comparing the outputs of three algorithms with manually digitized FMV and ground verification of sampled plots, it is found that the square and radial algorithms delineated FMV with 73% accuracy and image reclassification algorithm is the best suitable (with 86% accuracy) for mapping and assessing FMV area and it requires least post processing time to take out the errors compared to other two algorithms. Based on the results and their accuracy, it is suggestive that the

method is scalable for identifying, assessing and managing FMVs for sustainable socioecological development. This study gives a direction to adopt future research in developing a more accurate and precise method for this purpose.

Key words: Field Margin Vegetation; Image classification; Vegetation mapping; Agro-ecosystem

A22: CULTIVATION OF MEDICINAL PLANTS IN CHAUDAS VALLEY: LINKING WITH RURAL LIVELIHOOD

Indra D Bhatt, Amit Bahukhandi

G. B. Pant National Institute of Himalayan Environment & Sustainable Development
Kosi-Katarmal, Almora, Uttarakhand India
email: id_bhatt@yahoo.com

Conservation of medicinal plants is receiving high priority and attention all across the globe keeping in view the resurgence of interest in herbal and cosmetic medicines. In the Himalayan region, rural and traditional societies are using medicinal plants for health care and economic benefit. The increasing demands, over exploitation for trade, lack of knowledge for sustainable harvesting are some of the reason threatening Himalayan species in its natural habitat. Therefore, it would be pertinent to develop a strategy for conservation so as to pressure on natural habitat couldbe reduced. Keeping this in view, a cluster based approach for cultivation of selected medicinal plants was adopted at selected villages of Chaudas valley, Dharchula, Pithoragarh district of Uttarakhand. The people of the region adopted the medicinal plants cultivation as an additional source of income. This approach is solving the dual purpose as generating income and prseserving the genepool at the farmer's field. Initial results are an indicative of the fact this type of approaches could be useful for conservation and sustainable utilization of medicinal plants in the imalayan region.

Key words: Medicinal Plant; Conservation; Cultivation; Farmers; Chaudas valley

SYMPOSIUM - II

PROMOTING ENVIRONMENTAL CONSCIOUSNESS IN DEVELOPING INDIA

A23: CONSERVATION OF FOREST BIODIVERSITY IN ANCIENT INDIAN CULTURE

Kashinath Bhattacharya

Department of Botany, Visva-Bharati (A Central University), P.O.: Santiniketan - 731235, West Bengal
Email: kashinathb23@rediffmail.com

In ancient India, culture and diverse biological entities were the integral parts of life and the people were very much concerned with the conservation of natural resources, especially forest resources. The Rio Earth summit (1992) had approved historical agreement like Agenda 21 which recognised sustainable development. Fascinatingly, ancient Indian civilization also understood the importance of forest biodiversity conservation and found to be similar to Rio principles. The modern concept of biodiversity management is simply a replication of many ancient Indian civilizations. In Atharvaveda, earth is to be honoured as well as protected like our mother "bhoomi *mata putroham prithivyah"*. Many India communities have inherited such tradition. The lessons of Buddhism as back as 2500 years suggested conservation of plants vis-à-vis the rights of animals to freedom from fear. The idea about protection of animals by making sanctuaries for animals was dated back to the 3rd Century B.C.E In ancient India, planting and rearing of trees was a highly developed practice. The10th Century treatise, *Vrukshayurveda* contended with various species of trees and their growth which pointed out how spiritual beliefs and conservation of nature was inter-linked. There were three types of forests namely, Mahavana, Tapovana and Srivana in ancient India. The *Mahavana* (*Maha* means great, *Vana* means forest) was a dense and natural forest of great expanse, devoid of any habitation and human interference, considered to be a *Raksha* ("sanctuary"). These forests were virgin with high productivity and were the major

source of medicine like a core region of a reserve forest. The *Tapovana* (*Tapo* means meditation) was the major forest away from human habitation where sages had ashramas (residential school cum dwelling places) where gurus (sages cum teacher) taught the pupils who were used to stay in the ashramas. The tapovana is the forests of prosperity, consists of dense forests and groves. The tapovanas abounded in wild life and people had access to these forests, but only for peaceful purposes and no one were allowed to kill animals. *Upanishads* and *Aranakas* were written in these forests. Groves were spaces of forests where harvesting were done. The *Srivana* (*Sri* means beauty) was actually the village or town forests. The people dependent on Srivana for their food, wood, fruits, medicines and many day to day necessities. It was mandatory to grow five trees popularly called, "*panchavati*" in Srivana namely, Banyan, Peepal, Ashoka, Bela and Harad. Thus the modern holistic methods of sustainable development of biodiversity are replicated in many ancient Indian literatures. In modern times, the policies implemented for conservation of forest and biodiversity are directly or indirectly acquired from the traditional knowledge cultivated in the ancient Indian culture.

Key words: Conservation; Forest; Biodiversity; Ancient India

A24: STUDIES IN ENVIRONMENTAL SCIENCES: VARIABILITY OF ALL INDIA SUMMER MONSOON RAINFALL, CLIMATE CHANGE, GLOBAL WARMING AND ENVIRONMENTAL EFFECTS

R Suseela Reddy

Jackson State University, Jackson, Mississippi 39217, USA
Email: remata.s.reddy@jsums.edu

India much depends on monsoon rainfall for agricultural planning, industry, human and other life. A good monsoon resulting in improved agricultural brings down prices of essential food commodities and reduces their imports overall reducing the food and inflation. Further improved rains result in increased hydroelectric production. All these factors initiate positive ripple effects throughout the economy of India. Studies have been reported about the Indian

summer monsoon onset and rainfall variability (1). Recent studies have been reported that the variability of monsoon rainfall during the northern summer is well associated with the great deserts, equatorial lower stratospheric winds (QBO) and 11-year solar cycle. In the present study we further examine the seasonal, inter-annual and long-term variability of monsoon rainfall using all India rainfall data during June-September, for the period 1881-2010. We looked the impacts and processes including large-scale events such as QBO, ENSO and Climate Change including SST's over the Arabian Sea, on monsoon variability. The study has pointed out that the cooling SST's effect the monsoon onset and seasonal rainfall. The large-scale floods/droughts were associated with the westerly/easterly phases of the QBO. The large-scale droughts were associated with the ENSO and easterly phase of the QBO. Decadal analysis revealed a long-term variability (~ 50 year) in all India rainfall. Some of the processes associated with the monsoon variability will be discussed. Global warming and climate change refer to an increase in average global temperatures. Natural events and human activities are believed to be contributing to an increase in average global temperatures. This is caused primarily by increases in "greenhouse" gases such as Carbon Dioxide (CO_2). It is being clear that human activities have caused most of the century's warming by releasing heat-trapping gases-called greenhouse gases into the atmosphere. India will be among the worst urban and rural environment hit countries. Heat may face wrath of calamities like floods, heat waves, droughts affecting environmental impact of agriculture and health. In the present study, an attempt has been made to develop an empirical model and study the empirical aspects of the global climate change by applying the mass energy concept to the earth atmosphere system, assuming that the atmosphere is in hydrostatic balance. Further, we assumed that the earth atmosphere system behaves as a black body. The presence of the gas in the atmosphere keeps some of the radiant energy received by the earth from being returned to space, thus producing the so-called greenhouse effect. The results of the study pointed out that the global temperature changes due to mass increase as a whole of the earth atmosphere system for the period 1900-2050. These changes in global warming are due to temperature increases from 0.053°C to 0.84°C. The predicted changes are in good agreement with the observed global warming (IPCC, 1990). The temperature changes due to doubling of CO_2 are only 0.02°C by 2050. The global warming due to temperature changes may be attributed to increase in mass as a whole including greenhouse gases (CO_2, water vapor, particulate and other CFC's) and human activity and feedbacks.

Environmental Effects including heat waves, droughts, floods and agriculture and health will be discussed.

Key words: Monsoon Variability; Climate Change; Global Warming; Empirical Modeling

A25: EFFECTS OF ANTHROPOGENIC DISTURBANCES ON DIVERSITY-DISTRIBUTION OF WOODY PLANTS IN REIEK FOREST, MIZORAM, INDIA

BP Mishra

Department of Environmental Science, Mizoram University,
Aizawl – 796004, Mizoram
Email: mishrabp111@yahoo.com

The entity of plants has got due importance since time immemorial, as being very close to the nature and regarded as the most important natural resource. Due course of time, the threat to the plant resource intensified mainly due to human activities (clear felling, extraction of timber, overgrazing), and overexploitation has resulted in depletion of forest cover and subsequently loss of biodiversity to a great pace. In view of this, the present ecological investigation has been carried out in the Reiek forest of Mizoram, to observe effects of human activities on diversity-distribution of woody plants. The Reiek forest (area 1000 ha; altitude peak-1485 m asl) is situated in Mamit district of the state of Mizoram (about 25 km from the state capital Aizawl), and regarded as remnant of climax vegetation. But, in recent past, the human activities are extended in peripheral zone by the settlements in surroundings, and woody vegetation is badly affected. For vegetation analysis, 0.5 ha area each of the undisturbed and disturbed forest stand sampled, using standard methods.

The findings depict that a total of 89 woody plant species (belonging to 53 genera and 42 families) and 86 woody plant species (belonging to 70 genera and 37 families) were recorded from undisturbed and disturbed stands, respectively. It reveals that some tree species were eliminated from the disturbed stand, and disturbance facilitated introduction of shrubs, and

resulting into more number of genera, as mild disturbance facilitates shrubby species. *Lithocarpus pachyphyllus*, the dominant species in undisturbed stand was replaced by *Michelia champaca* in the disturbed stand. Similarly, Euphorbiaceae (with 6 species), the dominant family in the undisturbed stand was replaced by Lauraceae (with 7 species) in the disturbed stand. The shift in position of species and family from undisturbed to disturbed stand could be linked with disturbance.

The tree density decreased significantly from the undisturbed to disturbed stand. Moreover, the girth class distribution was extended >180 cm in the undisturbed stand, however, it was restricted up to girth class 120-150 cm in the disturbed stand. The above findings indicate extraction of mature trees from disturbed stand. The Shannon diversity index, species richness index and evenness index were computed high in undisturbed stand than disturbed stand. However, Simpson's dominance index followed a reverse trend in results. This could be attributed due to human activities in disturbed forest patch. The log-normal diversity distribution curve indicates stable and complex community in the undisturbed stand.

Key words: Anthropogenic disturbance; Woody plant diversity; Diversity - distribution of plants; Community characteristics

A26: NATURAL DISASTERS AND STRATEGIES FOR MANAGEMENT IN INDIA - A REVIEW

P Nammalwar

Project Advisor and Guest Faculty, Anna University, Tamil Nadu, India

Email: drnrajan@gmail.com

Nature has its own way of maintaining the balance necessary for the protection and evolution of life on the planet, where it has been restored enormous resources for its sustenance and its expansion. Development status and disaster risks are clearly and closely linked. About 75 percent of the world's populations live in areas affected at least once by earthquakes, tsunamis, tropical cyclones, floods or droughts. In global terms and for the various hazards

types, disaster risk was found to be considerably lower in high-income countries than in medium and low-income countries. The four phases of strategies in any disaster management which are broadly identified as preparedness, mitigation, response and recovery are discussed.

Key words: Natural disasters; Earthquakes; Tsunamis; Tropical cyclones; Floods; Droughts; Impacts to natural ecosystems; Strategies for disasters risk reduction and management

A27: AEROSOLS, RADIATIVE FORCING AND TEMPERATURE RISE IN THE NORTHWESTERN INDIAN HIMALAYA

Jagdish Chandra Kuniyal[1], Gulshan Sharma[2], Renu Lata[2]

[1]G.B. Pant National Institute of Himalayan Environment and Sustainable Development, Kosi-Katarmal, Almora- 263 643, Uttarakhand
[2]G.B. Pant National Institute of Himalayan Environment and Sustainable Development, Himachal Regional Centre, Mohal-Kullu- 175 126, Himachal Pradesh
Email: jckuniyal@gmail.com

Aerosols including black carbon have a tendency to alter Earth's radiation budget and thereby affecting climate. The present study deals with the assessment of Aerosol Optical Depth (AOD), Black Carbon Aerosol (BCA), transportation of aerosols, shortwave aerosol radiative forcing and Atmospheric heating rate at Mohal in the Kullu valley of the northwestern Indian Himalaya during the period of 2014 to 2016. Mean aerosol optical depth (AOD_{500nm}) was observed in the range of <•0.30-0.32. The mean short-wave aerosol radiative forcing at atmosphere was estimated to be 16.96 ± 4.17 W m^{-2}, which translates into average atmospheric heating rate 0.48 K day^{-1}.

Key words: Aerosol optical depth; Black carbon; Radiative forcing; Temperature rise; Northwestern Indian Himalaya

A28: CARBON DI OXIDE (CO_2) FLUXES FROM THE TEMPERATE MOUNTAINOUS ECOSYSTEM OF NILGIRIS AND THEIR IMPLICATIONS ON GLOBAL WARMING

P Raja, K Rajan, K Kannan, C Arulmathi

ICAR-Indian Institute of Soil and Water Conservation, Research Centre, Ooty, TN
Email: prajicariiswc@gmail.com

Carbon dioxide (CO_2) accounts for 76 per cent of the total greenhouse effect. Here diurnal variations of CO_2 fluxes were measured using LI-7500DS eddy covariance in the research farm (11°23' 15"to 11°24'6" N and 76°40' 3.96 to 76° 40' 7.29 E; 2218 m above MSL) of ICAR-Indian Institute of Soil and Water Conservation Centre, Udhagamandalam in the Western Ghats regions of India. Our study indicates net CO_2 fluxes from January to June 2019 are -839.797 -1720.47 - 2116.98 - 680.36 - 2572.19 - 1381.05 - 993.673 $Kgha^{-1}month^{-1}$ respectively. Our initial study found that the temperate ecosystem in Nilgiris of Western Ghats behave as a sink to the atmospheric CO_2 and could ameliorate global warming in the long run.

Key words: CO_2 emission; Eddy covariance, Temperate ecosystem, Western Ghats

A29: FOREST FIRE IN THE INDIAN CENTRAL HIMALAYA: INDICATORS AND CITIZEN SCIENCE

Subrat Sharma

Centre for Environmental Assessment and Climate Change, G.B. Pant National Institute of Himalayan Environment & Sustainable Development, Kosi-Katarmal, Almora 263 643 Uttarakhand, India
Email: subrats@rediffmail.com

Wildfires in the Himalaya are increasing, and frequency has been attributed to warmclimate of pre-monsoon period as impacts of climate change.Coinciding with leafall in major forest

forming tree species of the region add to the favourablefuel situation on dried forest floor. Large scale forest fire events lead to disasters impacting immediate and long term biological, social and economic values of forest landscape.Disastrous forest fire events maketheseforests vulnerable to current climate variability. Mountainous topography and insufficient state resources have been identifies as few of the bottle necks to respond fire disasters. We analyzed climate as pre-cursor to large scale forest fires, and mapped perception of villagers on impacts of forest fire and climate change. To adopt a 'Citizen Science' approach there is need to describe 'fire potential index'which can translate and covey ground situations from different areas in a usable form to various relevant state agenciesfor preparedness to combat threats of wildfire. This may be achieved bydevelopingsimple indicators forground based observations, training of village forest councils on indicators, developing geo-referenced communication through mobile app or simple text message. This approach further can be extended to other vigilant citizens for reporting who met with any disastrous event accidently or on route. Such approach may bring effective preparedness, reducedchances offorest fire, and resource optimization to combat any disastrous event of forest fire.

Key words: Himalaya; Forest Fire; Citizen Science; Mobile Phone; Preparedness

A30: MANAGEMENT OF ENVIRONMENT THROUGH RECYCLING OF WASTE PAPER AND PLANT FIBRES IN HANDMADE PAPER CREATING EMPLOYMENT FOR RURAL PEOPLE

Rohit Shukla[1], Arpana Pandey[1], T. C. Sharma[2], Anupam Dikshit[1]

[1]Centre of Science and Society, IIDS, University of Allahabad, Prayagraj – 211002
[2]Department of Rural management, Dev Sanskriti Vishwavidyalaya, Shantikunj, Haridwar-249411
Email: anupambplau@rediffmail.com

Waste paper and plant fibres representing a type of solid wastes are dumped in huge quantities in rural area of India annually creating environmental hazards. Recycling of these wastes is an alternative option and may contribute towards livelihood of rural people as these small

scale industries are known to convert waste into wealth. A low cost method is developed to recycle waste papers, surgical bandages and waste plant fibres that are collected from rural area of Haridwar and then converted it into an eco-friendly handmade paper using variable thickness ranging from 0.129 to 0.144 mm. Accordingly other parameters viz.; GSM from 250 to 350; burst index from 2.7 to 4 kPam²/g and tensile index were from 55.13 to 65.53 Nm/g may vary depending upon their utility. Thus, the current technology is cost effective than the traditional paper making ones.

Key words: Hazards; Recycling; Employment; Waste into wealth; Handmade paper; Cost effective

A31: MICROBIAL BIOMASS PHOSPHORUS UNDER DIFFERENT LAND USE SYSTEMS OF CENTRAL HIMALAYA

Surendra Singh Bargali

Department of Botany, DSB Campus, Kumaun University, Nainital-263002, Uttarakhand
Email: surendrakiran@rediffmail.com

Microbial biomass phosphorus (MBP) was estimated for five predominant agricultural land uses including (i) open cropland (OC), (ii) cropland with multiple tree species (C+mT), (iii) cropland with single tree species (C+sT), (iv) Homegardens (HG) and (v) Agriculturally discarded land (ADL). The highest values of soil phosphorus and phosphorus stock were recorded in C+mT system (0.042 % and 0.73 t ha^{-1}) whereas lowest in ADL system (0.033 % and 0.59 t ha^{-1}). The range of microbial biomass phosphorus and microbial quotient varied from 18 (OC) to 25 µg g^{-1} (C+mT) and 4.92 (OC) to 6.18 % (ADL), respectively. The MBP decreased with increasing altitude and was maximum during the rainy season. Soil MBP showed significant correlation with altitudes, systems, abiotic variables, physico-chemical properties of soil and vegetation parameters. This study concludes that tree based systems should be preferred as an agriculture management practices to promote microbial diversity, their activities and soil quality enhancement in the Central Himalayan region.

Key words: Decomposition; Land use systems; Microbial biomass; Mineralization; Soil phosphorus.

A32: REMOVAL OF LEAD (II) IONS USING BIOPOLYMER-MAGNETIC SPINEL FERRITE COMPOSITE

Mukesh Kumar[1], Harmanjit Singh Dosanjh[2], Harminder Singh[2]

[1]Oil and Natural Gas Corporation, Mumbai, Maharashtra-400051, India
[2]School of Chemical Engineering and Physical Science, Lovely Professional University, Phagwara, Punjab-144411, India
Email: harminder_env@yahoo.com

Magnetic nanoferrites are getting attention of researchers as an alternative adsorbent for the removal of various pollutants from wastewater. In order to increase the selectivity, nonoferrites can be modified to increase their selectivity towards a particular kind of pollutant. In the present study the sodium alginate was used to modify the surface of spinel copper ferrite develop Copper ferrite-alginate beads (CuFN-Alg beads) for the removal of Pb(II) metal ion from water. The adsorbent was characterized with different analytical methods viz. FT-IR spectroscopy for confirmation of spinel character and coating of alginate, XRD to determine crystalline structure before and after modification of nanoferrite, TEM to observe surface morphology, EDS to determine elemental composition, BET to find surface area and pore volume, TG-DTA to see thermal behaviousand pH point zero charge (pH_{zpc}). The kinetic, thermodynamic and regeneration studies indicated that CuFN-Alg beads are suitable eco-friendly alternatives to remove Pb(II) ions from polluted water.

Key words: Copper ferrite; Surface modification; Copper ferrite-Alginate beads; Lead ions removal; Regeneration.

A33: A STUDY ON PHOTOCATALYTIC DEGRADATION OF SOME SPECIFIC DYES BY USING NANOMETALCHALCOGENIDES

Harendra K. Sharma

School of Studies in Environmental Science, Jiwaji University, Gwalior (M.P.) India
Email: drhksharmagwl@gmail.com

Organic dyes are the largest group of pollutants discharged into water streams from many textile leather, paper printing, cosmetic and pharmaceutical industries. Various methods are being adopted to remove pollutants from the water, however these methods are not efficient to remove the dyes pollution. Recently transition metal oxide and chalcogenide based nanostructured photocatalysts attracting researcher's attention for degrading dyes pollution under irradiation of visible and UV light. Present work focuses on synthesis of transition metal oxide and chalcogenide based nanostructured materials for evaluating their photocatalytic activity to removal of dyes from aqueous medium. Dyes degradation efficiency of synthesised nanomaterials were tested under various optimised conditions such as effect of contact time, effect of dose, effect of concentration and effect of pH. Some characterization techniques transmission electron microscopy (TEM), X-ray diffraction (XRD), particle size analyzer (PSA) and ultraviolet-visible spectroscopy were used for material characterization.

Keywords: Dyes degradation; Nanomaterial; Photocatalysis Uv-visible radiation

A34: ALGAE: A POTENTIAL NATURAL FEEDSTOCK FOR SUSTAINABLE, RENEWABLE, ECO-FRIENDLY AND TECHNO-ECONOMICAL BIO-FUEL FOR FUTURE- *A CASE STUDY*

G Panduranga Murthy[1], Rajesh Kumar[2]

[1]*Dept. of Engineering Chemistry, Maharaja Institute of Technology, Thandavapura, Nanjanagud Taluk, Mysuru District, 571 302, India*
[2]*University Department of Chemistry, Ranchi University, Ranchi, 834 001, India*
Email:pranga.leeja@gmail.com

Microalgae have been recognized as most eventual feedstock for biodiesel production owing to its significant lipid contents and they are found to be simple with respect to its cultivation. The imperative factor is that, the algae can extenuating carbon dioxide emission and can mount-up lipids at highest level. The current study has been focussed on production of biodiesel from the freshwater algae, *Chlorella vulgaris* which is one of the plentiful reserves and explicitly collected from its own natural habitat as wild stuff. The algal material then subjected for processes by employing the integration of bio-engineering technologies, the maximum lipid content is explored from *C. vulgaris* even it is fully fledged at its natural habitat condition. The fatty acid profile indicates that, the average polyunsaturated fatty acids (71.6%) and the oil proportion from lipid fractions of *C. vulgaris* are found to significantly higher as compared to other algal types depicted in the literature. The specific correlation between oils of algae and the vegetable oils reveals that, the algal oil found to be highly viscous, ranging from 10-20 times. Subsequently, the transesterification of the algal oils to its analogous fatty ester is the most promising elucidation to the quandary of high viscosity. The optimum biodiesel yield of 89.65 % is achieved at 70th minute with the formation of 8.6 % glycerol and 2.4% soap, the reaction conditions are simplified and standardized to facilitate a single step extraction from wild culture of *C.vulgaris* and the quantitative conversion of triglycerides into biodiesel is achieved at the optimum level. In the characterization, the algal diesel show higher Heating value of *C. vulgaris* (34.5MJ/kg), Gross Calorific value (42.3KJ/Kg), Cetane value (55.56) and the significant out-put is noticed. Further, the parameters on performance and combustion are analyzed with internal combustion (CI) engine system using the different blends of algae esterified oil and petro-diesel at variable

loads. The results of AB20 (20% algae oil + 80% pure diesel fuel) blend reveals that, preferred brake thermal efficiency (çB), brake power (BP), Engine power and higher brake specific fuel consumption (BSFC) are considerably higher due to momentous heating value compared to pure petro-fuel. The enviable characteristics for emissions is recorded for AB20 fuel blend ratio such as, smoke density (SD), lower carbon monoxide (CO), hydrocarbons (HCs) and smoke respectively. Interestingly, the oxides of nitrogen (NOx) emissions are reduced with increasing load as compared to the base engine piston. The results finally show that; AB20 are found to be most promising blend ratio and considerably noteworthy in the naturally grown C. *vulgaris* with respect to all the parameters. In addition, the exploitation of this algae oil for the existing engine system does not require any modification and hence, this can be a most potential alternative potential source for biodiesel production for sustainable development with techno-economical feasibility. Therefore, the choice of algal bio-fuel has been admitted with the criteria such as fuel optimum production, storage stability and compatibility with transportation fuel infrastructure.

A35: FULBRIGHT-NEHRU FELLOWSHIP OPPORTUNITIES IN THE U.S.

S Lalitha Nagesvari

United States-India Educational Foundation, Fulbright Commission in India, American Consulate Building | 220 Mount Road | Chennai 600 006

Email: lalitha@usief.org.in

The 15 minute presentation will provide an overview on Fulbright-Nehru, Fulbright-Kalam and other Fulbright Fellowship, jointly funded by the Governments of India and the United States through the United States-India Educational Foundation (USIEF), the Fulbright Commission in India. The Fulbright Fellowships provide fully-funded opportunities for Indian academics, students and professionals to visit the United States for study, research or to teach, and provides opportunities for American citizens to visit India for similar professional development purposes. The presentation will discuss the various grant categories, disciplines offered, eligibility criteria and requirements of the fellowships (Website: www.usief.org.in).

107TH INDIAN SCIENCE CONGRESS

January 3-7, 2020, Bangalore

IV

ABSTRACTS OF ORAL PRESENTATIONS

ORAL PRESENTATIONS

SYMPOSIUM - I:

BALANCING ENVIRONMENTAL CONSERVATION AND SUSTAINABLE DEVELOPMENT IN INDIA

R01: CASSIA ANGUSTIFOLIA - AN ECONOMIC IMPORTANCE WITH SPECIAL REFERENCES TO THAR DESERT

Poonam Singh Jakhar, Achala Ram Choudhary

Rajasthan Environment Education Association, Jodhpur (Raj.) – INDIA
Email: poonamsinghjakhar@gmail.com; achalaram201@gmail.com

This paper will highlight the economic importance of *Cassia angustifolia* in Thar desert. Commonly known as Senna (*Cassia angustifolia*) it is an important medicinal shrub which has successfully been grown in hot arid areas. Senna is a reputed drug in Unani medicine, which has also been adopted by the pharmacopoeias of the world. It is a multi branched, erect and bushy shrub, perennial in nature and can be harvested up to 2-3 years if cultivated once. It is useful in habitual costiveness. It is used as expectorant, wound dresser, antidysentric, carminative and laxative. Useful in loss of appetite, hepatomegaly, spleenomegaly, indigestion, malaria, skin diseases, jaundice and anemia. Leaves are made into a paste, and applied to various skin diseases. It gives good economic returns to the farmers and local people even in severe drought conditions when agricultural crops fail which ultimately helps in the poverty alleviation of rural poor. About 6000 tons of *C. angustifolia* dried leaves and pods are exported from India to other countries every year. The market value of dried leaves is ranging from Rs. 15 to Rs. 60 per kg depending on the leaf quality. Present paper presents an economic importance of *Cassia angustifolia* in Thar Desert.

Key words: Senna; Malaria; Medicine; Skin; Thar Desert

R02: NEW APPROACHES TO WATER PROJECTS IN INDIA

Ranjit Singh[1], Gayatri Pandey[2], Chandan Kumar Soni[2]

[1]Sri Shankar College, Sasaram, Rohtas, Bihar
[2]S. P. Jain College, Sasaram, Rohtas, Bihar
Email: emailtoranjitsingh@gmail.com

As high – cost infrastructural investments become tough to come by, new approaches are needed to promote and implement urban water projects. This article highlights some of the innovative approaches for better water management in urban India.

Key words: *Water projects; Clean drinking water; Recycling; Waste water; Sanitation*

R03: A REVIEW OF PLANT BIODIVERSITY IN VARIOUS REGIONS OF INDIA

Ranjeet Singh

Pt. Chiranjilal Sharma Government College, Karnal
Email: ranjeet.s71@gmail.com

In different geographical area of India, large number of plant species has been reported by different taxonomist.The term Biodiversity is related with the species richness initially (number of different species in a location/sample) but later on it considered ecological and genetic diversity also. Nowadays, biologists described the biodiversity as the "totality of genes, species, and ecosystems of a region". The number of species of plants spreaded over hot and arid environment in the northwest to high cold arid weather conditions in upper Himalayan region; Northeast India (tropical wet evergreen dense forest) and the Western Ghats; Sunder bans area (mangroves rich) and a wide range of aquatic ecosystem. The angiosperms are approximately 17926 in number representing about 7 % of the total described species in the world. Out of this 5725 species are endemic type. Another group, Gymnosperms are also one of the important plant group and about 58 taxa of this growing in world including 15

genera and 8 families in India. Another group of plants, Pteridophytes, represented by about 1200 taxa and 204 genera distributed in various geographical regions of India. Around 88% species of fungi belongs to Ascomycotina, Basidiomycotina and Deuteromycotina classes of fungi. Bryophytes, represented by 2800 species which are widely distributed in Himmalyas and Peninsular India which have high humidity and heavy precipitation. Mosses as bryophytes have around 2000 species belonging to 342 genera and 54 families. Algae, as an important photosynthetic plant represented by 666 genera and 6500 species in Indian conditions. Out of total about 1924 species are endemic to Indian habitat. The marine algae show 50% Rhodophyceae species, 25% Chlorophyceae species, 22% Phaeophyceae species and 3% Cyanophyceae. Due to natural and man made factors, biodiversity of Indian region is under big threat and leads to depletion of certain species.

Key words: Algae; Fungi; Angiosperms; Gymnosperms; Pteridophytes; Biodiversity

R04: ASSESSING SPATIAL RELATIONSHIPS OF VPS VIS-À-VIS FOREST FIRES USING EXPLORATORY SPATIAL DATA ANALYSIS

Stutee Gupta[1], T. Dharamaraj[2], Shikha Anand[1], Vishesh Mathur[3], Ravi Sankar T[1]

[1] National Remote Sensing Centre, Balanagar, Hyderabad
[2]Andhra University College of Engineering, Andhra University, Vishakha Patnam
[3]University of Petroleum & Energy Studies(UPES), Dehradun
Email: stutee_g@nrsc.gov.in

Forests across the world are in the state of flux and so also the state of people depending on them. Forest Fires (FFs) represent one of the complex issue that causes adverse impacts on the forests at one end and life of the people on the other. Though it is a matured discipline in terms of technology applications, we have not been able to solve the issue. It is wodely recognised that neither the Government machinery nor the people can deal with the problems of FF individually. This realization has lead to the wide range of integrated approaches of fire management across many countries in the world. Van Panchayats (VPs) are looked upon as an important component of forest fires management framework in the state of

Uttrakhand that has a consistent history of forest fires. There are also instances where VPs will have logjams with the forest department for being held responsible for the FFs. The current understanding of relationship of the FFs and the VPs are very limited and biased. This study is therefore a novel attempt to analyze the space and time stamped fire event satellite data and its relation to the location of the VPs in the state using geospatial tools towards effective participatory approach for forest fires management.

Key words: Forest; Fire; VP; GIS; Hotspot

R05: METHANOL BLENDING AS A RENEWABLE FUEL IN AUTOMOTIVE INDUSTRIES TOWARDS MINIMIZING VEHICULAR AIR POLLUTION: CHALLENGES AND OPPORTUNITIES IN INDIAN AUTOMOBILE INDUSTRIES

AG Matani

Government College of Engineering, Amravati – 444 604 [M.S.] India
Email: ashokgm333@rediffmail.com, dragmatani@gmail.com

Developing renewable energy has become an important part of a worldwide energy policy to reduce greenhouse gas emissions caused by fossil fuel. Alternative transport fuels such as hydrogen, natural gas and biofuels are helping the transport sector in decreasing its dependency on oil and reducing its environmental impact. Adding methanol into gasoline or diesel allows the fuel to have a complete combustion with the present of oxygen which increases its combustion efficiency and reduces greenhouse gas emission. In terms of application, Brazil has successfully and widely used methanol as a fuel for spark ignition engine operation. In the United States,10% methanol blended with gasoline known as gasohol is available at thousands of petrol service stations as an automobile fuel. Methanol has emerged up as a sustainable fuel for IC engines in past few decades due to its characteristics of soot free burning and higher efficiencies at less cost. The EU has set a 10% renewable energy requirement for the transport sector, to be complied with by 2020. In 2010, the use of renewable energy by the transport sector was 4.70%, 91% of which was covered by biofuels. Problems related to fuelling engines with gasoline methanol blends (methanol fuels) will be

discussed but the the most important problem is phase separation, which can be solved with solubility improvers added to methanol fuel.

Key words: Low-emission polluting fuels; Alternative transport fuels; Combustion efficiency and greenhouse gas emission; Higher blending octane; Anhydrous ethanol blends

R06: REMOVAL OF CHROMIUM FROM AQUEOUS MEDIUM BY BENTONITES

Ashok Kumar Jha

University Department of Chemistry, T. M. Bhagalpur University, Bhagalpur
Email:ashokjha39@gmail.com

Bentonite is a hydrated alumina-silicate clay composed of the smectite class mineral Montmorillonite. The percentage of silica varied from 35.60% to 47.52% whereas percentage of alumina varied from 26.90% to 32.94%. Though many adsorbents eg fly ash, coal, activated slag and agricultural wastes have been tried, bentonites have been found to be a good adsorbent and ion exchanger for heavy metals. Fixed mass of bentonites has been treated with 100ml 2ppm Cr(VI) up to different interval of time as a result of which concentration of Cr(VI) decreases up to 0.05ppm obeying first order kinetics. Thus bentonites may be exploited as an eco-friendly method of removal of Cr(VI).

Key words: Bentonite; Cr(VI); Montmorrillonite; Ion exchanger

R07: AN ASSESSMENT OF WATER QUALITY FOR DRINKING PURPOSE IN AGRA CITY INDIA

Ashish Kumar

Chemistry Department, Agra College, Agra
Email: ashishx1@rediffmail.com

This paper presents a geochemical evaluation of the various parameters of drinking water sources of Agra city. Groundwater quality shows wide variations which depends upon depth, hydrogeological conditions and human activities. Ten samples of bottled water were purchased from local markets. Four samples of different R.O. systems output waters being used; two samples of tap water from different locations were collected in clean sterile bottles while ground water samples were taken from bore wells from various locations in different parts of city. Agra is situated on the banks of Yamuna River known for its brackish water, also the south-west side of city lies near fluoride rich area of Rajasthan. Therefore, the use of bottled water and domestic RO systems as source of drinking water is gaining momentum day by day. These facts make this study even more relevant. It is observed that the fluoride levels in bottled water are below recommended limits (0.07-0.35 mg/l) whereas in ground water fluoride levels are much higher. The groundwater samples also show higher values of hardness, TDS. The spatial distribution of fluoride, as estimated by geochemical assessment, agrees well with the incidence of dental and skeletal fluorisis. Apart from already affected people, a larger part of population is at risk. Similarly estimation of other parameters like hardness etc. agrees well with observed ill effects.

Key words: Agra; Drinking water; Fluoride; Bottled water; TDS

R08: ADSORPTION OF HEXAVALENT CHROMIUM USING CALCINATED EGGSHELL

B Santhaveerana Goud, Prathibha D, Alen Sukumar

Department of Civil Engineering, University Visvesvaraya College of Engineering, Bangalore University, Bangalore, Karnataka, India,
Email: drbsvgoud23@rediffmail.com; jayasgoud@rediffmail.com

The pollution of air, water and soil with heavy metals has increased due to the expansion of industrial activities. Hexavalent chromium is a heavy metal which is very toxic and mutagenic. Adsorption is one of the techniques for the treatment of heavy metal containing wastewater. Hence, the study aims at the removal of hexavalent chromium from wastewater by adsorption technique. The physico-chemical characteristics of the adsorbent (calcinated eggshell) were examined and optimum conditions for hexavalent chromium removal using calcinated eggshell was investigated. Suitable adsorption isotherms and reaction mechanisms of adsorption by calcinated eggshell powder by kinetic studies for the removal of hexavalent chromium was also made. The initial physico-chemical characteristics of the calcinated eggshell satisfied the requirements for the adsorption of heavy metal. From the batch studies, it was observed that 92.2% of hexavalent chromium was removed at pH6, dosage-0.03gm/50ml and contact time-60 minutes, mixing rate-100 RPM and an adsorbent size-75 μ. Multilayer adsorption and heterogeneous surface conditions were observed. Temkin isotherm was found to be a better fit for the adsorbent. The adsorption kinetics showed that pseudo-first order equation provides the good correlation of the experimental data. It can be inferred from this study that the physisorption mechanism is the rate controlling step.

Keywords: Hexavalent chromium; Calcinated eggshell; Adsorption isotherm; Kinetic studies

R09: SEASONAL VARIATION AMONG EXTRACELLULAR ENZYMATIC ACTIVITY (EEA) ANDTHEIR INFLUENCE ON THE PERFORMANCE OF SURFACE - FLOW CONSTRUCTED WETLAND MICROCOSM (CWM)

Saroj Kumar, Venkatesh Dutta

School of Environmental Science (SES), Babasaheb Bhimrao Ambedkar (A Central) University, Lucknow, UP, INDIA- 226025
Email: sarojbhargava73@gmail.com

Eight small-scale wetlands planted with threemacrophytic species were constructed for domestic wastewaterpurification. These were *Pistia stratiotes*, *Phragmites karka* and *Typha latifolia*in single as well as in combination with each other. The objective of this study was to determine the correlations between contaminant removaland soil enzyme activity with respect to time in the constructed wetlands microcosms. The results showed thatcorrelations between contaminant removal efficiency and enzyme activity varied depending on the contaminants.The removal efficiency of NH_4^+, $NO_2^-$$NO_3^-$was significantly correlated with urease activity in all wetlands.Removal of total phosphorus and soluble reactive phosphorus was significantlycorrelated with phosphatase activity in most wetlands, while the removal of biological oxygen demand (BOD) andchemical oxygen demand (COD) was significantly correlated with enzyme activity only in a fewinstances. Significant correlations between enzyme activityand root biomass and between enzyme activity and root growth were found mainly in *Phragmites karka* and *Typha latifolia*wetlands. Enzyme activities and root activity showed singlepeakseasonal patterns. Activities of phosphatase, urease, and cellulase were significantly higher in thetop layers (0-5 cm) of the substrate than in the deeper layers (5-15 cm).

Key word: Constructed Wetland Microcosms; Enzyme activity; Macrophytes, Contaminant; Removal performance

R10: CONSERVING AQUATIC INSECTS AND ITS SUSTAINABLE DEVELOPMENT: A PERSPECTIVE FROM ITS EDIBLE PROPERTIES

Sasanka Sekhar Ghosh, Karobi Bhuyan Saikia

Department of Zoology, Cotton University.
Email: karobisaikia24@gmail.com

Although insect community as a whole plays a very important role in maintaining the stability of the ecosystem they inhabit, they seldom receive the importance from researchers and scientists. According to latest findings, the estimate of current proportion of insect species decline is 41% which is twice as high of the vertebrates. Thus, a conservation strategy must be devised wherein; the population can be involved in conserving organisms which may also serve the purpose of providing food and nutrition in the coming future. The present study based on the findings of last 4 years, covering most of the indigenous tribes of the North Eastern states of India, identifies 3 species of edible aquatic insects namely *Lethocerus indicus, Laccotrephes sp.*, and *Dytiscus marginalis* which contain crude protein ranging from 30.05% - 82.56%, crude fat 4.01% - 40.65%, carbohydrate 1.57% - 46.95% and total solids 91.13% - 97.53% and explores the health benefit provided by them and thus popularize them in mainland India and the rest of the world. Popularizing edible insects as a cheap source of protein and nutrition will automatically necessitate its rearing and conservation of its natural habitat which are mainly fresh water lakes and wetlands. It also opens up income avenue for the rural folks thereby achieving the double aim of biodiversity conservation and sustainable development.

Key words: Edible insects; Conservation; Entomophagy; Nutritional value.

R11: IMPACT OF COPPER SULPHATE ON FRESH WATER FISH

Shashwat Katiyar, Kaveri Shukla

Department of Biochemistry, Iinstitute of Biosciences and Biotechnology, CSJM University Kanpur (U.P.)
Email: kvrshukla101@gmail.com

The aquatic ecosystem along with it's fauna is currently facing a huge threat in the form of heavy metal pollution. The human health is also adversely affected due to the elevated contamination and alarming toxic level of heavy metals. Agricultural and industrial waste plus activities majorly contribute to the increased levels leading to changes in enzyme activity, histopathological damage and toxicity in form of oxidative stress in fishes. Copper has shown harmful effect at high concentration in form of acute toxicity, free radical production, chromosomal aberrations, tratogenicity and biomagnifications. ASAT, ALAT, catalase & protein content parameters helped in investigating the hazardous effect of heavy metal contamination in fishes and humans.

Key words: Aquatic ecosystem; Copper; Heavy metals; Oxidative stress; Acute toxicity

R12: MICROBIAL LOAD OF AMBIENT AIR VIS-A–VIS METEOROLOGICAL PARAMETERS IN URBAN CONDITION

Meghna Talukdar[1], Asmita Sinha[1], Subhajit Chakraborty[1], S. Xavier[2], Sharadia Dey[2]

[1]Department of Microbiology, St Xavier's College (Autonomous), Kolkata
[2]Department of Environmental Studies, St Xavier's College (Autonomous), Kolkata
Email: talukdar.meghna@gmail.com

The large scale industrialization has caused a massive effect on the air quality. This has further led to a dynamic change in the inhabitant air microflora population. This investigation focuses on the identification and study of the inhabitant microflora in the ambient air of St.

Xavier's College (located at the heart of Kolkata city) vis-à-vis meteorological parameters such as relative humidity, temperature, wind speed etc. along with UV as these occurring phenomena have major influence on air borne bacteria and fungi concentration level. Two specific samplings were carried out at different atmospheric parameters of UV, humidity, temperature, wind speed and wind direction. It was observed that the number of colonies were more during the day time as compared to noon. It was also studied that the CFU was more during day when the temperature and UV were higher while the wind speed and humidity lower. Although the variety of organisms remained same, namely *Staphylococcus aureus*, *Enterobacter* spp. and *Klebsiella* spp. and two fungal colonies namely *Curvularia* spp. *Aspergillus* spp., there was no significant increase in the population. It can be assumed that all of them contribute towards airborne infection.

Key words: Microflora; Airborne infection; Meteorological parameters; Bacteria; Fungi

R13: IMPLEMENTATION OF IMPROVED CULTIVATION AND ADVANCE RETTING EXERCISE FOR JUTE -ICARE IN ASSAM AS PILOT PROJECT: SPECIAL REFERENCE TO KHARUPETIA D.P.C. IN THE YEAR 2017-2018

Nabajyoti Doley

Department of Philosophy, Mangaldai College, Assam
Email: nabajyotidoley@icloud.com

Improved Cultivation and Advanced Retting Exercise for Jute (Jute- ICARE) was launched in 2015 to popularize some of the better agronomic practices and recently developed microbial-assisted retting among farmers intensively in a few blocks in West Bengal and Assam on pilot Basis.Central Research Institute for research in Jute and Allied Fibres (CRIJAF)developed a microbial consortium called SONA, to enhance the quality of fibre yield by 20% as well as its quality in terms of grade by at least 1½ grades. The pilot project was implemented in many districts of Assam. Darrang district is one of the very important district as per as Jute Cultivation is concerned. The present study is the implementation of ICARE-JUTE in the year 2017-18 in Kharupetia D.P.C. Under Darrang District. There are

500 registered farmers in this D.P.C. and these farmer used to cultivate in 2000 Bighas area of Land. Farmers have got good quantity of Jute seed JRO 204 for their cultivation. Retting with the use of CRIJAF-SONA powder is beneficial. After implementation of JUTE-ICARE project the farmers have able to produce more Jutes then earlier and they have become economically strong and independent.

Key word: Jute ICARE; CRIJAF; Farmers; Retting; Seed JRO 204; Kharupetia D.P.C

R14: STUDY ON CONSERVATION OF VICTORIA LAKE AND ITS AQUATIC BIODIVERSITY: A CASE STUDY OF LOHARDAGA, JHARKHAND

Prasanjit Mukherjee[1], Jyoti Kumar[2]

[1]Plant Taxonomy and Ecological Research Laboratory, Department of Botany, KKM College, Pakur, [2]University Department of Botany, Ranchi University, Ranchi
Email: prasanjitmukherjee701@gmail.com

Victoria Lake popularly known as bada talab is situated in the heart of Lohardaga. The total area of the pond is about 17 acres with an average depth of 8-14 feet. The lake harbors a variety of aquatic flora. A regular study is being conducted to report the prevalence of different aquatic plant species in different season. Same time the biodiversity changing pattern in the lake was also recorded. Study conducted in the year 2009 reveals the presence of 38 species of aquatic and semi aquatic plants .Similar study was conducted in the year 2018 shows the drastic deteriotion of aquatic biodiversity, only 20 species were reported .The main reason of the deteriotion of aquatic biodiversity is the gradual invasion of the aquatic alien invasive.The unique features of the lake is that, during the last 24 years is the aquatic biodiversity has been changing in a great pace .In the earlier days of study the water of the lake was very clear and there was no *Eichhornia crassipes* in the lake ,species like *Potamogeton, Trapa, potamogeton, ceretophyllum, Nelumbo, Nymphaea, Ludwigia, Ipomea, Lemna ,Spirodella, Wolfia, Hydrilla, Hygrorhiza* were in abundance. But once the *Eichhornia* was introduced in the lake, the whole lake was covered with the same

species. Then there comes the time of *Alternanthera philexoroides* which was reported as suppressing the growth of *Eichhornia* Covered the complete lake. Again all these are replaced by *Nelumbo* and spreaded over the whole lake. Sometimes the lake was covered with *Azolla* the aquatic fern. Presently due to continuous death and decay of *Eichhornia* along with other aquatic species the depth of lake has been greatly reduced and the species of *Cyperus, Typha, Canna,* etc. are covering the lake beside *Eichhornia, Alternanthera, Ipomoea and Ludwigia*. The growth of the said species indicated that the lake was in its dying state, so a plan was sent to the state government to protect the lake and the state govt. took immediate action and finally the depth of the lake was increased in the year 2018-2019. The present condition of the lake is that the lake has sufficient water after the rain. But due to the beautification part the size of the lake became small. Only six species were report in august 2019.

Key words: Biodiversity; Alien Invasive; *Eichhornia crassipes*

R15: GLOBAL WARMING AND CLIMATE CHANGE

Radhashyam Muduli

Ex.Addl.GM/NTPC Ltd., Bhubaneswar
Email: rsmuduli@yahoo.co.in

Climate change is the outcome of global warming. A continuous warming of environment on daily basis over last mere 500 years has resulted in this disaster out of excess human activities upon nature with technological advancement s. By now the conditions are too severe and scientists are keeping themselves busy and hurried to find out any cluefor the same to check this undesirable calamity. Though our scientists have established some facts responsible for global warming, it is not complete. For this reason the monster of global warming is approaching too fast on the earth andit was not predicted by the scientists. Even today they are unaware of the technological reason that is contributing more for global warming than their familiar known facts. The fact that global warming is happening due to emission of green house gases is true and it is contributing only less than 50% of the net effects and this is an indirect method of global warming. The major factor that is responsible more than 50% of the net

effect is a direct method and that is waste heat coming out of different industrial processes at factories and at home. These waste heats being rejected from the process find no way but enters the atmosphere and warms the ambient air directly by raising its temperature. A bright example of direct heating of ambient air is waste heat from thermal power and nuclear power plants. In these power plants only 40% of the heat generated in steam generator and nuclear reactors is converted into electrical energy, and rest 60% of energy is simply rejected and dumped into the environment. This rejected heat is chiefly responsible for a substantial part of global warming. Also installations of domestic and industrial refrigerators and air conditioners whose numbers have multiplied many folds these days act as heat pumps to raise ambient air temperature. Since scientist have not considered these effects for global warming, at present the warming rate is far more than it was predicted by them. Since global warming is man made with unlimited industrial activities and power generation from fossil fuel sources, this can be reversed and for this the modern man has to cooperate and sacrifice a lot of their luxuries.

Key words: Global warming; Climate change; Fossil fuels; Heat pump; Reversing global warming

R16: ARSENIC (AS III & AS V) REMOVAL FROM WATER USING BIOCHAR DERIVED FROM SEWAGE SLUDGE

Sampurna Nand

CSIR-National Botanical Research Institute, Lucknow, Uttar Pradesh, India
Email: nandsam1005@gmail.com

Arsenic is a naturally occurring metalloid in the earth's crust and is a potential human carcinogen. Several technologies have been applied for mitigation of arsenic contaminated water such as filtration, coagulation, membrane separation, ion exchange, etc. But these methods are less effective, requiring high material costs, high energy requirements, and generation of sludge. To overcome these limitations, biochar derived from municipal solid wastes and sewage sludgehas been emerged as a efficient approach to treat arsenic contaminated water in a more specific and accurate way. It was used as adsorbent for

As(V), As (III) removal from aqueoussolutions.The kinetic study showed that sorption can be well described by the pseudo-second order kinetic model. Biochar derived from sewage sludge was efficient in removing 53%, 62% of As(V) and As (III), respectively. Its ash high Fe_2O_3 content may have enhanced metal adsorption via precipitation.

Keywords: Arsenic; Sewage sludge; Biochar; Removal; Contamination

R17: GENETIC ALGORITHM COMBINED WITH LEAST TRIMMED SQUARE REGRESSION FOR ESTIMATION OF LEAF CHLOROPHYLL CONTENT USING HYPERSPECTRAL RADIOMETER DATA

Prashant K Srivastava[1], Manika Gupta[2]

[1]Institute of Environment and Sustainable Development, Banaras Hindu University, Varanasi-221005, Uttar Pradesh, India
[2]Department of Geology, University of Delhi, New Delhi, India
Email: prashant.iesd@bhu.ac.in

Hyperspectral sensors provide data in contiguous spectral channel and is much better as compared to multispectral images in context of spectral resolution. However, the data suitability for chlorophyll prediction using different machine learning techniques is still in question. Therefore, the main goal of present research is to evaluate the Genetic algorithm combined with least trimmed square regression (GALTS) for chlorophyll prediction. The different indices developed using the hyperspectral radiometer data and a field-based measurement was used to train the model for chlorophyll prediction. The overall analysis indicates that the GALTS is performing better than linear regression model for chlorophyll prediction.

Key words: Genetic algorithm; Hyperspectral data; Chlorophyll content; Least trimmed square regression

R18: IDENTIFICATION AND CHARACTERIZATION OF NATURAL DIES FROM JATROPHA CURCAS, TERMINALIA CHEBULA, CAMELLIA SINENSIS AND MUSA PARADISIACAL OF DARRANG DISTRICT, ASSAM

Kangkan Medhi

Mangaldai College, Darrang, Assam
Email: kangkan.medhi@gmail.com

The use of natural dyes can be traced from the time immortal. There are several plants and plant products that can be used in dying cloths. These dyes are eco-friendly, less cost effective, long lasting, less toxic, pollution free and have lesser side effect to human health. On the other hand commercially available synthetic dyes are reported to have many side effects on human health and environment as well. Therefore, present study involves the identification of few natural dye yielding plants and their effectiveness in using in the textile industry.

Key words: Dye; *Jatropha curcas; Terminalia chebula; Camellia sinensis; Musa paradisiaca*

R19: SPECTROPHOTOMETRIC ANALYSIS OF POORLY WATER SOLUBLE DRUGS: AN ECO-FRIENDLY PHARMACEUTICAL APPLICATION OF HYDROTROPIC SOLUBILIZATION TECHNIQUE

Kavita Sharma[1], Ketan Soni[2]

[1]Shri Vaishnav Institute of Forensic Science, SVVV, Indore
[2]Research Scholar, Shri Vaishnav Vidyapeeth Vishvavidhyalaya, Indore
Email: kavitasharma5872@gmail.com

Hyderotropes provide a simple, efficient and green platform for various industrial, organic transformations, Moreover, being economic, non-toxic, non-flammable and eco-friendly, hydrotropic solutions possess surplus physical and chemical features required as alternate

green solvents for organic reactions. Another important characteristic of the hydrotropic medium is its simple recovery from the reaction mixture and its recyclability. Furthermore, easy recovery of products from hydrotropic solutions makes this protocol an attractive green chemistry approach. Poor solubility is the main problem of maximum drugs in the pharmaceutical analysis and formulation development field. Many organic solvents like benzene, acetone, toluene, methanol, chloroform, ethanol etc. are used in spectrophotometric analysis of poorly water soluble drugs. These organic solvents are very costly and harmful. These organic solvents have adverse effect like eye irritation, liver damage, nausea, headache etc. therefore these organic solvents should be replaced by other solvents which are eco friendly. There are many techniques that are used in the enhancement of solubility of poorly water soluble drugs. Mixed hydrotropic solubilization technique is one of them. It is a phenomenon to enhance the solubility of poorly water soluble drugs. Blends of hydrotropic solution have been suggested in this technique. It is new, safe, cost effective and eco friendly technique for the spectrophotometric analysis of poorly water soluble drugs. The main objective of the present study is to increase the solubility of ornidazole drug in water soluble solubilizer which is present in the blends. Proposed method is new, safe, economic, and free from toxic organic hazardous solvents and the recovery studies have also been proved the accuracy of this method.

Key words: Solubility; Hydrotropic Solubilization; Water Soluble Drug

R20: IMPURE AQUA AND ENVIRONMENT

Meenu Verma

Kolhan University, Chaibasa, Jharkhand
Email: meenuverma2401@gmail.com

Polluted water and its effect on environment are burning and major issues all around the world. Impure aqua is now a day creating huge problem for human being as well as each and every creature present on the earth. Air, water, animals, tress etc are involved in environment. The Environment is a natural creation where human live collaboration with nature. According to the history of the earth, it was created about five hundred fifty crore years ago. On this

earth, the ecosystem was created about only ninety crore years ago. Where the human creation was evolve about fifty lakhs years ago. After the creation of earth, the environment and condition got changed day by day and water not remains pure due to the urbanization. Our country India is well known for the people living in the rural areas and our economical condition rested on cultivation done by farmers living in the villages. Due to the aquatic impurities farmers suffer a lot. In villages of India aquatic purifying systems are in least access which causes health of the villagers. Most of the villagers use water from open wells, rivers, tanks, and ponds etc which are open and polluted but clean aqua having with ideal Total Dissolved Solid (TDS) is essential for human being living in both rural and urban areas. It is high time government should take care of villagers because they are unable to manage fresh and clean aqua for drinking and new technology for setting up the bottling plants and alternative resource so that rural people could get clean and fresh water with a view to defeat the diseases and ailments, arise on account of drinking polluted water.

Key words: Aqua; pollution; environment; TDS

R21: STUDY OF THE AWARENESS ABOUT AIDS/HIV AMONG THE STUDENTS OF R. N. COLLEGE HAJIPUR BIHAR

Rakesh Mohan[1], Sushma Kumari[1], Vijay Kumar[1], Suchitra Kumari[2]

[1]Department of Zoology, R N. College, Hajipur
[2]B.R.A.B.University Muzaffarpur
Email: ranjan2270@rediffmail.com

In this research paper it was try to know the awareness of HIV /AIDS among the students of R. N. College, Hajipur by the method of questionnaire and interview. The research works were carried during the month of August 2019. A set of 15 questions were framed in the form of questionnaire to know the awareness of the HIV/AIDS among our students. A total of 900 students of different stream of Bachelor courses were interviewed with the help of the students of M. Sc. (Zoology).

Key words: Hajipur; AIDS awareness HIV; Monogamy; Unsafe sex

R22: COASTAL VULNERABILITY ASSESSMENT, ADAPTATION AND MITIGATION OPPORTUNITIES ACROSS CLIMATE HOTSPOTS IN KERALA, INDIA

Shyam S Salim, R Naryanakumar

Central Marine Fisheries Research Institute, Kochi - 682018, Kerala, India
Email:shyam.icar@gmail.com

Climate change has multi-dimensional impacts on environmental, fisheries, social, economic and development drivers and it necessitates development of appropriate mitigation and adaptation plans by government. Climate change hot spots –are 'live labs' where climate change impacts and its manifestations are observed "first". The South west India has been recognised as one among the twenty four hot spot regions identified globally.The hotspot area of south west India comprises of four coastal districts (South Zone: Thiruvananthapuram & Kollam and Central zone: Ernakulam and Alapuzha), as these regions with extensive backwaters fall within the upwelling ecosystem of the south-west coast of India, with rich diversity and supports substantial marine and estuarine fisheries and identified as major spawning gyre of many pelagic species based on fish and larval surveys. The study aimed identifying the extent of vulnerability and the component structure of the vulnerability category measured using the Likert-type response scale and to summarize the data into one or more sub-scales of vulnerability category that can be used as further models. Exposure, Sensitivity, and Adaptive Capacity data were collected using structured household questionnaires. A simple random sampling technique was used to obtain information from fisher households. Local people from the respective communities (mostly educated and committed women and proactive college students) were selected as evaluators. A composite vulnerability index approach was used to evaluate relative exposure, sensitivity, and adaptive capacity. The study quantitatively assessed the vulnerability of fishery-based livelihood systems using the combination of individual indicators. Since each indicator was measured on a different scale, they were normalised (rescaled from 0 to 1).After normalisation, the values were transformed into a four point scale, categorised as 0-0.25, 0.26-.50, 0.60-0.75 and 0.76-1.00 which were assigned score values 1 (low), 2 (medium), 3 (high) and 4 (very high), respectively.

These values were averaged to yield the three sub-indices for Exposure (E), Sensitivity (S) and Adaptive Capacity (AC) to ultimately calculate vulnerability (V). Sub-indices were combined to create a composite vulnerability index by using the following additive (averaging) equation: V=E+S-AC. In addition, the individual household vulnerability indices were calculated and were classified into low, moderate, high and very high with geo-spatial distribution and mapped using Open domain Quantum GIS (QGIS).The study assessed the coastal vulnerability of over 800 coastal households in the two identified marine hotspots, *viz*, Elamkunnapuzha and Poonthura /Beemapallypanchayats in Ernakulam and Thiruvananthapuram districts of Kerala, India using 198 attributes – exposure (36), sensitivity (37) and adaptive capacity (125). The results revealed that majority of the fisher households in both the villages were highly vulnerable to climate change with vulnerability of Poonthura (2.85) higher than Elamkunnapuzha (2.80). Apart from that the problems and prospects of the inhabitants in the sector and the importance of Alternative Livelihood Options (ALOs) in climate change adaptation was also assessed. Based on our assessment, it was understood that climate change has impacted coastal communities, mainly fishermen communities, as a result of which 69.52% of them needed alternative livelihood option supports. The study suggests the need for bottom up planning process with Local Self Government (LSG) leads. The study developed multi stakeholders platform Climate Resilient Village Adaptation and Mitigation Plans (CReVAMP) aimed at sensitising and improving the resilience of community towards climate change.

R23: EFFICACY OF MARINE ISOLATE *ACINETOBACTER BAUMANNII* IN TEXTILE DYE DEGRADATION

Sneha Unnikrishnan, Karthikeyan Ramalingam

School of Life Sciences, B. S. Abdur Rahman Crescent Institute of Science an Technology, Chennai- 600 048
Email: snehavarier@gmail.com

Reactive textile dyes containing azo groups are a major threat to the environment as they possess carcinogenic and mutagenic properties. In this study a strain of *Acinetobacter baumannii*isolated from the sea sediments was found to possess the ability to degrade various reactive azo textile dyes. Optimization of the process variables such as pH,

temperature, dye concentration, incubation time, inoculum volume and incubating conditions for dye decolorization were performed using one factor at a time (OFAT) approach. Box-Behnken Design (BBD) of Response Surface Methodology (RSM) was further used to optimize the process variables. Then the biodegradation is confirmed by taking the UV-Visible and FT-IR spectral scan and comparing the results of dye and degraded metabolites. Further, phytotoxicity assay is performed with *Vigna radiata* to check the toxicity of the dye and degraded metabolites. Docking studies were performed between the various dyes and the bacterial enzymes involved in dye degradation. Thus, *A. baumannii* can be employed in the treatment of the major environmental pollutant- textile dyes and further study in this regard can exploit the use of this bacterium to treat effluents from textile industries.

Key words: *Acinetobacter baumannii*; Box-Behnken Design; Response Surface Methodology; Phytotoxicity; Docking

R24: DIVERSITY AND SEASONAL VARIATION OF WETLAND BIRDS IN SACRED WETLANDS OF KURUKSHETRA, INDIA

Parmesh Kumar, Archna Sharma

Department of Zoology, Institute of Integrated & Honors Studies, Kurukshetra University, Kurukshetra, Haryana 136119
Email: parmeshkuk@rediffmail.com

Man-made, perennial and sacred wetlands of Kurukshetra, India provide important habitats to resident and migratory wetland birds. Bird surveys were conducted at four sacred wetlands for two annual cycles (April 2014-March 2016) to characterise their species richness, community composition and seasonality. Point counts and direct observations were used to record bird species. A total of 64 species of wetland birds belonging to 17 families and 8 orders were recorded, of which 34 were winter migrants, 25 were residents and five were summer migrants. Anatidae was the most diverse bird family. Species richness, abundance, diversity and evenness differed significantly ($P < 0.05$) between seasons as well as among wetlands but did not vary significantly between the two years. Four species are listed as near

threatened and one species as vulnerable in IUCN Red List. Moreover, six species having a globally declining population trend were found common in the study area. This reveals that study sites are the habitats for bird species of conservation priorities. Weed infestation and anthropogenic activities were the major threats to avifauna. It is expected that findings of the study will promote appropriate management strategies for conservation of wetland birds in these sacred ponds.

Key words: Diversity; Species richness; Abundance; Management; Wetland birds

SYMPOSIUM - II

PROMOTING ENVIRONMENTAL CONSCIOUSNESS IN DEVELOPING INDIA

R25: HEALTH ASSESSMENT OF RIVER GANGA THROUGH ESTIMATION OF OXYGEN SATURATION LEVEL IN WATER

RK Manna, BK Das, NK Tiwari, A Ray, MH Ramteke, T Bera, L Chakraborty

ICAR-Central Inland Fisheries Research Institute, Barrackpore, Kolkata – 700120.
Email: basantakumard@gmail.com

Dissolved oxygen, a prime requisite for survival of aquatic organism is often used to describe the riverine health condition. However, various factor like organic loading, algal formation, etc. used to influence it besides temperature and altitude. Recent survey during 2018-19 in lower and estuarine stretch of river Ganga revealed that more than 84.0% observation have low oxygen saturation level (Avg. 82.06%; range: 40.41-99.39%). On the other hand, supersaturated condition was obtained at Buxar, Patna. Balagarh and Tribeni during pre-monsoon mainly due to *Microcystis*bloom formation and at Balagarh and Tribeni in winter due to bloom by the diatom, *Aulacoseiragranulata.* Severe unsaturation was noticed at lowermost stretch from Godakhali to Fraserganj (Avg.71.41%; range:40.41-97.04%) probably due to the impact of city sewage.

Key words: River Ganga; Dissolved oxygen; Supersaturation

R26: CHLOROPHYLL FLUORESCENCE MEASUREMENT: A BIOLOGICALINDICATOR OF HEAVY METAL TOXICITY IN ALGAE

PS Chandrashekharaiah[1, 2], A Banik[3], D Sanyal[2], S Kushwaha[2], S Dasgupta[4]

[1]Department of Microbiology, RK. University, Rajkot, Gujarat - 360020, India
[2]Reliance Industries Ltd, Jamnagar, Gujarat - 361140, India
[3]Department of Life Sciences, Presidency University, Kolkata, West Bengal, India
[4]Reliance Industries Ltd, Ghansoli, Navi Mumbai - 400701, India
Email: chandra.shekharaiah@ril.com

Pulse Amplitude Modulation techniques (PAM) provides a quick measure of chlorophyll fluorescence. Heavy metals,above certain concentrations,are known to affect photosynthesis. *Chlorella pyrenoidosa* was exposed to various concentration of $Cd^{+2}$for 96 hours and the inhibitory effects on photosynthesis was measured.Minimum inhibitory concentration was found to be 7.5 ppm at which 63.6%, 64.8%, and 65.2% reduction of maximum quantum yield,non-photochemical quenchingand electron transfer rate were observed respectively. These parameters were found directly correlated to chlorophyll-a content.Overall study suggests that in industrial effluent, measuring algal photosynthetic parameters can provide indication on heavy metal toxicity and concentration.

Key words: Heavy metal; PAM; Chlorophyll fluorescence; Toxicity; MIC

R27: ASSESSMENT OF HYDRO CHEMICAL CHANGES AND STUDY OF UNDERGROUND CONTAMINATION OF VARIOUS LOCATIONS OF WATER SOURCES IN KAKINADA OLD CITY EAST GODAVARI DT - AP, INDIA

D Rama Rao[1], NV Sudhakar[1], P Sara[1], D Ramamurty[2]

[1]P. R.Govt college (A) Kakinada, A.P., India
[2]GDC, Tuni
Email: drraoprga@gmail.com

Hydro chemical investigations were carried out in the Kakinada, AP India, to assess the chemical and microbial composition of ground water. A total of 20 ground water samples were collected and analyzed for the water samples obtained from different sample locations. People on globe are under tremendous threat due to undesired changes in the physical, chemical and biological characteristics of air, water and soil. Due to increased human population, industrialization, use of fertilizers and man-made activity water is highly polluted with different harmful contaminants. Natural water contaminates due to weathering of rocks and leaching of soils, mining processing etc.The availability of suitable quality water is an indispensable feature for preventing diseases and improving quality of life. It is necessary to know details about different physico-chemical parameters such. The evaluation was done by the hydro chemical metals characterization by measure of contamination levels with the Ground waters. The purposes of this study are, specifying spatial distribution of groundwater quality parameters such asTemperature,pH, Electrical Conductivity (EC), TDS, TA pH, Hardness,Chloride, Nitrate and sulphate. The research results reveals that their common origin, especially from industrial effluents and municipal wastes that are responsible for the enhancement of chemical components moving together in groundwater higher values of physicochemical parameters reveal the anthropogenic sources of these variables. The high concentration of parameters in groundwater water may cause serious threat to public health as well as the aquatic environment.

Key words: Toxicity; Characterization; Environment

R28: COMPARATIVE STUDY OF NOISE POLLUTION LEVEL IN YEOLA AND MANMAD TOWNS BELONGING IN MAHARASHTRA STATE DURING NORMAL DAYS

SV Dhanwate, DB Goswami

Swami Muktanand College of Science Yeola (Nashik) - 423401 India
Email: dhanwatesv67@rediffmail.com

Most of the towns in the State of Maharashtra are congested and densely populated. Towns having the combinations of old and new structure. Because of heavy traffic, urbanization, migrants of peoples from village to town for their civil work with vehicles and residential has been increased noise level. We were mentioned noise level by sound level meter at different locations of Yeola and Manmad town Noise level is notably high at different location as compared to prescribed standard of pollution control Board at both towns, but the present study investigate that noise level in Yeola town is comparatively lower than the noise level in Manmad town. Also Railway junction in Manmad campus this is achieved because well noise more than as in Yeola. Planned development of Yeola town, roads are widened, good plantation cover, modern design of hospitals, Govt. Official building with proper spacing and acoustic design consideration. We conclude that public awareness and public environmental education is essential to safeguard natural environment and to control pollution. Peoples showed be aware about importance of human health and environment protection Act.1986.

Key words: Noise pollution; Sound level meter, Awareness; Environment projection Act.1986

R29: EXTENT, ABUNDANCE, THREATS AND INFORMATION GAP ON ALPINE MEDICINAL AND AROMATIC PLANTS OF WESTERN HIMALAYA, INDIA: A REVIEW

Gajendra Singh[1], Naveen Chandra[1], Shashank Lingwal[1], MPS Bisht[1], LM Tiwari[2]

[1]Uttarakhand Space Application Centre, 93/2 Vasant, Vihar, Dehradun
[2]DSB, Campus, Kumaun University Nainital
Email: gajendrawat@yahoo.com

Alpine region of western Himalaya arbours rich array of medicinal and aromatic plants (MAPs)(350-400 species) owing to diverse topography and climatic conditions. These MAPs are significant for traditional systemof medicine. However, our standing on their extent, abundance and management strategies are meagre, leading their population declined at an unprecedented rate. Hence, the present study assess the directionality, quality and sufficiency of past and ongoing research for conservation and management of MAPs wealth in the region. We analysed over 300 research articles on MAPs of alpine region to consolidate the knowledge on population status, ethnobotany, biotechnological attempts for *ex-situ* conservation, anthropogenic pressure and information gaps and future scope for research. The results reveals that the landscape has long history of MAPs studies dates back to 1849 and progressed remarkably after 1990. Initially (until 2000) most of the studies were on surveys (diversity) and ethnobotanical aspects, extended to biochemistry and biotechnology after 2000. Studies are very site specific (of the total reported alpine meadows (82) of the state, about 45% of the studies conducted only in 10 meadows) and species specific (of the total MAPs only 8-10 species are studies across meadows *viz.,Angelica glauca* in (25 meadows), *Picrorhiza kurroa* in 16 and *Dactylorhiza hatagirea*in 14 meadows. Majority of the studies are confined to biochemistry (23%), followed by biotechnology (12.2%) and ethnobotany (9.4%). Till date, the abundance of only 31 MAPs is studied in few meadows, having average 1-2 individuals/m^2. 16 species have been studies for multiplication using biotechnological tools, however none of them succeed in producing at large scale. Inadequate information on geo-spatial extant of species, habitat suitability, lack of information on demand

and supply ratio, climate change impact, no clear cut management strategies for MAPs were identified as area of immediate concern.Therefore, despite some national, state and scattered local initiatives on management, conservation and sustainable utilization of MAPs, there still exist gaps in our knowledge and understanding in extent and availability of MAPs resource base in the alpine region of western Himalaya.

Key words: Medicinal plants; Alpine; Population status; Ethnobotany; Himalaya

R30: IMPACT OF HIGHWAY DEVELOPMENT ON TREE CUTTING AND BIODIVERSITY OF KHAMGAON AREA IN MAHARASHTRA

GB Kale, SN Ghait, AM Wankhade, Rizwan Khan

G.S. Science, Arts and Commerce College, Khamgaon, (MS), India
Email: gokulbkale@gmail.com

The infrastructure developments such as roads and highways play a synergistic role in the socio-economic development of a country. The present study was carried out on National highway no.6 and state highways in different directions of Khamgaon with 25 Km distance on each road. It attempts to understand the impact of these highway developments on biodiversity of Khamgaon in Maharashtra .It reveals total 5194 trees on national and state highway sides. Out of these, 4670 trees were cut during last few years and remaining 524 trees on Pimpalgaon Raja road may be cut in future for road development and expansion.

Key words: Highways, road, sustainability, biodiversity, tree cutting.

R31: PHYSICO-CHEMICAL CHARACTERISTICS OF TALADANDA CANAL WATER IN AN AROUND PARADEEP AREA, ODISHA, INDIA

Hemanta Meher, SN Panda, PK Behera, Ashish K. Sarangi

Sambalpur University, Jyoti Vihar, Sambalpur-768019, Odisha
Email: hemanta1892.ppl@gmail.com

The precious natural resource is water. Canal is an artificial constructed channel; carry water from source (River/Reservoir) to fields. *"Life is the matrix of water. Within water life is originated, thriving and also it's medium and solvent".* The longest canal in Odisha is Taladanda canal. The canal was designed to provide irrigation, recreation and navigation and finally mixed with Bay of Bengal at Paradeep town. The total length of the canal is 82.3 km. The canal is contaminated by different polluting sources at its off taking locations. The water has become unfit for human consumption. Realising the importance of this problem the aims of our study is to determine the present pollution load of the canal with different physico-chemical parameters and based on the finding suitable models for prediction of the pollution behaviour at different locations of canal and its remedial measures.

Key words: Canal water; WHO; Drinking water; Water quality

R32: CALCITE SOLUBILIZING ACTIVITY OF *EXIGUOBACTERIUM AQUATICUM* CS6 ISOLATED FROM MARBLE SLURRY DUMPED IN SUKHER, UDAIPUR, RAJASTHAN, INDIA

Harshada Joshi

Department of Biotechnology, Vigyan Bhawan, Block B, Mohanlal Sukhadia University, Udaipur, Rajasthan, India
Email: hjbiotech@gmail.com

Marble slurry is the waste generated during marble cutting, processing and polishing. Large amount of marble slurry is discharged as a waste either to a vacant land or to a surface water source in the nearby areas. The present study was aimed to detect calcite solubilizing bacteria from marble slurry collected from dumping yard in Sukher, Udaipur, India. Isolation was performed on nutrient agar medium. Calcite solubilizing efficiency (CSE) and index (CSAI) of the isolate was tested on 0.1% calcite agar medium. The plates were incubated at 37°C for 10 days. Characterization of the isolate was done on the basis of morphological, biochemical and molecular methods. Isolate CS6 was appeared on nutrient agar medium after an incubation of 24 hours at 37°C. The colony appeared as orange, pinpointed and with convex elevation. It showed clear zone of 32 mm diameter after 10 days of incubation indicating calcite solubilizing activity. The maximum CSE and CSAI observed were 166% and 260 respectively. Isolate CS6 was identified as *Exiguobacterium aquaticum* CS6 (accession no. MK353511). The isolate showed remarkable calcite solubilizing activity and can be further analyzed for its possible use in restoration of marble slurry contaminated soil.

Key words: Calcite Solubilizing bacteria; Marble slurry; *Exiguobacterium aquaticum* CS6; Calcite solubilizing activity

R33: VALUE CHAIN PROMOTION OF CHYURA (*DIPLOKNEMA BUTYRACEA*) FOR SUSTAINABLE DEVELOPMENT IN MOUNTAINS: AN OPPORTUNITY FOR MARGINAL FARMERS OF UTTARAKHAND FOR SUSTAINING LIVELIHOODS

Pankaj Tewari[1], Ripu Daman Singh[2], Pratap S. Nagarkoti[3]

[1]Aarohi, Satoli, Nainital; [2]Kumaun University, Nainital; [3]Central Himalayan Environment Association (CHEA), Nainital
E-mail: pankutewari@gmail.com

Agriculture has been practiced for centuries, and like any socio-economic or political system that has stood the test of time, it is a product of the circumstances in which it exists. The Non Farm Sector (NFS) in India, albeit comparatively new, possesses inherent strengths that can be leveraged, and the current context in which it thrives offers many opportunities that can be utilized. The focus of the present study is for unique tree based by products that occurs in specific zone in border area of Uttarakhand across river Kali. An initiative has been taken up under landscape programme i.e. Kailash Sacred Landscape-Conservation and Development Initiative (KSLCDI) to develop a Chyura based value chain with emphasizing the marginal farmers as the producer in the chain. Smallholder farmers have difficulties entering established value chains with value-added products specifically in mountains where still entrepreneurship is a huge challenge. In this paper, we also look at smallholders' capability to establish and sustainably manage a competitive and economically viable Chyura based value chain (Chyura Soap, Chyura Ghee and Chyura Honey) through the case of Pancheshwar Ghati Self Reliant Cooperative, a cooperative operational in Pithoragarh district and in a primary phase. The research approach adopted for this study includes value chain approach and sustainable livelihood approach, as a framework to identify the possibilities for upgrading and the determinants of competitiveness in value chains in which smallholder farmers can participate. Results highlight the benefits Pancheshwar Ghati Self Reliant Cooperative participants receive, but caution that a multitude of constraints could impede scaling-up in the future. On the other hand, for those independent farmers, they enjoy the price premium and prefer to sell large

proportion of their products through cooperative with a more stable but lower price compared to the market price, and in this case both of their financial and social capitals are strengthened. The efforts are being made to strengthen the value chain by approaching for Geographical Indicator (GI) and also initiating the concept of Biodiversity Management Committee (BMC) and Access Benefit Sharing (ABS). However, the undeveloped local market with low consumer's recognition and interest of niche products restraints the local scale and the products have to be marketed in other cities and buyers which still needs effective management and skill development of cooperative and farmers. This study recommends that the work is still required for value chain improvisation at different stages leading to effectiveness and efficiency of the chain and also ensuring the conservation issues for sustainability of value chain in the region.

Key words: ABS; BMC; By Products; Chyura; Marginal farmer; Sustainable livelihoods; Value chain

R34: INTEGRATED SPRINGSHED MANAGEMENT APPROACH: LINKING SCIENCE, POLICY, AND PRACTICE FOR BUILDING ENVIRONMENTAL CONSCIOUSNESS & WATER SUSTAINABILITY IN HIMALAYA

Rajesh Joshi[1], R S Rawal[2]

[1]G.B. Pant National Institute of Himalayan Environment and Sustainable Development, Sikkim Regional Centre, Pangthang-737101, Sikkim

[2]G.B. Pant National Institute of Himalayan Environment and Sustainable Development, Kosi-Katarmal, Almora-263643, Uttarakhand
Email: dr.rajeshjoshi@gmail.com

Spring water, emerging naturally from confined and unconfined aquifers, is the primary resource for sustenance of life in the Himalayan region. However, due to change in land-use patterns, climate, increasing demand of growing population and various other factors, large number of springs in Himalaya are drying up leading to new challenges to rural communities.

Nearly 8,000 villages across the Indian Himalaya are under acute water shortages due to drying up of springs. In the Kumaun region of Uttarakhand, nearly 75% of the springs have gone dry during last 4-5 decades. This scenario calls for improved understanding of water balance (i.e. demand-supply patterns), social governance system, and geo-hydrological dynamics of ground water with the perspectives of aquifers that act as storehouse or the source. Realizing this, a systematic and collaborative approach of Spring-Shed Management (SSM) was applied for spring water augmentation in pilot site of Kailash Landscape in Uttarakhand. Based on the preliminary results, pre-and-post analysis of the interventions reveals that the discharge of selected springs has increased by 20% during post monsoon, 19% during winter and 16% during pre-monsoon/ dry season. The results of pilot sites are indicative that integration of geo-hydrology and ecosystem based approach along with community participation is a prerequisite for success of any water recharge interventions. The findings shows that for effective planning and implementation for spring rejuvenation in the Himalaya requires effective integration of science based approach with the customary bio-engineering interventions, and building synergy amongst diverse stakeholders, including community and community based organizations is crucial.

Keywords: *Spring, Spring Shed Management, Water Sustainability, Himalaya*

R35: ENVIRONMENT-FRIENDLY RURAL HOUSING TECHNOLOGIES BY CSIR-CBRI, ROORKEE FOR DEVELOPMENT OF RURAL INDIA

Atul Kumar Agarwal

Senior Principal Scientist,
CSIR-Central Building Research Institute, Roorkee
Email: atulcbri@rediffmail.com

A major section of Indian population lives in the country outskirts- the Rural India – and define the progress of the nation through prime contributions towards the agriculture sector. The disheartening reality is that the very people providing the nation with one of the basic necessities- food- lack the comfort of the other – housing. There is a sections of Rural India

that continues to live in less than acceptable living conditions, with primitive housing structures lacking the basic comfort or sanitation facilities. Understanding the need, CSIR-Central Building Research Institute, Roorkee has worked towards development of technologies for rural construction and environment improvement. In this paper efforts have been made to discuss major environment-friendly affordable rural housing technologies developed by CSIR-CBRI, Roorkee for the development of Rural India to meet the slogan Housing for All.

Key words: CSIR; CBRI; Roorkee; Rural India; Rural Development; Rural Technologies; Environment

R36: PHYSICO-CHEMICAL ADVANTAGES OF PYRIDINE BASED POLYBENZIMIDAZOLE MEMBRANE FOR POLYMER ELECTROLYTE MEMBRANE FUEL CELL

Md Nazrul Islam

Department of Chemistry, Jawahar Lal Nehru College, Chakradharpur
(A Constituent Unit of Kolhan University, Chaibasa, Jharkhand)
Email: nazsuman@gmail.com

PBI (Polybenzimidazole) based on 3,3- diaminobenzidine (DAB) and isophthalic acid (IPA) is gaining increasing importance as the proton exchange membrane (PEM) material. It has remarkable thermal stability, mechanical property, chemical resistance, fibre forming property, adhesion property, etc. Fuel cell based on its membrane can be operated up to 200°C having high CO tolerance, low fuel crossover, almost zero osmotic drag co- efficient and proton conductivity comparable to Nafion membrane. This highly basic material is characterized by high density, high Tg , H_3PO_4 uptake of ~14 moles per repeat unit (mol/RU) and 3.4–3.6 mol/RU of water sorption. In the present work, a systematic variation in PBI family based on a common tetramine 3,3-diaminobenzidine (DAB) and different aromatic dicarboxylic acids is investigated. Among all PBIs, the Pyridine based PBI gives better performance. Due to presence of extra Nitrogen atom in the acid moiety which enhances the proton conduction by providing extra site for hydrogen bonding in the polymer matrix through Hoping mechanism for application in (PEMFC).

Key words: Polybenzimidazole; Polymer Electrolyte Membrane Fuel cell; Proton exchange membrane

R37: SUITABILITY OF INDUSTRIAL SUGARCANE BAGASSE WASTE ON PRODUCTION OF OYSTER MUSHROOMS

T Saha, S Das, S Biswas, S Das, D Datta, S Sau, S Kundu, E Ghosh, Arup Mitra

Department of Microbiology, St. Xavier's College, Kolkata
Email: drakmitra01@sxccal.edu

Fungi culture or Mushroom Cultivation is rapidly expanding throughout the world. This is further catalyzed by its nutritional value and increased market demand. In this method the space required is less and per-unit production is very high compared to others. Bagasse is the byproduct left after extracting the juice from sugarcane. Thus, the in vivo experiment was performed by growing readymade spawns of *Pleurotus*in bagasse collected from industries. The mushrooms showed considerable growth in very short duration, with fruiting bodies ranging in weight from 144mg to 856mg. The suitability of the bagasse to act as a substrate for mushroom cultivation was studied. Heavy metal content in the bagasse fibers were detected. The bagasse contained 0.015mg of Cadmium, 8.56mg of Arsenic, 10.47mg of Copper and 9.17mg of Chromium. The transfers of these heavy metals into the fruiting body of the mushrooms were analyzed. It was found that they had up taken Cd by 146.77%, As by 118.22%, Cu by 114.59% and Cr by 82.77%. The plethora of microbes which included both fungi and bacteria present in the bagasse were characterized. The interaction of these microbes and their effect on the growth of mushrooms were analyzed in this experimental study. It showed that *Cladosporium* a fungus found in bagasse inhibits *Pleurotus* growth, while the residual bacteria promote Pleurotus growth.

Key words: Fungi culture; nutritional value; Oyster Mushrooms; Bagasse; Heavy metal content; Interaction

R38: DIVERSITY OF MANGROVE PLANTS IN RELATION TO PALAEOENVIRONMENT DURING HOLOCENE PERIOD IN BENGAL BASIN, INDIA

Nimai Chandra Barui

Department of Botany, Bethune College, 181, Bidhan Sarani, Kolkata -700 006, India
Email: ncbarui@gmail.com

Peat samples were collected and palynologically investigated from Chinar Park**,**Rajarhat area, N-24Paraganas, 20 km North East of the great city Kolkata. The pollen analytical investigation of the collected peat samples reflected the existence of large number of mangroves plants and some fresh water elements and ferns from a peat band located at the depth of about 535.5 cm to 614.5 cm below the surface. The present investigation reveals the age of the peat layers ranging from 4690 to 5060 YBP, confirming the Quaternary age of the deposit. The dominant pollen grains recorded from the samples were *Heritiera, Excoecaria, Avicennia,Bruguiera, Barringtonia, Rhizophora, Sonneratia, Suaeda, Phoenix paludosa, Nipa* ; fern spores of *Acrostichum* and grass pollen grains, reflected a diversity of mangrove vegetation in the peat bands. The variability of the vegetation in the peat bands from bottom to top shows the change of monsoon months during Quaternary Period in Bengal Basin. They also reflect the swampy halophytic vegetation, to some extent comparable to the present day vegetation of the Sunderbans where the diversity of vegetation is also noticed. The Sunderban mangroves in India are spread over 4266.6 km^2 of the estuarine tracts of the Ganga-Brahmaputra system on the northern parts of the 24 Paraganas district (North and South) in West Bengal. There are also changes in shape and size of the tidal creeks, coastal wet lands and low lands through space and time. The present study reflected the specific geomorphologic changes supposed to affect the existing vegetational assemblages during Quaternary Period in Bengal Basin.

R39: PREY PREFERENCE BY CRITICALLY ENDANGERED VULTURE SPECIES IN MOYAR VALLEY, TAMILNADU

Ramasamy Venkitachalam

Department of Zoology, Kongunadu Arts and Science College (Autonomous), Coimbatore - 641 029
Email: poojithvenkat@gmail.com

Vultures keep hygienic environment feeding from animal carcasses in groups. The three species of critically endangered vultures namely White-rumped Vulture, Indian Vulture and Red-headed Vulture were preferred carcasses of wild ungulate and livestock in terms of biomass. These vultures were preferred mostly large body sized e" 20kg wild and livestock carcasses. Rather than predation the animal carcasses available for vultures in the landscape due to old age, disease and accidents. All the three vulture species were found different animal carcasses and the preference of each species varied significantly. Niche overlap analysis showed that a complete overlap among three species of vultures.

Key words: Vulture; Prey; Predator; Preference; Moyar; Tamil Nadu

R40: PLANKTONIC BLOOM OF *AULACOSERIAGRANULATA* IN LOWER AND ESTUARINE STRETCH OF RIVER GANGA IN RELATION TO HYDROLOGICAL CHARACTERISTICS

RK Manna, BK Das, A Ray, TR Mohanty, NK Tiwari, N Chakraborty, RK Raman, S D Sarkar, A Sengupta, S Mandal

ICAR-Central Inland Fisheries Research Institute, Barrackpore, Kolkata – 700120.
Email: basantakumard@gmail.com

River Ganga is facing lot of anthropogenic disturbances via domestic and industrial fallouts consisting of heavy nutrient load triggering planktonic bloom in water. During winter months of 2018-19, a bloom (496-45160 u litre^{-1}) of *Aulacoseira granulata* (Phylum:

Bacillariophyceae) was noticed at the freshwater sector (Buxar to Tribeni) of lower and estuarine stretch of river Ganga. Analysis of water and soil quality data revealed that water parameters like depth, total alkalinity and silicate have positive influence on the bloom formation whereas water temperature and soil organic carbon influenced negatively. Water parameters like dissolved oxygen, pH, chlorophyll have observed to be strongly influenced by this seasonal bloom establishment.

Key words: River Ganga; planktonic bloom; GIS; *Aulacoseiragranulata*; water quality

R41: BIOADSORPTIVE REMOVAL OF CR (VI) BY IMMOBILIZED FUNGAL BIOSORBENT IN AQUEOUS PHASE

S Chhikara

Assistant Professor, University Institute of Engineering & Technology, Maharshi Dayanand University, Rohtak-124001(Haryana) India
Email: chhikaras14@rediffmail.com

Saccharomyces cerevisiae biomass was developed into immobilized bisorbent by chemical treatment with 0.1 M H_2SO_4 and 0.1 N NaOH, after that mixing with magnetite powder. The biosorbent was immobilized in Ca-alginate matrix and its capacity to adsorb Cr (VI) ions was investigated. The effect of several parameters, such as biosorbent dosage, contact time, initial metal ion concentration, pH and temperature on biosorption process was evaluated. The value of a, b (Langmuir constants), R_L (separation factor) and 1/n (adsorption intensity) revealed the favorable nature of biosorption process. Thermodynamic parameters including change of free energy (Ä*G*) was determined. The results show that the biosorption process of Cr (VI) ions by immobilized biosorbent was feasible, spontaneous and exothermic under studied conditions. Equilibrium was well described by Langmuir and Freundlich isotherms and rate kinetics was found to follow pseudo-second order type biosorption kinetics. The biosorbed metals were completely desorbed from the biosorbent by elution and biosorbent can be reused for, five consecutive biosorption/desorption cycles without apparent loss of

efficiency. The changes in the functional groups and the surface properties of pretreated fungal biosorbent were confirmed by FTIR spectra.

Key words: *Saccharomyces cerevisiae;* Biosorption; Kinetics; Adsorption isotherm

R42: LIVELIHOOD ENHANCEMENT FOR MOUNTAIN RURAL WOMEN FARMERS THROUGH VALUE CHAIN PROMOTION OF SELECTED CROPS (BASIL, ROSEMARY AND CHAMOMILE) IN UTTARAKHAND

Manju Sundriyal[1], S Jha[1], M Kunwar[2], S Panwar[2], D Pant[1]

[1]Uttarakhand Science Education & Research Centre (USERC), Dept of Science & Technology, Govt. of Uttarakhand, Dehradun
[2]Himalayan Action Research Centre (HARC), Indira Nagar, Dehradun
Email: manjusundriyal@yahoo.co.in

World over in recent years up-gradation of livelihood through strengthening of pro-farmer/ pro-poor value chain (VC) has been considered the best feasible strategy for upliftmentof rural and marginal farmers. In Uttarakhand state agriculture is the main source of income but maximum community is facing the problem of poverty. Therefore, there is an immense need to connect the villagers with livelihood opportunities besides agriculture. It is also important because returns from agricultural produce may not be very profitable as the community is not using modern agricultural techniques. For enhancing livelihood of selected community, we need to either introduce the modern agricultural practices or cultivate some new cash crops which provide maximum profitable returns. Unfortunately, agricultural practices are on low pace during recent years particularly in hill areas. As a result, large portion of land is transformed into barren land. It is necessary to utilize the barren land for cash crop after adopting some new emerging technologies for land preparation. To promote agriculture and efficient land use system, it is crucial to prepare land as agricultural land which in turns enhances the land use efficiency and economy of Himalayan community. Considering that the present study describes the strategy to upgrade the livelihood of rural farmers (particularly

women) by providing economic opportunities through value chain enhancement of three highly market demanding species (Tulsi, Rosemary &Chamomile) in district Chamoli(Ghat block) of Uttarakhand. The approach envisages collecting baseline information on socioeconomic status of targetgroup, existing VC of Tulsi, Rosemary and Chamomile along with conducting strategic investigations of the farmers' skills, needs, and resource management wisdom in participatory ways. This will access farmers priorities for developing value chain of Tulsi, Rosemary and Chamomile based trade comprising VC mapping (who is involved and what is their role), its SWOT analysis, and identifying activities & primary actors of the VCs. Marketing bottlenecks and major players in VC have been investigated. The ongoing interventions comprised development of farmers' skills and capacity to meet the challenges of cultivation, harvesting, drying & post- harvest management and value addition of selected crops. Upgrading strategies for VC analysis was done by social mobilization, and designing systems and processes to mainstream the trade of rosemary, tulsi and Chamomile. Marketing availability was assured by facilitation and participation of buyers from outside the state and by organizing a local auction in one of the production village. It is expected that a systematic approach would help to develop an ensured value chain from producers to buyers which will lead to provide high economic opportunities to farmers, thus solve societal challenges in a sustainable way. The findings of the study will be presented in detail.

Key words: Livelihood; Value chain; Upliftment; Marginal farmers; Community mobilization

R43: SUSTENANCE OF HEALTHY SOIL ENVIRONMENT IN HUMID TROPICAL KERALA THROUGH NUTRIENT BUDGETING USING NUTMON –MODEL

U Surendran

Water Management (Agriculture) Division,Centre for Water Resources Development and Management, Kozhikode -673 571
Email: suren@cwrdm.org

Mining of nutrients from soil is a major problem causing soil degradation and threatening long-term food production in developing countries. Decision Support Systems (DSS) / models are interactive computer software that help decision makers utilize data and models to solve unstructured problems. In this paper an attempt was made using NUTMON model for carrying out nutrient audits, which includes the calculation of nutrient balance at micro (plot/ field), and meso (farm) level and evaluation of trends in nutrient mining/enrichment. A nutrient budget is an account of inputs and outputs of nutrients in an agricultural system. Nutrient Monitoring (NUTMON) is a multiscale approach that assess the stocks and flows of N, P and K in an well defined geographical unit based on the inputs *viz.,* mineral fertilizers, manures, atmospheric deposition and sedimentation and outputs of harvested crop produces, residues, leaching, denitrification and erosion losses. The nutrient budgeting study was carried out using NUTMON model for 2 farms in Palakkad district by adopting the standard procedures and calculations (*viz.*, 1.Organic 2.Integrated nutrient management (INM). The calculated nutrient balances at crop activity level indicated a negative balance for nitrogen, phosphorus and potassium in crops like paddy, coconut, arecanut and banana. At farm level, the integrated nutrient management farm showed N balance as negative, whereas P and K balance was positive. The organic management farm, showed a positive balance for N, P and K. The results revealed that the nutrient management practices are not appropriate and sustainable in INM farm. The management options to mitigate this mining by manipulating all inputs and outputs in a judicious way with an integrated system approach are suggested and discussed.

Key words: Nutrient balance; Inputs; Outputs; Fertilizers; Nutrient mining; NUTMON

R44: ANTIOXIDATIVE RESPONSES OF MUSTARD GROWN IN ZINC- CONTAMINATED SOIL WITH THE APPLICATION OF CHELANTS

SN Pandey, Isha Verma

Department of Botany, University of Lucknow, Lucknow- 226007
Email: snpandey511@gmail.com

Clay pots filled with excess zinc amended soil (@ 300 mg $ZnSO_4kg^{-1}$ soil) were used to grow mustard (*Brassica juncea* L.). The soil was supplied with EDTA and Citric acid (CA), singly or in combination, of 10 µM to each for one time. Plants were determined for some antioxidative responses (catalase and peroxidase activity and proline content); Protein content was found to be decreased by 23.3% and by 34% at CA+ EDTA (in combination) and EDTA (used singly), respectively. Proline content showed maximum reduction (-30.7%) at CA+ EDTA supply in zinc- contaminated soil. The antioxidative enzymes catalase and peroxidase showed maximum activity by +433% and 77.8% at CA + EDTA application in soil, respectively in mustard. Both the use of chelants CA and EDTA increased the activity of antioxidant enzymes in mustard. These, results may be helpful on remedial measures to minimize toxic effects of heavy metals/Zn contamination in soil on plants.

Key words: Antioxidative enzymes; Catalase; Peroxidase; Chelants; Mustard

R45: PLANNING FOR DEVASTATING RIVERS FLOOD CONTROL TO MAINTAIN THE ENVIRONMENTAL BALANCE FOR SUSTAINABLE DEVELOPMENT: A CASE STUDY OF KARNATAKA STATE

Pragnya S Hangaragi

Sri Sri College of Ayurvedic Science and Research Hospital, Kanakapura Road, Bangalore – 560 082, Karnataka State, India.
Email: hangaragips10@gmail.com

Severe floods in the past as well as the recent floods in many States including Karnataka, which caused devastation and vast area submergence are warning us of inadequacy of flood management measures. Therefore, concerted efforts are required to make a critical review of the existing flood management measures, capabilities of managers and related guidelines and policies together with state of the art technologies. The main objectives of this paper are to demarcate the frequent flood occurrence region for planning to reduce the loss of lives (man & animals), public property and changing natural landscape and its resources bringing untold misery to the people, especially maximum affected areas of rural Karnataka. The necessary data is collected from secondary sources and published articles of daily news papers and applied GIS techniques to demarcate the frequent flood affected areas and calculated the loss. There are seven river systems in Karnataka which with their tributaries, drain the state i.e., Godavari, Krishna, Cauvery, North Pennar, South Pennar, Palar and West -Flowing Rivers are flowing in different direction. Out of these total 11 rivers create devastating flood occurs in Karnataka State. According to state disaster management agencies 8 districts namely: Belagavi, Kodagu, Dakshina Kannada, Uttara Kannada, Chikmagaluru, Shivamogga, Richur and Bagalkot have been hit/affected the worst and only likely to get worse as rains recede and other expose larger challenges of rehabilitation. In 2019, the death toll by flood in Karnataka rose to 40 human deaths with 14 missing while at least 525 animals had lost their lives. Over 2,028 villages were inundated and 5,81,702 people were evacuated, of which 3,27,754 are currently in the 1,168 relief camps across the flood districts. A total of 28,325 houses and 4,20,039 lakh hectares of crop loss has been incurred. In

Karnataka state rivers flood occurrence due to heavy rainfall in the catchment areas of many rivers upper valley region (in the Maharashtra state), while in middle valley region of rivers catchment area (Karnataka State) having prone to flood in 30% of state geographical area (in between 02-08-2019 to 16-08-2019), 40% areas receives moderate rainfall and remaining 30% area affected by severe drought (130 taluks/238) due to rainfall scarcity. The intensity of the rains havoc come down in 2019 (from 17-08-2019) and estimated flood related loss in Karnataka is about [1] 33,000 crores (says CM - B.S.Yediyurappa). Flood rescue authority faces other challenges including recovering the dead, prevention of water borne diseases, de-silting entire, land slides, rehabilitation and resettlement submerged portion of many towns and villages. For rescue the people four Indian Air Force choppers have been deployed at Belagavi, Mysuru, Raichur and one Indian Navy chopper in Uttara Kananda. Hundreds of others from the army, state and central agencies have been working tirelessly since last week to help rescue stranded people and livestock. The same condition was happened by flood in 2018 (only Kodagu dist), 2009, 2001, 2000, 1995, 1979, etc. In 2018 (29th September-4th October 2009) floods and landslides in the Coffee-growing district of Kodagu was left crippled after most of the bread winning agricultural and plantation lands was lost. In this regard some strategies for flood management and regional specific issues is suggested whih would enable the decision makers and the Planning Commission in adopting appropriate policies and measures required for flood management for environmental balance towards sustainable development.

Key words: Devastating Rivers; Environmental Balance; Sustainable Development; River Basin Management; Flood Havoc and its Control

R46: ENVIRONMENTAL ISSUES AND CHALLENGES

Saraswati Rachayya Ratkalle

Sane Guruji Vidya Prabodhini Comprehensive College of Education, Khiroda,
Dist. Jalgaon, Maharashtra
Email: srr20156@gmail.com

Environmental education is a study of the factors influencing ecosystem, mental and physical health, living and nonliving things, working conditions and population pressures. Man is an integral ingredient of physical and biological world in which he lives. In a broader sense we may define this as physical and biological world as environment. Which contain biotic (living) and Abiotic (nonliving) factors on the earth. All the physical and biological aspects of human survival involves some kind of interaction with his environment .Earth is the only planet in this universe which has been gifted with life supporting vital elements like water, food, land and air. Rich biodiversity of flora bestowed with aesthetic, commercial, medicinal values that are of almost significance to human beings. Life on this planet earth has been possible only because of its environment and depends upon its natural resources like forest, water, minerals, food energy and land. Forest, one of the important natural resources cover the earth like a green blanket. Water is very important resource without which any living things could not survive. Minerals and fuels which form a very important part of any nations economy occur naturally in inorganic and crystalline solids, e.g., rocks, clay minerals, metals. Fuels like petrol, coal, diesel. Land a valuable resource upon which we depend for our food, fuel, wood, the basic needs of life. Plants, food from plants. Air, we can breathe and take oxygen from air. The temperature of the Earth is changing. The Earth is getting hotter. Some people call this "Global Warming". Hotter temperatures mean smaller icecaps, higher ocean levels, and more storms. Use of vehicles, cars, industrial wastes, effluent, deforestation cutting of trees more population, water pollution, air pollution, soil pollution, noise pollution.

Key words: Environmental issues; challenges

R47: STATUS OF AIR QUALITY IN AND AROUND STONE CRUSHER AT JHANSI TOWN, U.P. INDIA

Shree Ganesh, MM Singh

Bundelkhand University Campus, Kanpur Road, Jhansi - 284128
Email: ganeshenviro12@gmail.com

Bundelkhand is a wealthy economic region of central India and also known as granite mining zone or stone belts. Rapid growing of population poses increasing of industrialization and infra systems with burgeoning infrastructure zone, stone crushing is turning into an essential enterprise. It engaged in generating crushed stone of various sizes as in line with the requirement of respective construction activities including highways, bridges, colonies, production of road, and canals. Stone crusher creates a lot of noise and it emits large and fine particles in surroundings, because of greater attention of respirable particles in air and creates pollution. During the investigation the samples were amassed from 10 distinctive sites for suspended particulate matter (SPM), respirable suspended particulate matter (PM_{10}), oxides of sulfur (SOx) and oxides of nitrogen (NOx) in the period of December 2016 to Novrmber 2018 from residential and industrial areas. It was noticed in this study that the SPM and RSPM levels at all selected sites exceeds the prescribed limits of the NAAQS as stipulated by central pollution control board (CPCB) New Delhi. The average ambient air concentration of SO_2 and NO_2 were found below the permissible limits of NAAQS of CPCB at all the study sites. This paper presented over view on the status of air quality index (AQI) of in and around of stone crushers at Jhansi town by using multivariate statistical techniques. This baseline data can be help governmental and non-governmental organization for the management of air pollution.

Key words: air quality; AQI; stone crusher; statistical technique (SLM 321)

R48: PINNALES OF RIVER GANGA AND THEIR IMPLICATIONS IN WATER POLLUTION

Sachendra Kumar Tripathi

Department of Botany, Brahmanand P. G. College, The Mall, Kanpur (U.P.), India
Email: sktbnd10@gmail.com

The present study deals with the investigation of Pinnales in Ganga water at Kanpur. Herein qualitative and quantitative estimates of algal compounds have been made on monthly basis and as many as 23 genera (Amphora, Achnanthes Cymbella, Cocconeis, Cymatopleura, Diatoma, Denticula, Epithemia, Encyonema, Fragillaria, Gyrosigma, Gomphonema, Gomphoneis, Mastoglea, Navicula, Nitzschia, Ropalodia, Pleurosigma, Pinnularia, Stauroneis, Synedra, Surirella, and Ttracyclus) spread over 134 species were recorded . Pinnales play an important role in determining the water quality, odour, and pollution.Their role as possible indicator of sewage, eutropic nature and organic pollution has been discussed.

R49: BIODIVERSITY OF INSECTS AND BEHAVIORAL STUDY IN PERIYANAICKENPALAYAM VILLAGE, COIMBATORE DISTRICT, TAMILNADU, INDIA

J Sornapriya

Kongu Nadu Arts and Science College (Autonomous), Coimbatore, Tamil Nadu, India Email: swarnapriya122@gmail.com

The study examined the Biodiversity of insects and behavioral study in the Periyanaickenpalayam village, Coimbatore District, Tamil Nadu, as there is no adequate information pertaining on insect diversity of this region. The present study was carried out during November 2018 to May 2019. We have sampled insects by employing intensive all out search method. During this study 98 species were identified by different order. Hymenoptera order was rich in our study area. The sampled specimens representing 35 species belonged to 12 genera and five subfamilies. The most diverse subfamily was

Formicinae (4 genera with 16 species), followed by Myrmicinae (5 genera with 12 species), Pseudomyrmicinae (1 genera with 4 species) followed by Dolichoderinae (2 genera with 2 species). The smallest number of species belonged to the Ponerinae (1 genus with 1 species). Among the sampled genera, the highest number of species representation was Camponotus with 4 species. Few ant genera as Crematogaster and Pheidole of Myrmicinae, Camponotus of Formicinae and Leptogenys of Ponerinae were mostly found everywhere. Some genera viz; Oecophylla, Anoplopsis, Paratrechina of Formicinae subfamily and Tetraponera of Pseudomyrmicinae are represented by one species each. We also identified the insect's biodiversity and nesting behavior of insects and ants. Insects are powerful and rapid adaptive organisms with high fecundity rate and short life cycle. Due to human interruption in agro-ecosystem and global climatic variations are disturbing the insect ecosystem.

Key words: Insects; Hymenoptera; Ants

R50: AGRO-ECOSYSTEMS SUSTAINABILITY IN INDIA BY ADOPTING THE ECO-CONSCIOUSNESS OF AGRICULTURAL FARMING PRACTICES OF ISRAELI IRRIGATION

M Jaya Kumar Jacob[1], P Brahmaji Rao[2]

[1]Department of Sciences & Humanities, Environmental Studies, Amrita Sai Institute of Science and Technology, Amrita Sai Nagar, Paritala,- 521 180, Andhra Pradesh, India
[2] Department of Environmental Sciences, Acharya Nagarjuna University, Nagarjuna Nagar, Guntur 522510, Andhra Pradesh, India
Email: mjayakumarjacob@gmail.com; drbrahmajirao@gmail.com

Many of India's problems are self-made problems. Main reasons for these problems are misuse or disuse of available valuable natural resources. Most of the fertility of soils was lost due to heavy dumping of synthetic fertilizers and pesticides by the illiterate farmers. Andhra Pradesh is once known as the 'Food Bowl' of India now becomes 'Hunger Hotspot' and Agricultural farmers became the scapegoats in the 21st century. In this juncture, our research

paper reveals that certain ways to adopt for the sustainable agriculturism to safeguard and conserve our soils, life and agro-ecosystems by following the Israeli irrigation farming techniques.

Key words: Agro-ecosystems; Sustainability; Agriculture Economy; Irrigation; Hunger

R51: ELECTROCHEMICAL SENSORS FOR TRACE DETERMINATION OF POLLUTANTS

Nimisha Jadon

School of Studies in Environmental Chemistry, Jiwaji University, Gwalior-474011(India)
E-mail: nimisha09@yahoo.com

Environmental pollution caused by chemical and energy industries has increased for several decades, there is a social expectation that scientists and engineers try to design sustainable chemical processes, to generate less hazardous materials and more environmentally friendly methods of pollution detection. Electrochemical techniques are well suited for the determination of pollutants and drugs in various samples i.e., in pharmaceutical dosage forms (tablets, syrups, creams, ointments), environmental samples (waste water and sludge) and even in biological fluids (serum, plasma and urine). A Chemically Modified Electrode (CME) or electrochemical sensor is an electrical conductor that has its surface modified for different electrochemical functions. CMEs are modified using advanced approaches to electrode systems by adding a thin film or layer of certain chemicals to change properties of the conductor according to its targeted function. At a CME, an oxidation-reduction substance accomplishes electrocatalysis by transferring electrons from the electrode to a reactant, or a reaction substrate. Chemically Modified Electrodes (CMEs) comprise a relatively modern approach to electrode systems. Characterization of the developed electrode has been done by SEM, TEM, FAB, IR etc. In the present study, a CME has been fabricated with an aim to electrochemically investigate the properties of the compounds/pollutants under investigation. The method was validated and a very low limit of detection and quantification was obtained with a wide range of linearity.

107TH INDIAN SCIENCE CONGRESS

January 3-7, 2020, Bangalore

V

ABSTRACTS OF POSTER PRESENTATIONS

Poster Presentations

SYMPOSIUM - I:

BALANCING ENVIRONMENTAL CONSERVATION AND SUSTAINABLE DEVELOPMENT IN INDIA

P01: ENVIRONMENTAL JOURNALISM, ENVIRONMENTAL ETHICS AND ENVIRONMENTAL POLICY

Sanjay Verma

Computer Science Department,DDU Gorakhpur University,
Gorakhpur-273009, UP
Email: vermasanjay_gkp@rediffmail.com

Environmental journalism is the collection, verification, production, distribution and exhibition of information regarding current events, trends, issues and people that are associated with the non-human world with which humans necessarily interact. To be an environmental journalist, one must have an understanding of scientific language and practice, knowledge of historical environmental events, the ability to keep abreast of environmental policy decisions and the work of environmental organizations, a general understanding of current environmental concerns, and the ability to communicate all of that information to the public in such a way that it can be easily understood, despite its complexity. Falls within the scope of environmental communication, and its roots can be traced to nature writing. One key controversy in environmental journalism is a continuing disagreement over how to distinguish it from its allied genres and disciplines.The growth of environmental journalism as a profession roughly parallels that Environmental journalism of the environmental movement, which became a mainstream cultural movement with the publication of Rachel Carson's *Silent Spring* in 1962 and was further legitimized by the passage of the Wilderness Act in 1964. Grassroots environmental organizations made a booming appearance on the political scene in the 1960s

and 1970s, raising public awareness of what many considered to be the "environmental crisis", and working to influence environmental policy decisions. The mass media has followed and generated public interest on environmental issues ever since. The field of environmental journalism was further legitimized by the creation of the Society of Environmental Journalistshttp://www.sej.org/ in 1990, whose mission is to advance public understanding of environmental issues by improving the quality, accuracy, and visibility of environmental reporting. Today, academic programs are offered at a number of institutions to train budding journalists in the rigors, complexity and sheer breadth of environmental journalism. Environmental ethics is the part of environmental philosophy which considers extending the traditional boundaries of ethics from solely including humans to including the non-human world. It exerts influence on a large range of disciplines including environmental law, environmental sociology, ecotheology, ecological economics, ecology and environmental geography. Environmental policy refers to the commitment of an organization to the laws, regulations, and other policy mechanisms concerning environmental issues and sustainability. These issues generally include air and water pollution, solid waste management, biodiversity, ecosystem management, maintenance of biodiversity, the protection of natural resources, wildlife and endangered species. Policies concerning energy or regulation of toxic substances including pesticides and many types of industrial waste are part of the topic of environmental policy. This policy can be deliberately taken to direct and oversee human activities and thereby prevent harmful effects on the biophysical environment and natural resources, as well as to make sure that changes in the environment do not have harmful effects on humans. Environmental law is a collective term describing international treaties (conventions), statutes, regulations, and common law or national legislation (where applicable) that operates to regulate the interaction of humanity and the natural environment, toward the purpose of reducing the impacts of human activity. The topic may be divided into two major subjects: pollution control and remediation, and resource conservation, individual exhaustion. The limitations and expenses that such laws may impose on commerce, and the often unquantifiable (non-monetized) benefit of environmental protection, have generated and continue to generate significant controversy. Given the broad scope of environmental law, no fully definitive list of environmental laws is possible. The following discussion and resources give an indication of the breadth of law that falls within the "environmental" metric. Environmental Journalism can

be daunting at times, but it is an opportunity to truly make a difference. Above all, a passion for environment and wildlife protection is what provides the motivation to smell out a story and pursue it.

P02: COMPARATIVE STUDIES OF SOME PONDS OF DEOGHAR DISTRICT OF JHARKHAND.

Ashok Kumar[1], Rajesh Kumar Bishen[2]

[1]A.S.College, Deoghar
[2]Sido Kanhu Murmu University, Dumka - Jharkhand

The Present study deals with the comparative studies of two ponds named Halima and Shivganga of Deoghar District of Jharkhand, India with special reference to their Physico-Chemical analysis. Filamentous and microscopic algae are present in these ponds. Chlorophycean algae are dominant whereas Diatoms and Cyanobacteria are sub-dominant. The micro organisms are able to adopt to the pond's salinity. As the water is the most precious natural resource to everyone needs to do what they can to reduce water usage i.e. slow flow and save water. Thus our efforts are in tune with our culture and social challenges for the sustainable development.

Key words: Halima and Shivganga Ponds; Diatoms; Cyanobacteria

P03: ALTERATION IN AGRICULTURAL PRACTICE UNDER CHANGING COASTAL ECOSYSTEM

Biplab Ghosh

Asian Marine Conservation Association (AMCA), 42/1, Feeder Road, Belgharia, Kolkata
E-mail: ghosh.biplab9@gmail.com

Coastal agricultural practice to produce various crops is a part of national agricultural productivity of any coastal nation. In recent years the 'Climate Change' is the major point of discussion in any intergovernmental political meetings and academic conference for giving shape in decisionmaking agenda of any national policy. World community now understand that because of world's development sustainability depends upon its all the 'key-factors' that significantly play into various thrust areas like growth in agriculture, education and industry, and their respective drivers. It is evident from recent research on the subject that because of changing climate, classical physico-chemical characteristics of some coastal components like coastal soil, coastal water and even coastal air have been changed. Keeping the above in mind, the present research work was carried out to assess any future impact of agricultural practice in selective coastal areas of Andhra Pradesh and DIU. This paper shows that how resilience and adaptation fails in agricultural practices in and nearby coastal areas of 2 States (Andhra Pradesh and DIU-U.T.) of India, due to warming of coastal soil and water lead to alter the conventional crop production.

Key words: Climate Change Coastal Agriculture; Coastal Areas; Impact Assessment

P04: ANALYSIS OF HUMAN BODY AS ENERGY CONVERSION PLANT FOR SUSTAINABLE DEVELOPMENT

Dinesh K Sharma[1], Meenakshi Sharma[2]

[1]Vidya College of Engineering, Meerut, [2]Dewan V.S. Institute of Education
Email: dksharma.limat@gmail.com

This abstract is basically intended to throw the light on some of our common and familiar energy conversion systems which functions in our human body throughout the day and night (24x7) without any rest. In fact, the human body works like a machine. When our hand holds the sheet of paper then it pulsates thousands of engines; each with its own fuel requirements; each yielding varying amounts of work, heat, and waste output. Each is a cell in our body. Our body can be considered as Energy Conversion Plant (and some sustainable and modern energy generating systems may be developed) which has been briefly described as follows: Human Eye: Optical Energy Conversion System; Human Ear (and Throat): Sound/ Vibration Energy Conversion System; Ear (as Microphone) and Throat (as speaker); Human Stomach: Thermal and Chemical Energy Conversion System; Human Heart: Fluid Energy Conversion System; Human Limbs: Mechanical Energy Conversion System; and Human Nerves: Electrical Energy Conversion System

Key words: Energy Conversion; Human Body; Modern Energy; Sustainable Development

P05: SOCIAL COGNITION TOWARDS ENVIRONMENT AMONG TEACHER TRAINESS IN PUDUCHERRY

JA Ebenezer, C Vijayapriya

Pope John Paul II College of Education, Puducherry
Email: jpsvcv@gmail.com

Social cognition refers to the study of the processes by which people make sense of themselves and of others as well as of their social environment, and the implications of this thinking for

social behaviour. Environment is the sole necessity for the survival of a living beings and as the human beings are the master of the world so their role is immensely important. The urgency of Environmental education was realized by various Education commission as well as National policy of Education (1986) It is emphasized that Environmental education to be introduced not only as a part of school curriculum, but also in the teacher education curriculum in order to develop social cognition towards environment and its conservation among teacher trainees. Considering the necessity of social cognition in order to protect the environment, it is time demanding to find out the social cognition towards Environment. The research was carried out on teacher trainees at Pope John Paul College of Education, Puducherry. The findings reveal that majority of the teacher trainees have a moderate social cognition towards environmental problems, issues and other related aspects. They also have social cognition towards conserving the environment.

P06: ANTIBIOTIC RESISTANT BACTERIA ISOLATED FROM URBAN ENVIRONMENTAL SOIL FROM WEST BENGAL

Jhulan Basu[1], Pranab Giri[1], Priyanka Bhowmik[2]

[1]Dum Dum Motijheel College; Kolkata -700074
[2] Techno India University, West Bengal

Recent studies demonstrate that urban industrial ecosystems are potential reservoirs of antibiotic-resistant bacteria (ARBs) and antibiotic resistance genes (ARGs).We have analyzed urban industrial soil samples from North 24 Parganas district of West Bengal, India and analyzed the relative abundance of antibiotic resistance in culturable environmental bacterium of those samples. One culturablevancomycin resistant bacterial strain was further investigated. In addition to antibiotic resistance, the bacterium was moderately salt tolerant and showed increased biofilm formation at higher salt concentration. Studying this bacterium might help to understand the propagation of ARBs in environmental samples in relation to human activity.

Key words: Antibiotic-resistant bacteria;Vancomycin resistant bacteria; Biofilm formation

P07: REDUCE CHEMICAL POLLUTION ON SOIL

KV Subba Reddy

Z.P.H.School,Chapirevula Nandyal Mandal. Kurnool (D.T.) Andhra Pradesh
Email: ksubbareddy59@yahoo.com; ksubbareddy95@gmail.com

The current study is of importance to support the local knowledge, concerning the best use of land and their management with the purpose of improving soil quality / health for sustainability of crop production by reducing chemical pollution in Kurnool district, of Andhrapradesh. In this connection, 6 soil samples were collected and noted physical properties at field level. Analyzed for pH, electrical conductivity (EC) organic carbon available nitrogen, phosphorus and available potassium at Regional laboratory Nandyala. The pH and EC were higher in conventionally cultivated soils as compared to organically cultivated soils and forest soils. Soil organic carbon (SOC) content of organic farming (0.82-1.06%) and forest (1.52-1.87%) soils was high when compared to conventional farming (0.30-0.39%) as SOC is the most important constituents of the soil due to its capacity to affect plant growing as both source of energy and a trigger for nutrient availability through mineralization. The soil available nitrogen, phosphorus and potassium contents were higher in conventional farming than organic and forest soils due to indiscriminate and excess usage of inorganic fertilizers. Earthworms activity observed in forest and organic farming soils only. No earthworms were observed in conventional farming due to excessive usage of chemical fertilizers and pesticides without organic matures. From Experimental results, it can be concluded that, soil and crop management practices that add or maintain soil carbon appear to be among the most important for restoring, maintaining by reduction chemicals on soil. .This includes utilizing reduced tillage, producing green manures or cover crops where climate and water resources will support the practice, applying supplemental animal or poultry manures or composted materials when available, and enhancing biological diversity to facilitate nutrient cycling and maintain soil structure. Protection of soil pollution under intensive land use and fast economic development is a major challenge for sustainable resource use in the developing world. The basic assessment of soil health and soil quality is necessary to evaluate the degradation status and changing trends following different land use and small holder management

interventions. In Asia, adverse effects on soil health and soil quality arise from nutrient imbalance in soil, excessive fertilization, soil pollution and soil loss processes.

Key words: Conventional farming; Soil compaction; Physical indicators; Biological indicators; Organic farming; Electrical conductivity

P08: TREATMENT OF HEAVY METALS BEARING EFFLUENTS USING BIOCHAR DEVELOPED FROM JUTE CADDIES

Lata Ramrakhiani, Swachchha Majumdar, Sourja Ghosh

CSIR-Central Glass and Ceramic Research Institute, Kolkata, India
Email: lata_ram@hotmail.com; sourja@cgcri.res.in

Metal-bearing effluents generated from industrial sectors like electroplating, super alloys production, batteries, ceramics, mining and metal processing and discharged directly into natural waters that could constitute high-risk for ecosystem. Jute industry solid wastes are known as caddies that have been discarded in open landfills. In present investigation, chemically activated biochar from jute mill waste as adsorbents were developed for removal and recovery of heavy metal contaminants from effluent. The developed biochar showed >90% removal of Zn(II),Cu(II), Pb(II), Ni(II), Co(II),Cd(II) from aqueous solution. The biochar was characterized and adsorption mechanism elucidated using BET, zeta potential, FESEM-EDX, FTIR, XPS, XRF, ICP-AES, techniques.

Key words: Jute caddies biochar; Heavy metals; effluent treatment; waste management

P09: RECYCLING OF GROUNDNUT SHELL AND VEGETABLES WASTE AS BIOFERTILIZER FOR THE CULTIVATION OF PIGEON PEA

Rajasri Ramesh, Vijayalakshmi Annamalai, Karthiya Velmurugan, Gnanamani Kittan, Pinky Raihing, Silpa Melathra

Department of Botany, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil nadu, India.
E-mail: avijayalakshmi85@gmail.com

The aim of the study was to find out the use of vermicomposted groundnut shell and vegetable wastes on growth and yield parameter of pigeon pea. On 15, 35, 55 and 75 DAS the biometric parameters and on 90 DAS yield parameters were analyzed. The T_3 treatment [Vermicomposted Groundnut shell and vegetables waste (75 g)] increased the biometric and yield parameters of pigeon pea compared to the control. The cheapest groundnut shell and vegetable waste vermicompost are more efficient for vigorous production of pigeon pea and in minimizing environmental pollution.

Keywords: Organic farming; Vegetables waste; *Eudrilus eugeniae;* Vermicomposting; Yield parameters

P10: ETHNOBOTANICAL INVESTIGATION OF AROMATIC AND MEDICINAL PLANTS USED BY THE MUSLIM COMMUNITY OF MANIPUR, INDIA

Md Riyajuddin Khan, A Kikim

Institutional Level Biotech Hub, LilongHaoreibiCollege, Thoubal District, Manipur
Email: drriyajuddin_khan@rediffmail.com

The present paper deals with 35 species of aromatic and medicinal plants for traditional medicine and other ethnobotanical purposes by the Muslim community during 2015-2016. Most of the plant species are used in common diseases like dog bite, bee and wasp sting,

burns and scalds, high body temperature, sore mouth, tongue, catching inflammation on skin, scabies, ear infection, jaundice, diabetes etc. and mostly consume as decoction. Such type of ethnobotanical knowledge is needed to conserve for further research and also to uplift the economic condition of the backward Muslim community in the state.

Key words: Ethnobotany, Muslim community, medicinal plant

P11: INTEGRATED IN-VIVO CULTIVATION MODEL TO SCREEN LIPID AND GROWTH OF GREEN OLEAGINOUS MICROALGAE.

Prachi Singh, SK Soni, M Gupta

Dayalbagh Educational Institute (Deemed University) Agra, Uttar Pradesh
Email: singhprachi832@gmail.com

This integrated model was developed to evaluate growth rate and lipid content of some selected green oleaginous microalgae under fluctuating climatic conditions. This model was corroborated for three different oleaginous green unicellular microalgae viz. Chlorella pyrenoidosa, Chlorella protothecoidesandcolonial Scenedesmusobliquus. TAG (triacylglycerol) from oleaginous microalgae can be transformed into biofuel. Microalgae biofuels are renewable sustainable energy source that are crucial in order to overcome fossil fuelpaucity and mitigation of green house gas (GHG). Microalgae are a suitable alternative feedstock for next generation biofuels.

Keywords: Chlorella, Scenedesmus, protothecoides, pyrenoidosa, microalgae, lipids, biodiesel, biofuel and cultivation.

P12: SUSTAINABLE UTILIZATION OF BIODIVERSITY VIS-À-VIS ECO-FRIENDLY VALUE ADDITION TO BIOMASS

Raj Dev Rawat

Himalayan Research Foundation, Vasant Vihar, P. O. New Forest, Dehra Dun
E-mail: rawatrd@gmail.com

Himalayan region is one of the world's richest ecosystems in terms of biological diversity. It has always been conducive to the growth and development of flora and fauna. The floral diversity in Himalayas includes tropical, subtropical, temperate and alpine vegetation. Forests in India provide valuable non timber forest products like gums, resin and oleoresins, oil seeds, essential oils, spices, drugs and dyes with several others. In present study forest based raw materials leaves and barks available in abundance were used for value addition. Research findings showed the way for sustainable use of biodiversity and development of value added products – eco-friendly dyes from forest repository of Himalayan region. Moreover, the green methods were also demonstrated to the rural population to substantiate the "lab to land" concept with a view to enhance their economy and to associate the people in conservation of forest and environment. Present paper concentrates on the need for value addition to the available biomass using eco-friendly methods and conserving the natural prosperity.

Key word: Biodiversity; Plants; Value Addition; Biomass

P13: *LANTANA CAMARA*: ITS NEGATIVE IMPACT AND EFFECTIVE CONTROLLING MEASURES IN INDIA

Ramandeep Kaur Arora, Prachi

University School of Environment Management, Guru Gobind Singh Indraprastha University, Dwarka, Delhi – 110078, India
E-mail: ramandeeparora1996@gmail.com

Lantana camara , an invasive alien species , has covered vast tracts of moist tropical land around the world, especially wasteland and deforested areas. Its allelopathic effect , resistance to cutting and burning , drought- resistance and its biological traits has led to its proliferation, causing negative impact on native species, crops and death in cattle. Various measures have been taken to combat its growth , and the best way is to use it as a resource which will protect the forest and provide livelihood benefits to the tribal society.

Key words: *Lantana camara;,* Invasive alien species; allelopathic effect; native species; resource

P14: COMPARITIVE STUDY ON NATIVE *BOS TAURUS INDICUS* AND EXOTIC *BOS TAURUS* BREED COWDUNG SUBSTRATES TO SUPPORT THE REPRODUCTIVE POTENTIAL AND COMPOST QUALITY OF EARTHWORM *EUDRILUS EUGENIAE*

Rini Joseph, P. Kathireswari

Department of Zoology, Kongunadu Arts and Science College, Coimbatore, Tamil Nadu
E-mail: rinijoseph1304@gmail.com

The composting posses the action of different microbial communities and release most of the nitrogen as in the form of ammonia. Were as, vermicompost release nitrogen in the form of nitrate and it can be easily absorbable by plants. The eco-friendly method of vermicomposting

helps to convert the organic waste into wealth. An attempt was made for composting of two different breed cowdung such as native cowdung of Vechur breed *(Bos taurus indicus)* and exotic cowdung of Jeresy breed (*Bos taurus)* using earthworms *Eudrilus Eugeniae*. The reproductive potential and compost quality was determined by short term on 45th day and long term 90th day in control and vermicompost samples. The experimental results showed that the reproductive potential of *Eudrilus Eugeniae* was higher in *Bos taurus indicus* (428.66 ± 2.02) samples than *Bos taurus* (219.33 ± 0.88) compost quality *viz.,* macro and micro nutrients were observed higher in native *Bos taurus indicus* than exotic *Bos taurus*.

Key words: Composting; Vermicomposting; *native breed Bos taurus indicus; exotic breed Bos taurus indicus; Eudrilus eugeniae*

P15: STUDY OF EXTREMOPHILIC CHARACTERISTICS OF BACTERIA ISOLATED FROM YAMUNOTRI

Rohini Bhattacharjya, Anish Chakraborty, Srijan Bhattacharjee, Bedaprana Roy, Sampurna Ghosh, Sahesta Akram, Arup Kumar Mitra

Department of Microbiology , St. Xavier's College(Autonomous), Kolkata

Yamunotri is a sacred pilgrimage site at an altitude of 3291 m marking the origin of Yamuna river. Just beside the temple at Yamunotri there is a hot spring believed to be highly sacred for Hindu pilgrimage. In this investigation, some microorganisms were isolated from the hot spring and on the basis of frequency *Bacillus subterraneus* and *Brevibacillus parabrevis* have been identified by 16S r RNA technique. They exhibited certain extremophilic characteristics which included resistance to temperature (90°C, 121°C), UV stress, $_{p}$H (at 1, 3, 7, 10 and 12), salt concentration (at 0.5%, 1%, 1.5%, 2%, 2.5%, 3%, 3.5%, 4%). Hence these organisms will be of tremendous potential in future microbial research because of their ability to sustain environmental stress and to produce certain metabolites for which investigation is on.

Key words: *Bacillus subterraneus;Brevibacillus parabrevis;* extremophilic; metabolites; hot springs

P16: SIGNIFICANCE AND RELEVANCE OF PERIODIC TABLE IN INNOVATIVE RESEARCHES

Rajesh Kumar Bishen, Hashmat Ali

[1]Dept. of Chemistry, A. S. College, Deoghar (Jharkhand); [2]Dept. of Chemistry, S. K. M. U, DUMKA (Jharkhand)
Email:dr.rajeshraj@yahoo.com

The current year declared as "International Year of Periodic Table" and being celebrated the world over itself throws light on the significance and relevance of Periodic Table in the innovative researches to be undertaken by the aspirants working in the field of Physical Sciences. Also,it is highly beneficial and conducive in imparting education to the beginners studying especially chemical sciences. It must be known to all that the Periodic Table has not been associated with the faculties and students of Chemistry alone but also with those connected to Physics, Mathematics, Engineering and even non-scientific realms of knowledges including History, Geography as also the Origin of Words. Regarding Origin of Words, the following example will make the thing clear. Strontium, a member of Group 2 is so named because the mineral containing the element was found in Strontian, a village in Scotland. Likewise, all elements named in Latin have adequate reasons behind. Periodic Table is a long chart consisting of all the elements discovered so far. Till date as many as 118 elements have been discovered including both natural and man-made; and more elements are to be discovered in the incoming years. The new discoveries would surely bring about radical changes in the notions and perceptions of the human mind about the world. The greatest advantage of long form of periodic table is that new elements have been discovered with its help. The table provided prior to the discoveries of new elements, a well judged systematic pattern to study elements and their compounds, and most importantly positions in anticipation were left vacant for the new elements to be arranged there after their discoveries later on. When Inert gases were discovered, these could be placed in a new group without disturbing the existing set-up. Of course, this was one of the great merits of Mendeleev's Periodic Table. Long form of Periodic Table based on Moseley's Atomic Number also has great advantage as it provides a valid link between position of elements and their electronic

configurations. The elements having similar properties find place in the same group due to their similar valence shell configurations. Finally, the Table is highly useful to chemists, scientists, scholars and the students as it provides many significant informations such as reactivity of an specific element, nature of a particular element, and various other characteristics associated with it.

Key words: Periodic Table; Strontium; Mendeleev; Inert gases

P17: GLOBAL COOLING: ITS IMPACT ON ENVIRONMENT IN NORTH BIHAR

Shahnaz Jamil

Deptt. of Botany, M.L.S.M. College, Darbhanga, (North Bihar)

Climate fluctuation over the past several hundred years suggest 30th years climate cycles of global warming and cooling on a generally rising trend from the little ice age about 500 years ago. Global cooling is a conjecture during the 1970s of imminent cooling of the earth's surface and atmosphere culminating in a period of extensive glaciations. The year 2018 is recorded as the coolest year in North Bihar. The winter period is being coolest both in intensity and duration. The incidence of abnormal heavy snow fall, stormy rains in different parts of North Bihar, is depicting an upward trend this year.

Key wards: Global Cooling; Climate Change; North Bihar

P18: APPLYING STATISTICAL TOOLS FOR THE ASSESSMENT OF SURFACE WATER QUALITY IN MAHOBA, U.P., INDIA

Swati Gupta, Poonam Mehrotra

Institute of Environmental science, B.U. Jhansi, India

The present study was centred on selected historical ponds in Mahoba district to monitor the surface water quality. For two to thirty years, the different types of effluent coming from household in adding to farming runoff have had a harmful impact on surface water quality. This work was carried out from January 2016 to December 2016 to study physico-chemical characteristics, *viz*. temperature, pH, EC, TDS, TH, Cl^{-}, Ca^{++}, Mg^{++}, Na^{+}, DO and BOD to evaluate the surface water quality and the parameters' statistical correlations. The values of WQI (Water Quality Index) were 36.43, 36.07 and 35.60 at Keerat Sagar, Kaliyan Sagar and Madan Sagar, respectively and it was compared with Indian Standard Drinking Water (IS 10500: 2012). The assessment of the surface water quality of Mahoba district are in the scale of polluted (BAD), which is not acceptable in respect to potable water with no proper treatment of polluted water, however it is acceptable meant for agricultural and other household purposes. This paper presents an overview of the status of WQI of Mahoba district using multivariate statistical techniques. These baseline statistics can help out non-governmental and governmental organizations in the management of water pollution.

Key words: Surface water; Physico-chemical parameters; WQI; Statistical analysis

P19: NATURAL DISASTERS IMPACT ON HUMAN RIGHTS – A REVIEW OF THE STUDY

T Konaiah

Sri Eswara Reddy College of Law, Tirupathi, Andhra Pradesh
Email: drkondaiah@gmail.com

Natural Disasters are existing Geological disasters, Hydrological disasters, Meteorological Disasters and Space disasters. Geological process like Earthquakes, sink holes, volcanic eruption and landslides are normal natural events which have resulted in the formation of the earth that we have today. They are however, disastrous in their impacts when they effect human settlements. Human Societies have witnessed a large number of such natural hazards in different parts of the world. Hydrological disasters Flood, Limnic eruptions, Tsunami it is a violent, sudden and destructive change either in quality of earth's water or in distribution or movement of water or in distribution or movement of water on land below the surface or in atmosphere. Meteorological disasters like Blizzards, Cyclonic storms, Droughts, Heat waves, Tornadoes, Hail storms and wildfires and space disasters are airburst, solar flare are badly affected all corners of the world. A natural disaster can cause loss of life or property damage and typically leaves some economic damage in its wake, the severity of which depends. In the affected populations' resilience, or ability to recover and also on the infrastructure available. And adverse event will not rise to the level of a disaster if it occurs in an area without vulnerable population. In a vulnerable area, however, such as Nepal during the 2015 earthquake, an earthquake can have disastrous consequences and leave lasting damage, requiring years to repair.

P20: DECLINING BENGALURU URBAN LAKES AND ITS SUSTAINABLE FUTURE

Veenashree, N Nandini, M Kumar

Department of Environmental Science, Bangalore University, Jnana Bharathi campus, Bengaluru – 560 056

The present study was carried out to know the current status of Bengaluru urban lakes and to assess the causative agents contributing to the decline of these lake water resources. The physico-chemical analysis of lake water samples was carried out to quantify the nutrient load and harmful algal diversity in the lake water systems. The phosphates and nitrates pollution are the key stressors promoting eutrophication in lake ecosystems. The enhanced proliferation of unpleasant harmfulalgal blooms has set off the eutrophication which thusly disrupted the normal functioning of the lake ecosystem diminishing its resource value. Consequently, attaining lake sustainability is the only technical way to deal with the prevailing issue for better lake resource management.

Key words: Algal pollution; Eutrophication; Nutrient load; Lake sustainability

P21: CURRENT STATUS OF EGYPTIAN VULTURE (*NEOPHRON PERCNOPTERUS*) AT JORBEER, BIKANER (RAJASTHAN)

Balram Sain, Ravi Parihar, Devaram Meghwal

Govt. Dungar College, Bikaner, Rajasthan
Email: sainbalram@gmail.com

Birds are among the best monitors of environmental changes. Changes in their population, behavior patterns, and reproductive ability have most often been used to examine the long-term effects of habitat fragmentation. Vultures are large, magnificent raptors, often referred to as nature's own disposal system because of their scavenging habits. There are 23

species of vulture, inhabiting diverse biomes from the Amazonian rainforest and East African savannahs, to the Sahara Desert and high Himalayas. There are two main groups of vultures: Old World vultures of the Accipitridae family, found in Europe, Africa, and Asia, and New World vultures of the Cathartidae family, found in North and South America. Out of nine species found in India seven species are reported at Jorbeer, Bikaner district north western Rajasthan. Egyptian Vulture (*Neophron percnopterus*) is resident species of Jorbeer Bikaner and population status of Egyptian Vulture (*Neophron percnopterus*) has been investigated in present study. Over the last two decades, there has been a dramatic decline in the population of vultures over most parts of the country. Considering the urgent nature being under the measures required, and predicted changes in the threats to vultures; the present paper emphasizes on population status of Egyptian Vulture (*Neophron percnopterus*) at Jorbeer conservation reserve to necessitate regular review and revision of the recovery plan of vultures in this area.

Key words: Behavior patterns; Raptors; Scavenging; Vultures

P22: EFFECT OF CHELANTS SUPPLY IN ZINC CONTAMINATED SOIL ON GROWTH, GRAIN YIELD AND SOME BIOCHEMICAL CONSTITUENTS IN MUSTARD

Isha Verma, SN Pandey

Department of Botany, Plant Nutritrion and Environment Management Lab
University of lucknow, Lucknow- 226007
Email: ishaschoar1991@gmail.com

The effectiveness of chelants (EDTA and Citric acid) supply (10 µM) in the soil contaminated with excess zinc on growth (shoot length and dry weight), grain yield and some biochemical constituents (pigments and activity of amylase) in mustard plants. Chelating agents EDTA and citric acid were supplied in soil to overcome the toxicity effects on growing mustard *Brassica juncea* L. plants. The soil was alluvial (sandy loam, mild calcareous, low organic matter content <0.3%) amended with excess zinc as $ZnSO_4$ (300 mg kg^{-1} of soil). Plants were grown at above soil and supplied with EDTA and citric acid, singly or in combination,

once. At intervals of 30, 50 and 70 days of sowing, plants were observed for above parameters. The combination of chelants enhanced the above parameters maximum as compared with their single use. Maximum total chlorophyll content by 3.01%, amylase activity by 125% and grain weight by 40.38% was increased at combination of above chelants in zinc contaminated soil.

Key words: EDTA; Citric acid; Zinc contamination; Biochemical constituents

P23: INDIGENOUS WILD EDIBLE FRUITS USED AS COMMERCIALIZATION OF KANGPOKPI DISTRICT OF MANIPUR, NORTH-EAST INDIA

A. Kikim, Md Riyajuddin Khan

Institutional Level Biotech Hub, Lilong Haoreibi College, Lilong, Manipur
Email: angom.kikim@yahoo.com

The present study deals with 15 species of wild edible fruits used as commercialization by the inhabitants of Kangpokpi District, Manipur. The survey-cum-exploration trips undertaken during 2015 and 2016. The wild fruit plant is declining day by day due to overexploitation and anthropogenic disturbances in the forest ecosystems. Therefore the present study emphasized the need for special attention should be paid to them in order to maintain and improve this important source of food supply. In this paper, the scientific and vernacular names, period of availability, taste, parts used and related notes are provided.

Key words: Different communities; Kangpokpi; Manipur; wild edible fruits

P24: EMERGING TRENDS OF WEEE HANDLING AND RECYCLING IN INDIA

Abhishek Kumar Awasthi[1], J Li [1], AK Pandey[2], MG Tiwari[3]

[1] School of Environment, Tsinghua University, Beijing 100084, P.R. China
[2] Department of Biological Sciences, R.D. University, Jabalpur (M.P.), India
[3] 72, Palamau Bhawan, Williams Town, Deghar-814112, India
Email: abhishekawasthi55@ymail.com

Rapid global progress and an exponential growth rate in the electronic industries in the 21st century has come a transformation in consumer way of life, resultant in the unwanted generation of a massive quantity of waste electronics, also recognized as e-waste. According to the United Nation University report projected that about 42 million tons (Mt) of e-waste is produced worldwide for every year, and further forecasted to increase around 50 Mt in 2018. In this context, according to literature review revealed that, almost 80% of e-waste from developed countries is shifted to developing countries particularly some of the Asian and African countries, for the reason that the lesser labor costs and lack in implementation of environmental rules & regulations. Similar to other Asian and African countries, According to published report and information suggested that, India is also reported as a one of the country for e-waste shifted from developed countries, the majority of e-waste is collected, handling, recycled and managed by the informal sector in India. These informal sites increase for the reason that of the convenience of very low labor cost. There are multiple studies indicated that the environment (air, soil, water) is polluted due to exposure of hazardous substances released at these improper workshop in developing countries. There are toxic substances & materials are used in several electronic items, which led to serious environmental problems and public health risk. Although, such e-waste could be one of the sources of sustainable livelihood option for engaged workers, especially those are economically not strong. This article evaluates the environmental issues due to e-waste informal recycling at the backyard workshops in India. Therefore, the aim of this communication is based on gained experience and knowledge about e-waste management system in India. There is need to complete the e-waste inventorization through. Effective measures and proper implementation of e-waste regulation, also regular monitoring to maintained environmental

standard. Accordingly, we suggests, the exiting informal sector must be combined with formal sector from the collection channels, and regular environmental monitoring must be done.

Key words: E-waste; Informal sector; Pollution issue; Resource recovery; Environmental Sustainability

P25: ROLE OF SUCROSE IN AMELIORATION OF ARSENIC INDUCED PHYTOTOXICITY THROUGH MODULATING PHOSPHATE AND SILICON TRANSPORTERS AND BIOCHEMICAL RESPONSES IN C_3 (*ORYZA SATIVA* L.) AND C_4 (*ZEA MAYS* L.)

Ambedkar Gautam[1,2], Kavita Shah[2], Shekhar Mallick[1]

[1]CSIR-National Botanical Research Institute, Lucknow, India
[2]IESD, Banaras Hindu University, Varanasi, India
Email: ambedkargautam176@gmail.com, shekharm@nbri.res.in

The present study investigated the interrelationship between sucrose (25ìM) and phosphate in amelioration of arsenic (As) [60 ìM of AsIII and AsV] in C_3 and C_4 plants. Application of sucrose ameliorated As toxicity and improved morphological parameters in both seedlings. Sucrose suppressed the gene expression of low silicon while upregulate the phosphate transporters in both C_3 and C_4, which coincided with reduced iAs accumulation in maize root (23%) against AsIII, in shoots of both C_3 (12%) and C_4 (35%) seedlings over AsV. Overall, results indicate sucrose plays a vital role in amelioration of iAs induced toxicity through reduced As accumulation.

Key words: Arsenic; Sucrose; Phosphate transporter; silicon transporter; antioxidants; C_3 and C_4 plants

P26: SUSTAINABLE ORGANIC WASTE MANAGEMENT USING BLACK SOLDIER FLIES (BSF), *HERMETIA ILLUCENS* ALONG WITH AN EFFORT TO GENERATE LIVELIHOOD FOR LOCAL COMMUNITY IN MUHAMMA, KERALA

Ananya Das[1], Deepali Bansal[1], Alankrita Sharma[2]

[1]Guru Gobind Singh Indraprastha University, Dwarka, Delhi – 110078, India
[2]Zakir Husain Delhi College, University of Delhi, Delhi-110002
Email: mimishinu@gmail.com

Solid waste management has become an important and serious issue to deal with worldwide. The rapid urbanization, change in consumption pattern and social behaviour have increased the generation of solid waste in Kerala. In the waste management chain, there have been value addition efforts where wastes have been transformed to other valuable resources. One such approach is in the Black Soldier Fly (BSF) bioconversion of organic wastes. It provides a valuable solution to this problem, as they naturally upcycle nutrients from organic matter. This environmentally responsible approach reduces the volume in landfills while delivering high quality nutrients for animal feed. BSF bioconversion of organic wastes can help promote business opportunities in local communities.

Key words: Solid waste management; Organic waste; Black Soldier Fly (BSF)

P27: DYNAMIC USE OF MICRO-ORGANISM IN WASTEWATER TREATMENT AND BIO-ENERGY PRODUCTION

Anita, DP Singh

Department of Environmental Sciences
Babasaheb Bhimrao Ambedkar University, Lucknow
Email: verma.02anita@gmail.com

Our environment is drastically changing and number of environmental issues like water and energy scarcity is emerging as major issues of the world. Both the issues need dreadful solution and micro-organisms such as bacteria and microalgae have shown great potential in treating wastewater with simultaneous bio-energy production from microalgal biomass. Some microalgae and bacteria work symbiotically to improve the physico-chemical properties of water and also enhance the rate of toxic pollutant degradation. Thus, the need is to screen potent microalgal and bacterial species that grow efficiently under harsh and changing environmental condition in order to reduce the menace of wastewater.

Key words: Microalgae; Bacteria; Bioenergy; Wastewater

P28: MENSTRUAL HEALTH AND MANAGEMENT: IMPROVING QUALITY OF LIFE OF RURAL INDIA

Anjali Yadav, Chanchal, Arpana Pandey

Centre of Science and Society, Institute of Interdisciplinary Studies (IIDS),
University of Allahabad, Prayagraj-211002.
Email:anjiyadavs247@gmail.com

Menstruation is a unique phenomenon to the females. It is clear from the study findings that majority of the girls were having wrong knowledge about menstruation regarding the practices. In rural India the lack of knowledge and awareness of menstruation leads the major and

several disease such as UTIs, RTIs, cervical cancer and also increase the Maternal mortality rate etc. The present paper highlights the issue of lack of awareness which leads major diseases, and non-biodegradability, non-affordability of special hygiene product and how it has turn into a critical environment concern all over the world. To solve this problem the study proposed an idea of creating awareness and hygiene in females during their menstruating period through cost effective, eco-friendly and Biodegradable sanitary napkin.

Keyword: Biodegradable; Eco-friendly; Hygiene; Awareness

P29: INFORMATION AND COMMUNICATION SCIENCES AND TECHNOLOGY (INCLUDING COMPUTER SCIENCES) OPETICAL CHARACTER RECOGNITION USING NEURAL NETWORK

AP Yadav[1], Adarsha Kumar[2]

[1]Dept. of Physics, Marwari College, Darbhanga; [2]Dept. of Physics, L.C.S. College Darbhanga
Email: drapyadav786@gmail.com

Neural Networks is now a subject of interest to professionals in many field and also a tool for many areas of problem solving. The results are astounding, even phenomenal with Neurala Networks and the effort is at times relatively modest to achieve such results. Image processiong, vision, financial market analysis and pattern recognition are among many areas of application of Neural Networks. The main purpose the paper is to use the Kohonen network model, which is required to recognize or categorize a few alphabetic characters using neural Networks. The Network will be trained to recognize various forms of same alphabet as written by different people as one. After training Network will be tested for its capability to generalize its knowledge obtained during training session to the form of trained characters, which it has never come across.

Key words: Epoch; ANN; Kohonen Neural Networks

P30: LAND USE LAND COVER CLASSIFICATION AND QUANTIFYINGCHANGE ANALYSIS (1976 TO 2018) IN THE KAILASH SACRED LANDSCAPE–INDIA

Arvind Pandey[1], Gajendra Singh[2],Charu Pundir[1], Shashank Lingwal[2]

[1]S.S.J. Campus-Almora, Kumaun University, Nainital
[2]Utttarakhand Space Application Centre, 93/2, Vasant Vihar, Dehradun

Quantifying land cover changes is a challenging task at high altitude Himalaya, which have colossal value addition for natural resource management. The present study conducted,i) quantification of land use land cover assessment and ii) depicting the changes from 1976-2018 in the Kailash Sacred Landscape-India (KSL-India). Seven major classes *viz.,* Forest, Agriculture, Scrubland, Grassland, Settlements, Water body and glaciers (snow) were delineated by using LANDSAT 2, 5 and Sentinel 2A satellite images of the year 1976, 1990, 2011and 2018. The semi-automated classification approach was used for LULC classification in the hilly region. Since, 1976 to 2018, major changes occurred in forest, agriculture and human settlementclasses. Forest cover loss was ca 7.14% of existing forest in 1976; which is lower in other Himalayan regions but forest fragmentation consistently increased especially in montane broad-leaved and subtropical needle leaved forests. Negative changes occurred in Agriculture as well and high altitude agricultural lands were converted into grassland and scrublands mostly increased due to non-cultivation for several years. However, settlements showed positive change with over four time increase in the area since year 1976.Changes across elevation gradients (e.g.,<1000m, 1000-2000 m, 2000-3000 m, 3000-4000 m and > 4000m) were also studied. Community based forest management practices aided restoring forest cover at places, whereas overexploitation led to forest degradation.

Keywords: Land Use Land Cover; LANDSAT; Sentinel; Semi-Automatic Classification

P31: DETERIORATION IN THE REPRODUCTIVE VIABILITY OF *CHANNA PUNCTATUS* EXPOSED TO TEXTILE EFFLUENT ALONG THE STRETCHES OF GANGES IN SOUTHERN BENGAL

Arya Sen[1], Nilemesh Das[2]

[1]*Department of Mathematics, Jadavpur University, Kolkata, West Bengal, India*
[2]*ICAR-Central Inland Fisheries Research Institute, Barrackpore, West Bengal, India*
Email: dasnilemesh16@gmail.com

Increasing toxicity has posed a serious threat to environment worldwide. Drainage of textile effluents into the natural water sources has devastated the existence and survival of aquatic life. *Channa punctatus*, an indigenous species has a profitable market value in SE countries, is considered to be a weed fish in Indian scenario. The natural proliferation of the fish, its reproductive viability gets hampered under the exposure of the textile effluents. Being exposed for about 40 days, the liver functioning tests showed significant changes, the GSI had a steep deterioration and the clinical parameters confirmed excessive stress. The study aims to create awareness on preserving the indigenous fish diversity.

Key words: *Channa punctatus;* industrial effluent; toxicity; reproductive viability

P32: ESTIMATION OF PHTHALIC ACID ESTERS BY MICROWAVE ASSISTED EXTRACTION AND ULTRA HIGH PERFORMANCE LIQUID CHROMATOGRAPHY IN SOIL OF PATNA, BIHAR, INDIA

Aseem Kumar Anshu[1], Preety Sinha[2]

[1]*P.G. Department of Biotechnology, Magadh University, Bodh Gaya, Bihar India*
[2]*P.G Department of Environmental Sciences, Anugrah Narayan College, Patna, Bihar, India*

Phthalic Acid Esters (PAEs) are widely used as plasticizers in plastics for imparting flexibility. However, due to anarchic use of plasticizers, PAEs have become ubiquitous in our environment. The occurrence of PAEs in soil, water, food, beverages, other environmental and biological samples has been documented multiple times in past from different parts of the world. PAEs can easily leach out into the environment from the plastics upon change in pH and temperature as they are not covalently bonded with the polymer of plastics. This study aims to quantify the levels of major PAEs in the soil of municipal wards of Patna, Bihar. In this study, soil samples from randomly selected 33 municipal wards of Patna urban, Bihar were collected at the depth of 50 cms. Quantification of 7 PAEs viz. DiMethyl Phthalate (DMP), DiEthyl Phthalate (DEP), DiPropyl Phthalate (DPP), DiHexyl Phthalate (DHP), DiEthylHexyl Phthalate (DEHP), and DiIsoPropyl Phthalate (DIPP) were assessed in the soil samples with the help of Microwave Assisted Extraction (MAE) followed by Ultra High Performance Liquid Chromatography (UHPLC). The mean concentration of DBP was observed to the highest (95% CI, 1493.533-2126.11) followed by DMP (95% CI, 105.4034-699.1694), DPP (95% CI, 183.4364-412.7626), DEHP (95% CI, -6.870309-293.4834), DIPP (95% CI, -70.27246-325.2153), DHP (95% CI, 11.20322-47.86696) and DEP (95% CI, 8.808694-24.59728) with p-value < 0.00001. The highest concentration of PAEs was recorded in ward no 69 and the lowest in ward no 4. Soil samples of all the municipal wards were observed to be contaminated with high levels of PAEs. Conclusively, the assessment of PAEs in soils samples is utmost necessary for the management of environmental pollution produced by anthropogenic activity.

Key words: PAEs; Microwave; Plasticizers; Patna; Municipal Wards

P33: PHYTOCHEMICAL AND NUTRITIONAL CHARACTERIZATION OF SELECTED MEDICINAL PLANTS OF NORTH GUJARAT

Asha Humbal

School of Environment & Sustainable Development, CUG, Gandhinagar, Gujarat

Medicinal plants have tremendous attention in recent years. They are considered as chemical factory of biosynthesis of huge array of phytochemicals such as primary and secondary metabolites. Medicinal plants are also known as backbone of traditional medicine.In many developing countries there are millions of people, are still dependent for their food needs and medicinal purposes on the wild resources including wild edible plants. Medicinal plant having rich source of component can be used to develop and synthesis of new drug. Medicinal plants are major interest in pharmacological and pharmaceutical sectors due to their diverse function and biological activities. But due to anthropogenic pressure and other destructive activity medicinal plants are under threat. There is a need to conserve medicinal plants and focus on unexplored medicinal plant species with higher medicinal values. In Gujarat, large number of wild medicinal plants are found in the north region (polo forest) used by the local people for their primary health care. The present study highlights on the nutritional value,phytochemical screening and antibacterial efficiency of selected four medicinal plant species (*Andrographis paniculalata*, *Terminalia arjuna*, *Terminalia cordifolia*, *Vitex negundo*) of North Gujarat.

Key words: Medicinal plants, Traditional knowledge, Phytochemical screening, Nutritional characterization

P34: DISTRIBUTIONAL PATTERN OF FOREST TYPES AND MAJOR TREE SPECIES IN NORTH WEST HIMALAYA

Ashish Kumar, Subrat Sharma

G.B. Pant National Institute of Himalayan Environment and Sustainable Development, Kosi-Katarmal, Almora, 263643, Uttarakhand

The Himalayas are one of the youngest and richest ecosystems on the earth with a variety of species and forest types due to the varying altitude, topographic and climatic conditions. Amid this, the North West Himalaya (NWH) constituting of three states namely Jammu and Kashmir, Uttarakhand and Himachal Pradesh covers a total geographical area of 3,31,392 km^2. In terms of the total forest cover of the region (i.e. NWH) it account to about 10% of total geographical area of India. The present study has classified forest type's and major forest forming tree species of NWH based on the forest cover area data of forest survey of India (FSI, 2015). The study characterized 9 major forest type including 55 sub-forest types, nine major tree species and along with their zonal distribution. The predominant forest type includes; moist temperate (38.50 %) and sub-tropical pine forest (22.06 %).The study has brought out a comprehensive vegetation cover of NWH and different forest type based on different forest class. This spatially explicit distribution pattern database will be highly useful for the studies related to changes in various forest types, degradation of forest land, and climate-vegetation modeling.

Key words: Himalaya; Forest type; NHW; Forest cover

P35: ISOLATION AND CHARACTERIZATION OF KERATINASE FROM FEATHER DEGRADING SOIL BACTERIA

Ashish S Wani, Govinda R. Jadhav

Department of Biotechnology, New Arts, Commerce and Science College, Ahmednagar, Maharashtra
Email: ashishwani19@gmail.com

Proteolytic bacteria were isolated from local poultry waste of Ahmednagar region. Two isolates out of four showed high keratin degrading activity when cultured in broth containing feathers. These two isolates (P1 and P4) were identified and found to be belonging to *Azotobacter* and *Bacillus* genus respectively. Keratinase was produced using both isolates and characterized. Maximum keratinase activity of isolate P1 was 38.1 U/ml and P4 was 51.7 U/ml. Optimum pH for enzyme activity was found to be 9. Also optimum temperature for P1 keratinase was 40°C and for P4 Keratinase it was 50°C. The keratinase activity was inhibited by metal ions such as $MnCl_2$, $BaCl_2$ and $CaCl_2$. Keratinase has application in improving digestibility of feather.

Key words : Keratinase; Proteolysis; Poultry waste; Feathers; Bacteria

P36: WOODY VEGETATION AND TIMBERLINE MAPPING OF PERMANENT MONITORING SITE AT SINTHAN (JAMMU & KASHMIR)

Avantika Latwal[1], Subrat Sharma[1], Shaik Rehana[2]

[1]G. B. Pant National Institute of Himalayan Environment & Sustainable Development
Kosi-Katarmal, Almora-263643, Uttarakhand
[2]International Institute of Information Technology, Gachibowli, Hyderabad-500032
Email: avantika.latwal@gmail.com

The objective of the study is to develop a coherent baseline information using remote sensing technique, to characterize spatial features of Himalayan treeline ecotone in the watershed (Sinthan) considering timberline, treeline, woody patches and isolated trees above timberline through high resolution satellite image (Digital Globe, 0.5-2m). Sinthan watershed is a micro watershed of Bringi River, located in Anantnag district of Jammu & Kashmir state. Total length of the timberline in the watershed is about 14.12km (3065m-3679m; average timberline elevation 3474m) and treeline is 5.32km (3396m-3724mabove sea level; average timberline elevation 3557mabove sea level). Distribution of timberline in the watershed in relation to altitudinal gradient indicates that maximum distribution is in the range of 3500m-3550m above sea level (23%) followed by the range 3550m-3600m above sea level (19%). Among major aspects in the watershed distribution of timberline is maximum in North aspect (30.5%). Above timberline total 910woody patches of different size with area 227ha and total 970 individual trees (trees species are *Betula utilis*, *Abies pindrow* and *Pinus wallichiana*) were mapped. The different types of patches are Trees patch, pure patches of *Rhododendron* and *Junipers* mats, andpatches of *Rhododendron*and *Junipers* mats with individuals of *Abies*,*Betula* and *Pinus wallichiana*. Distribution of woody patches (elevation at central point of the patch) along altitudinal gradient indicates that the highest number of patches (121 in number) occurred between 3550m and 3600m above sea level.Timberline and treeline are the most sensitive ecotones and an indicator of warming climate. The detailed dataset are required for long term monitoring of climate change impact and developing relationship between climatic parameters and vegetation.

Key words: Remote Sensing; Timberline; Treeline; Watershed

P37: TREATMENT OF REAL WASTE WATER BY HETEROGENEOUS FENTON PROCESS USING A GRAPHENE OXIDE NANOPARTICLE

Ayesha Hashmi, Ajaya Kumar Singh

Govt. V. Y. T. PG Autonomous College, Durg, (Chhattisgarh) 491001, India.

Graphene oxide (GO) was used as catalyse a heterogeneous Fenton reaction for the degradation of real waste water. The high catalytic activity and stability of GO are confirmed. Waste water removal percentage still maintained at 99.03%. The reaction rate can be faster by improving the dosage of the catalyst. The efficiency of the process explored as a function of the experimental parameters: pH, hydrogen peroxide concentration and dose of GO. Owing to the extremely high chemical oxygen demand (COD), toxicity, and acidity of the contaminated wastewater, biological processes cannot be directly applied for its treatment. Therefore, Fenton's reagent was employed to treat the wastewater before discharge. The Fenton process is also the easiest and most reliable method of advanced oxidation. The treatment of this wastewater with pH, COD, BOD, TDS, and acidity contents of 2.0, 46.4 mg L^{-1}, 11.5 mg L^{-1}, 0.56 gL^{-1}, and 20 mg L^{-1}, respectively, was investigated in this study.

Key words: waste water; Heterogeneous Fenton process; GO

P38: A STUDY ON EFFECT OF SOLAR WIND PLASMA PARAMETERS

Balveer S Rathore, Rammohan S Bhadoria, DC Gupta

Govt. Model Autonomous Science College, Gwalior, Madhya Pradesh, India;
School of studies in Physics, Jiwaji University Gwalior (India)
Email: balveer _singhra@yahoo.co.in

Today's challenge for space weather research is to quantitatively predict the dynamics of the magnetosphere from measured solar wind and interplanetary magnetic field (IMF) conditions. Correlative studies between geomagnetic storms (GMSs) and the various interplanetary

(IP) field/plasma parameters have been performed to search for the causes of geomagnetic activity and develop models for predicting the occurrence of GMSs, which are important for space weather predictions. We find a possible relation between GMSs and solar wind and IMF parameters in three different situations and also derived the linear relation for all parameters in three situations. On the basis of the present statistical study, we develop an empirical model. With the help of this model, we can predict all categories of GMSs. This model is based on the following fact: the total IMF *B*total can be used to trigger an alarm for GMSs, when sudden changes in total magnetic field *B*total occur. This is the first alarm condition for a storm's arrival. It is observed in the present study that the southward *Bz* component of the IMF is an important factor for describing GMSs. A result of the paper is that the magnitude of *Bz* is maximum neither during the initial phase (at the instant of the IP shock) nor during the main phase (at the instant of Disturbance storm time (Dst) minimum). It is seen in this study that there is a time delay between the maximum value of southward *Bz* and the Dst minimum, and this time delay can be used in the prediction of the intensity of a magnetic storm two-three hours before the main phase of a GMS. A linear relation has been derived between the maximum value of the southward component of *Bz* and the Dst, which is Dst = (0:06)+(7:65)*Bz* +*t*. Some auxiliary conditions should be fulfilled with this, for example the speed of the solar wind should, on average, be 350 km s¡1 to 750 km s¡1, plasma ¯should be low and, most importantly, plasma temperature should be low for intense storms. If the plasma temperature is less than 0:5 X 10^6 K then the Dst value will be greater than the predicted value of Dst or if temperature is greater than 0:5 *X* 10^6 K then the Dst value will be less (some nT).

Key words: Solar wind; geomagnetic storms (GMSs); interplanetary magnetic field (IMF)

P39: STUDIES ON POLLUTION ECOLOGY OF BENTHICFORAMINIFERA FROM THE VISAKHAPATNAM HARBOUR CHANNELS, EAST COAST OF INDIA

Bangaku Naidu Kilaparthi, Anji Reddy Mareddy

Centre for Environment, Jawaharlal Nehru Technology University Hyderabad-500085, Telangana, India
Email: naidu0756@gmail.com

A total of thirty bottom water and sediments samples were collected at fixed stations from the Visakhapatnam harbour channels (one outer channel and two inner channels) in pre-monsoon and post-monsoon. The ecological parameters such as salinity, temperature, dissolved oxygen, pH, and its organic matter content play a major role on the living conditions and the foraminiferal test showed abnormalities in heavy metal concentrations. The ecological parameters and the sediments are affected by pollution; they in turn affect the metabolism and the morphology of the foraminifera. The Visakhapatnam Harbour channels are highly polluted by domestic and industrial sewage, steel plant, Hindustan Petroleum Corporation Limited oil refinery, and fertilizer complex, appreciable amounts of manganese and iron ore dust and other minerals, which settle in the waters during loading and unloading operations, fuel lets off the exhausts of ships and other crafts rendering the water less transparent. These changes in foraminiferal species and increase in the test abnormalities are indicates of environmental stress in the harbour.

Key words: Foraminifera; Abnormalities; Ecological parameters; Heavy metals; Harbour

P40: GLYCINE-MODIFIED ZINC OXIDE NANOPARTICLES AS CATALYSTS FOR AURAMINE-O-DYE ABATEMENT BY A HETEROGENEOUS FENTON PROCESS

Bhawana Jain, Ajaya K Singh

Department of Chemistry, Govt. V. Y. T. PG. Autonomous, College, Durg, Chhattisgarh

In this work, the successful abatement of Auramine O (AM) dye by a heterogeneous Fenton process is reported. Zinc oxide (ZnO) nanoparticles by a simple chemical precipitation method and later modified by glycine (M-ZnO). The nanoparticles size sharply decreased upon modification with glycine. Light absorbing capacity and band gap were determined by using UV-visible spectrophotometry. X-ray diffraction (XRD) was used to find basic crystal properties such as crystallinity. Changes in crystal size and morphology were determined by scanning electron microscopy (SEM) while high resolution transmission electron microscopy (HRTEM) allowed obtaining more information on the shape and size of nanoparticles. The ImageJ computational software was used to determine the size distribution of nanoparticles and planes of the crystal. The catalytic activity for AM abatement has been determined using the Fenton process at pH 6.

Key words: Glycine modified-ZnO; heterogeneous Fenton process; wastewater; Auramine

P41: EVALUATING THE DEODORIZING AND DECOLORIZING POTENTIAL OF AGAROSE ENTRAPPED IMMOBILIZED MICROBIAL CONSORTIA DB1, DB2, DB3, DB4 AND RN1, RN2, RN3, RN4

Darshana Badve, Reshma Nalage, Rajesh Sharma

VPASC College, Vidyanagari, Baramati - 413133.

Effluent and domestic sewage disposal is one of the greatest challenges faced by human population. Effluent and domestic sewage because of its high organic content not only favors the growth of pathogens but also imparts obnoxious odor and color. The current study involves the use of agarose immobilized consortia of microorganisms namely DK1, DK2, DK3 and DK4 which efficiently deodorize the sewage and RN1, RN2, RN3, RN4 for its ability to decolorize. The bacteria were isolated from sewage contaminated soil (18.17 o N and 74.6o E). The major contributors to the odor are H2S, mercaptans, ammonia and urea etc. DK1 to DK4 efficiently deodorize by reducing the above compounds to the tune of 70, 75 89 and 84% respectively, and RN1– RN 2 have capacity to decolorize 58, 62, 62 and 68% respectively, after 50 hours of incubation as measured by spectrophotometer (Jasco 630).

P42: RISK ASSESSMENT OF SLUDGE TREATED SOILS IN RELATION TO TRANSFER OF METALS TO HUMAN FOOD CHAIN

Debasis Golui

ICAR-Indian Agricultural Research Institute, New Delhi-110012
Email: goluiiari@gmail.com

Risk to human health for intake of Ni, Pb and Cd through consumption of wheat grain grown on sludge treated (sludge applied since 2014) soilswas computed in terms of hazard quotient (HQ), following USEPA protocol.Free ion activity of Zn, Cu, Fe, Mn, Ni, Pb and Cd (as intensity) in sludge treated soils were computed using Baker soil test programme. Highest free ion activity of all metals was recorded at highest level of sludge addition i.e. 34 t ha^{-1}, such results corroborate with the results obtained in uptake data by wheat grain.Solubility and free ion activity model (FIAM)was validated to predict the uptake of Zn, Cu, Ni, Pb and Cd by wheat grain. By and large, observed and predicted Zn (R^2=0.77), Ni (R^2=0.77), Pb (R^2=0.77) and Cd (R^2=0.77) content in wheat grain indicates the reasonably good agreement between these two values.Wheat grain is not likely to induce any health hazard to consumers as the values of HQ for Ni, Pb and Cd werefar less than 1. Thus, wheat grown under sludge treated soils are safe for human consumption.

P43: HOLISTIC MANAGEMENT OF ALGAL PATHOGEN FOUND IN ORNAMENTAL TEA VARIANT

Debodyuti Sadhukhan, Debapriya Maitra, Bikram Dhara, Debdatta Das, Prapti Victoria Rozario

Department of Microbiology, St. Xavier's College (Autonomous), Kolkata
Email: dsadhu1234@gmail.com

Camellia sinensis is affected by Red rust algae *Cephaleorus sp*. In this investigation the same organism was observed in a tropical ornamental variety of *C. sinensis* having similar symptoms. The organism was isolated in pure form and biomass was increased in Bold's

Basal media from the Tea leaf fragments. The Koch postulate was carried out for the pathogenicity. Five commercially important bio-controlling agents *Bacillus subtilis, Bacillus thuringiensis, Bacillus megaterium*, Potassium solubilizing bacteria and Phosphate solubilizing bacteria along with *Trichoderma sp* (as an antifungal agent) and *Metarhizium sp* (as an entomopathogenic fungi) were applied as leaf spray in an oil-based consortium which remarkably reduced the symptoms on the leaf surface.

Key words:*Cephaleorus sp;* tea pathogen; algal disease; biological control; consortium

P44: MEASURES OF SOCIAL ORGANIZATION IN BLACKBUCK, *ANTILOPE CERVICAPRA* (L. 1758) IN SEMI-ARID HABITAT OF HARYANA (INDIA)

Deepak Rai, Jyoti

Department of Zoology, Kurukshetra University, Kurukshetra, Haryana-136119
Email: drbkuk@gmail.com, jyoti.aggroia02@gmail.com

Among ungulates, group size varies both within and between species depending on ecological factors such as forage abundance, habitat structure and predation pressure. So, the present study was conducted to measure the sociality as well as social organization of blackbuck in semi-arid habitat of Haryana i.e. Lalpur Jheel, Dobhi Village in district Hisar. Scan sampling method was followed to record the variations in group size from March, 2017 to February, 2019. A total of 48 fortnightly periodic visits were made and 130 blackbuck sightings varying from a minimum of one to maximum of seven sightings per visit were sighted. Among 130 sightings, 36 lone territorial male, 5 unimale-unifemale, 22 mixed herd, 36 bachelor herd, 21 harem herd and 10 female herd sightings were observed varying from a minimum of 2 individuals to a maximum of 58 individuals persighting (excluding solitary sightings of the animal).The solitary as well as group sighting of blackbuck reflects their partial social organization. The observed animals were categorized into six age-sex classes, namely, adult male, sub-adult male, yearling male, adult female, sub-adult female and fawn. Out of 1715 individual blackbuck sightings, adult female (783 sightings) were most commonly observed reflecting skewed female ratio in blackbuck population. Based on the data on observed

group size, two measures of sociality were calculated including mean group size and mean crowding in which first reflects the group size from outsider's viewpoint while the later represents the group size experienced by any individual in a particular group. The average mean group size and mean crowding for blackbuck was 13.19±1.29 S.E. and 29.66 (N=1715 individuals), respectively. Although fawning occurred throughout the year but two peaks were observed during summer and winter seasons. For the effective conservation, one of the essential requirements is the evaluation of social group size as well as social organization of a species.

Key words: Age-sex classes; Blackbuck; Crowding; Mean group size; Social organization

P45: BIOMONITORING OF A PERENNIAL POND USING BENTHIC-MACROINVERTEBRATE

D. K. Paul[1], Sumona Sanyal[1], D. Sayantan[2]

[1]Department of Zoology, Patna University, Patna, Bihar
[2]Department of Life Sciences, CHRIST (Deemed to be University), Hosur Road, Bengaluru, Karnataka
Email: dkpaul.pat31@gmail.com

With ever growing urbanization, water pollution poses major challenge. There is urgent need to setup pertinent bio-monitoring and conservation strategies to retain sustainable freshwater environment including ponds. Biological Water Quality Criteria (BWQC) using benthic macro-invertebrates, proposed by Central Pollution Control Board, India (CPCB, 1999) is used to assess the actual health of Sanjay Gandhi Jaivik Udhyan pond, Patna, India (25°35' 49" N 85°05' 57" E). A total of 17 taxonomical families belonging to 6 taxonomical groups were identified. For BWQC, Saprobic score ranged between 3-6 and diversity score ranged between 0.3 – 0.9. The calculated indices suggest that pond is moderately polluted. Presence of pollution tolerant families like *Chironmidae* indicate that pond water could only be used for aquaculture, irrigation and recreational purposes.

Keywords: Benthic macro-invertebrates; Bio-monitoring; BWQC; Pollution; Pond

P46: A SURVEY OF BHIWAPUR FISH MARKET IN CHANDRAPUR, MAHARASHTRA

D. M. Gaidhane, Sadaf Siddiquei, M. Subhas

Department of Zoology, Janata Mahavidyalaya, Chandrapur-442401, Maharashtra
Email: dmgaidhane@yahoo.com

India is the third largest producer of fish and 2nd largest producer of inland fish in the world. Bhiwapur fish market is located near Mahakali temple in Chandrapur, District-Chandrapur, Maharashtra. The survey of fish market was done during January to March, 2015 for a period of three months in the morning and evening hours. This is a 2nd biggest fish market in Chandrapur district, after Bengali camp's fish market. In this market 23 species of fishes and prawn were found. Wholesalers sold 1 to 1.5 tonnes fishes daily and retailers sales 25 to 50 kg fishes per day. Fish market of Bhiwapur area generates direct and indirect employment to so many people. It helps in the betterment of urban economy and poverty reduction and contributing to the economic welfare of people in Bhiwapur area, Chandrapur.

Key words: Bhiwapur; Fish market; Urban economy; Fishes and prawns

P47: SEASONAL VARIATION OF FLUORIDE ACCUMULATION IN AGRICULTURAL CROPS AT UNNAO DISTRICT, UTTAR PRADESH

Gayatri Singh, Geetgovind Sinam, Babita Kumari, Kriti, Shekhar Mallick

Plant Ecology & Climate Change Science Division, CSIR-NBRI Institute, Lucknow, U.P.
Email: gayatrisingh.15@gmail.com

The study assessed the level of fluoride in agricultural crops grown in Unnao district, Uttar Pradesh. The plants samples including *Oryza sativa*, *Trichosanthes dioica*, *Piper betel, Legenaria siceraria, Coccinia grandis, Zea mays*, *etc* collected and analyzed for three

seasons (pre-monsoon, monsoon, post-monsoon). Highest fluoride accumulation was observed for *O. sativa* and *T. diocia* among the pre-monsoon crops. *T. diocia*, followed by *C. nardus, M. charantia and C. annus* accumulated maximum among monsoon crop, however, *M. charantia* accumulated highest among post-monsoon crops. Overall, the accumulations of F^- were highest in pre-monsoon crop owing extensive consumption of F^- contaminated ground-water for irrigation.

Key words: Fluoride; agricultural crops; seasonal variation; Unnao

P48: DISTRIBUTION OF LEOPARD AND ITS PREY SPECIES IN KALESAR NATIONAL PARK, HARYANA

Janam Jai Sehgal[1], Rajiv Kalsi[2], Randeep Singh[1]

[1]Amity Institute of Forestry and Wildlife, Amity University, Noida, Uttar Pradesh, India
[2]Mukand Lal National College, Yamuna Nagar, Haryana, India
Email: janamjai18@gmail.com; randeep04@rediffmail.com

We assessed the distribution of leopard (*Panthera pardus*) and its prey species in different habitat strata in Kalesar National Park, Haryana using sign survey method. Track plots (n=24) were used to collect presence/absence data in the study area from May 2019 to June 2019. Nine track plots of 2 x 1m each were selected in sal forest, 10 in mixed forest and 5 in open forest. Information of forest structure characteristics, prey species, water source, village, etc were collected along with leopard presence data. Encounter rate for leopard and its prey species were calculated. It was observed that leopard was recorded with highest encounter rate in mixed forest (0.22) followed by sal forest (0.21) and open forest type (0.11). Among prey species sambar was recorded with highest encounter rate in all forest types followed by spotted deer and wild boar. Vegetation around each track plot was sampled by marking a circular plot of 20m radius for sal and mixed forest type and 5m radius for open forest type. A strong correlation was observed between leopard and its prey species distribution. On the basis of this study, we proposed a further in-depth study on the habitat-use of leopard in Kalesar National Park.

P49: ASSESSMENT OF ANTIOXIDATION POTENTIAL, LIPID PEROXIDATION, CYTOTOXICITY AND DNA DAMAGE OF MICROBIAL PIGMENT

Kajal Satpute, Arti Kale, Rajesh Sharma

VPASC College, Vidyanagari, Baramati - 413133

Bacterial pigments have found many applications in everyday life. Nontoxic nature of pigment produced by number of microorganisms makes them environmental friendly for utilization in dye, food, pharmacy, cosmetic and other industries. The current study involves isolation of Yellow (Zeaxanthin), Orange (â - carotene) and Pink (Canthaxanthin) pigment produced by *Staphylococcus aureus, Dunaliella salina* and *Monascus roseus* respectively and assessment of antioxidant potential by DPPH assay, Lipid peroxidation bb TBARS, cytotoxicity by MTT assay and DNA damage by Comet assay. The results of DPPH assay exhibited 81, 75 and 71% radical scavenging for Yellow, Orange and Pink by respectively. Lipid peroxidation by TBARS indicated that pigments efficiently lowered the MDA production in goat lever cells, MTT assay proved the noncytotoxicity of pigments to the tune of 92, 95 and 91% and Comet assay reveled that pigments do not cause genotoxicity.

P50: URBANISATION AND ITS IMPACT ON BIRDS

Kirti Sharma, Himani Gaikwad, Deepali Bansal, Ananya Das

University School of Environment Management, Guru Gobind Singh Indraprastha University, Delhi – 110078, India
Email: poetoct@gmail.com

The growth of inefficiently planned modern cities due to rapid increase in population size and migration has majorly affected the biodiversity of that particular region. As the development proceeds, the biodiversity composition of an urban area tends to become limited due to less diverse habitats which ultimately results in building up of homogenous environment in the cities. The plantation in urban areas gets restricted only to the ornamental plants or to those

which have less role to play in providing suitable habitat to different species of birds, insects and animals. Plants, animals and birds are equally affected by the process of urbanization and only those tend to survive who adapt themselves in these urbanized areas.

Keywords: Urbanization; Urban Biodiversity; Green Space; Canopy Heterogeneity

P51: COMPARATIVE EVALUATION OF THE PHYTOREMEDIATION IN NI AND CD CONTAMINATED SOIL FROM E-WASTE

Kriti[1,2], Kumkum Mishra[1], Shekhar Mallick[2]

[1]Department of Botany, Lucknow University, Lucknow
[2]Plant Ecology & Climate Change Div., CSIR-NBRI Lucknow
Email: kriti.v02@gmail.com

India generates about two million tones of electronic waste (e-waste) per annum due to an increasing demand of technologies. The present study was conducted to determine the phytoremediation potential of two different plants namely, Vetiver (*Chrysopogon zizanioides*) and Lemongrass (*Cymbopogon citrates*). These plants were grown under pot experiment supplemented with three concentration of e-waste. The effect of e-waste on growth, leaf chlorophyll was found notably. Malondialdehyde contents were found significantly increased by all e-waste treatments of plants after 120 days as compare to the control. Therefore, these plants may be used for the phytoremediation of e-waste.

Key words: Electronic waste; Phytoremediation; Vetiver; Lemongrass.

P52: IMPACT OF CLIMATE CHANGE ON FLORAL BIODIVERSITY OF HIGH ALTITUDES WETLANDS OF HIMALAYA

KS Kanwal[1], RS Rawal[2]

[1]*G. B. Pant National Institute of Himalayan Environment and Sustainable Development, Himachal Regional Centre, Mohal, Kullu-175 126, Himachal Pradesh*

[2]*G. B. Pant National Institute of Himalayan Environment and Sustainable Development, Kosi-Katarmal, Almora- 263 643, Uttarakhand*

The high altitude wetlands (HAWs) are the pristine ecosystem, mainly found in the higher reaches (above 3000 masl) of the Himalayas and support rich, unique and endemic floral biodiversity. Among the globally distributed areas of HAWs, the Himalaya and the Tibetan plateau is the largest and it harbours numerous lakes of different geological origin in myriad of shapes and sizes. There are around 4699 HAWs covering around 1,26,125 Ha area in Indian Himalayan region. These wetlands provide numerous ecological goods and services, abode of unique and endemic biodiversity, source of many important rivers, play key role in carbon sequestration and have religious significance among communities. Arunachal Pradesh state is ranked second in India after Jammu & Kashmir with 1672 HAWs covering a total area of 11,864 ha, accounting for about 7.6% of total wetland area of the state. The present article highlights a case study of climate change impact on floral diversity of Nagula and Bhagajang high altitude wetland complex of Tawang district of Arunachal Himalaya. Standard methodology was followed for documentation of floral biodiversity, ethnobotany study, and climate change impact assessment. A total 346 plant species belonging to 194 genera and 92 families recorded from study area. Several species were reported as new record for flora of India and flora of Arunachal Pradesh. Rare, endangered and threatened (RET) species such as *Gentiana kurroo, Nardostachys jatamansi Aconitum heterophyllum*, *Aconitun ferox, Meconopsis paniculata, Picrorhiza kurrooa, Podophyllum hexandrum* will face severe threat from climate change in the future due to very narrow range of distribution and small population size. Indigenous community living around the high altitude areas are mostly nomadic and poor and highly vulnerable to climate

change impact. Anthropogenic pressures such as population growth, grazing, unregulated tourism, infrastructure development and forest product collection etc. are other major threats for plant biodiversity of HAWs. Considering the emerging threat of climate change, comprehensive management and mitigation measures have been suggested for the conservation of floral diversity of HAWs of Arunachal Himalaya.

Key words: Floral biodiversity; High altitude wetland; Himalaya; Climate change; Alpine

P53: ASSESSMENT OF TRAFFIC NOISE POLLUTION IN BANKURA- A SEMI URBAN TOWN OF W.B, INDIA

M Roy, PDey, D Ghosh, F Shamim

Dept. of Environmental Science, Vidyasagar University, Midnapur, West Bengal
Email: misha.india@yahoo.co.in

Noise pollution is an air-pollutant which possesses both auditory and a horde of non-auditory effects on the exposed population. Noise pollution is nowadays becoming an international concern. In this study the impact of noise pollution in Bankura city, W.B, India has been observed. The noise measurements were taken for Heavy traffic zone, Commercial zones and Silent zones from different city areas. Average, maximum and minimum values were collected and compared with standards. L1, L5, L10, L50, L90, L95, L99, Equivalent sound pressure level (Leq), Noise climate (L_{NC}), Noise pollution level (Lnp) and Noise traffic Index (TNI) were computed for analysis of noise pollution intensity. The result reveals that the whole city is profoundly affected by noise pollution, almost in all the zones and is much higher than the recommended level. The results indicate high noise levels, surpassing on many occasions to the prescribed levels. All the recorded data in silent zones shows that they are almost double the prescribed limits and fall in dangerous to highly dangerous category. The Leq varies from a minimum value of 56.49 dB (A) to 87.39 dB (A). The L90 and L99 are recorded to be higher in the pre monsoon season [85.5 dB (A) and 81.33 dB (A)]. The Noise pollution index (Lnp) is also recorded to be very high in these areas [114 dB (A)]. The commercial and heavy traffic noise intensity is also quite higher than the prescribed standards. However, Noise Climate (L_{NC}) is found to be low in all seasons. As such no

major variation is recorded in the noise intensity during the pre-post and monsoon seasons.The city is rapidly developing which is adding thrust on the noise level and creates several health issues hence immediate steps must be taken to control the increasing noise pollution of the city.

Key words: Pollution; Noise pollution; Traffic noise; Noise monitoring; Equivalent noise level

P54: CALCIUM CARBONATE SATURATION INDEX AND PHYSICO – CHEMICAL FACTORS INFLUENCING PHYTOPLANKTON IN EXAMINED WATER BODIES OF MANDYA DISTRICT

J Mahadev, G Sugeetha, KV Shivkumar, NS Pankaja

College of Agriculture, V. C. Farm, Mandya
Email: jmahadev999@gmail.com

Scale deposition and corrosive nature of water are basic essentialities to evaluate corrosive properties in industrial equipment. The study aimed at a comparative account of pollution strength in six lakes viz., Guthalu lake, Konnanahalli lake, Hulivana lake, Sathanur lake, Thonnur lake and Hirode lake of Mandya. The calcium carbonate saturation index and physico - chemical properties of water influence the growth of phytoplankton and these parameters were interrelated either directly or indirectly. The results obtained for water temperature, total solids, total alkalinity, total hardness, pH. are directly related to calculating calcium carbonate saturation index. Out of six lakes, three lakes *viz.,*Hulivana lake, Sathnur lake and Thonnur lake had significantly less corrosion and supported the growth of large number of phytoplanktons. Such water is useful for domestic purposes. Konnahalli lake showed high scale deposition with low phytoplankton growth whereas Guthulake and Hirode lake showed low scale deposition high density of growth in the phytoplanktons. The water utilized from the Konnanahalli lake damaged the domestic appliances such as utensils and water pipes. Therefore introduction of phytoplanktons reduce the corrosive property of the

water. Diatoms and members of Chlorococcales had high tolerance capacity to various changes in water quality.

Key words: Calcium carbonate Saturation index; Physico – chemical properties; Lakes; Phytoplanktons; Mandya

P55: ROLE OF MUSIC IN GENERATING ENVIRONMENTAL AWARENESS

Mamta Rani Thakur

Deptt. of Music, MLSM College Darbhanga, Bihar
Email: mamtart960@gmail.com

Sound has an increasing role in generating environmental awareness. Music is one of the most powerful media to communicate environmental messages to billions of people world wide irrespective of race, religion, income, gender and age. Music is constituted of a set of elements that may be selected and delimited at will. This can be done by acts of focal attention and conscious efforts but there is also a lot of subconscious processing and reactive behaviours to the sounds. These basic constituents are considered as discrete units . Music, however, is also a sounding art with aspect of meaning, which cannot be grasped merely in symbolic terms. The paper provides an attempt to conceive of music in terms of a sounding environment. The term sonic or sounding environment, first has many definitions depending upon the field of study. Attempts have been made to provide definitions and criteria for classifying them revolving basically around the concept of soundscape, which suggests exploring all the sounds in the environment in its complexity, ambivalence meaning and context. Music in its broadest definition, is a subset of the sonic universe which can be considered as the collection of sounding elements that represent the totality of sounds as a virtual infinity of possible combinations of individual vibrational events. On the other side an environment is all that surrounds. This broad definition by an evolutionary biologist simply means that there is no environment without an organism and no organism without an environment. Environments of animal and men, more over, are characterized by their most fundamental property, namely that they perceive and act in their environments.

Key words: Music; Environment; Internal Semantics; Ecology; Biosemiotics

P56: IRRIGATION WATER CONTENT INFLUENCE ON ISOPROTURON PERSISTENCE AND MOBILITY THROUGH NUMERICAL MODELING

Manika Gupta*[1], NK Garg[2], Prashant K Srivastava[3]

[1]Department of Geology, University of Delhi, New Delhi
[2]Department of Civil Engineering, Indian Institute of Technology, Delhi, New Delhi
[3]Institute of Environment and Sustainable Development, BHU Varanasi, UP
Email: manikagup@gmail.com

The present study has been undertaken to understand the persistence and mobility of Isoproturon in the unsaturated soil zone undervarying irrigation treatments. The movement of the pesticide has been determined spatio-temporally, both experimentally and through simulations using one dimensional numerical model-HYDRUS-1D. The numerically simulated results showed a good agreement with the monitored Isoproturon concentration profiles. After validation of the numerical model, regulation strategies were conducted, which suggested that the safe dosageof Isoproturon depends uponirrigation treatments.It was concluded that the wheat crops grown under deficit water conditions should be supplied with lower Isoproturon dose.

Key words: HYDRUS 1D; Isoproturon; Irrigation management; Persistence and mobility; Soil contamination

P57: ASSESSING VULNERABILITY AS AN INTERACTION OF EXPOSURE AND RESILIENCE IN A MULTI-HAZARD PRONE DISTRICT THROUGH A COMPOSITE INDEX – A CASE STUDY OF SOUTH 24 PARGANAS, WEST BENGAL

Manisha Bhor, Keya Mitra

Indian Institute of Engineering Science and Technology (IIEST) Shibpur
Howrah 711103, West Bengal
Email: manishabhor7618@gmail.com

Vulnerability assessment is an important component of disaster risk estimation. This study has attempted to conceptualize human vulnerability through the development of a composite index. It is expected that such an index would provide an important decision making tool for administrators to develop risk mitigation strategies for vulnerable populations. The study aims to assess vulnerability of the study area as it is a district prone to multiple hazards compromising community safety. Observations were drawn from physical, environmental, social and economical aspects affecting vulnerability of the study area for each variable ensuing which aggregate vulnerability has been generated. Initially based on a general approach, it was observed that over 90% of blocks in the district were unsafe as vulnerability was very high. To prioritize initiation of mitigation efforts, weights were applied to each variable. This result focused upon a single block with very high vulnerability making it highly unsafe. The study may be considered as an initial step towards systematic planning so that vulnerability is lowered thereby reducing disaster risk in the community. This is a fresh attempt to assess vulnerability that considers a unique set of contributing variables.

Key words: Vulnerability Assessment; Physical aspect; Environmental aspect; Social aspect; Economic aspect; Composite Index; Holistic approach

P58: ECOLOGICAL STUDY WITH DENSITY DEPENDENT PARAMETER OF BAHIARA WETLAND OF SARAN, BIHAR

Md. Suleman, Ravindra Kumar Singh

PG Department of Zoology, Jai Prakash University, Chapra (Saran), Bihar
Email: mdsuleman3650@gmail.com

Water bodies in Bahiara wetlands of saran, Bihar are not in healthy conditions. In the present study increasing atmospheric temperature, increased pH in some water bodies, low oxygen in water, high level of fluoride ions were noted to be harmful for the habitat of aquatic and semi aquatic fauna still thriving in the area. During summer low level of water and anthropogenic activities were noted to be increasing the threat to their survival and make them easy target of poaching.Wetland is a habitat of different fauna of both Invertebrate and vertebrate including, Mollusca, turtles, fishes, amphibians, birds and mammals indicating the importance of the area, thus need special attention for habitat management.

Key words: Wetland; Density dependent parameter; Fauna; Bihar

P59: CATALYTIC DEGRADATION OF DICOFOL BY SYNTHESIZED ZNO NANOPARTICLES

Mata Subhashita, N Sasikala Reddy, Meena Vangalapati

Dept of Chemical Engineering, AUCE (A), Andhra University, A.P, India

Dicofol is an organo-chlorine pesticide used for variety of fruit, vegetable and field crops. It is moderately toxic to humans and may absorbed through ingestion, inhalation or skin contact. Symptoms of exposure have included nausea, dizziness, weakness and vomiting from ingestion and it is highly toxic to aquatic organisms like fish, aquatic invertebrates and algae. The present work signifies the preparation of nanoparticles pure ZnO using precipitation method with sulfates of metallic precursors. Further the crystalline and structural analysis was being observed by XRD(X Ray Diffraction) and SEM(Scanning Electron Microscope).SEM

obtained pure ZnO nano particle size is 107.7nm and also gives information about surface topography and composition of the sample. XRD is used for phase identification of a crystalline material and FTIR(Fourier Transmission of Infra Red) spectroscopy observes chemical properties. ZnO exhibits catalyst activity for degradation of Dicofol was investigated. And the maximum removal percentage was obtained by varying different conditions of parameters such as time, dosage, pH and temperature. From the experiments, the percentage removal of Dicofol using ZnO was found to be 88.4%.

Key words: ZnO Nano Particle; SEM; XRD; FTIR; Precipitation; Dicofol

P60: EFFICIENCY OF GLYPHOSATE AS A WEED KILLER

Meenakshi Arya, Narendra Kumar

Department of Environmental Sciences, Babasaheb Bhimrao Ambedkar University, Lucknow, UP
Email: meenakshiarya.gbpuat@gmail.com

Glyphosate is effective organo-phosphate weedicide used worldwide on large scale by the farmers. Although, use of glyphosate is very controversial as it is linked with several health issues but is widely used to reduce the loss due to weeds. Glyphosate works very rapidly and with fast action kill weeds in no time and thus proves helpful for increasing production. To increase efficiency and reduce side effects, glyphosate can be used with other management practices in order to protect the environment from higher doses of glyphosate. Thus, use of glyphosate may end with less weeds, high productivity and good economic growth.

Key words: Glyphosphate; Weedicide; Efficient; Weeds

P61: ENHANCEMENT OF COCONUT PRODUCTION USING FARADAY CAGE

Nazrin Yasmin, Bhargab Baishya, Subhrajyoti Baruah, Jasminara Jahan, Nabina Yasmin, Salema Begum, Ranjan Sarmah

Dept. of Physics, Mangaldai college, Mangaldai, Darrang, Assam
Email: nazrinyasmin28@gmail.com

The relationship between radiofrequency, electromagnetic fields emitted from mobile phones and infertility is a burning issue nowadays. Alike living individuals plants are also badly effected by it. Large scale exposure to electromagnetic radiation produced from different sources like micro wave antenna, cell phones etc are effecting agricultural production. Coconut, Betel nut etc are also a few examples of it. In this present study, we have used the idea of Faraday cage to reduce the effect of such radiation ,mainly in case of coconut tree ,which is found to every cost effective and efficient.

Keyword: EMR; Faradaycage

P62: FLORISTIC DIVERSITY AND ITS CONSERVATION THROUGH COMMUNITY PARTICIPATION IN SOUTH GUJARAT

Neha Chaudhari

School of Environment & Sustainable Development, Central University of Gujarat
Sector 30, Gandhinagar-382030, Gujarat, India

Floristic diversity in any geographic area is very important for identification of characteristic feature or different types of land use classes. The present study highlighted the floristic diversity across different land use land cover in selected villages of Surat district, Gujarat. The study area cover five different land use classes (agriculture/ water bodies/ fallow land/ waste land and forest).The status of floral diversity, structural compositionwas assessed. Rich floral

diversity across all habitat was recorded. The physicochemical characterization and micronutrients across different land use classes were analyzed and result varies across land use and land cover. The ethnobotanical study in selected villages was performed by interaction and questionnaire. Sound information about traditional knowledge of local medicinal plants showed the dependency of local people on the natural resources in the villages. Identification of the role of community for the conservation of floristic diversity showed the community participation.In present scenario there is an urgent need to focus on participatory approach for conservation & management of biodiversity at rural level.

Key words: Land use; Floristic diversity; Ethnobotany; Medicinal properties; Conservation; Community participation

P63: SEASONAL VARIATIONS IN AVIFAUNAL DIVERSITY OF KALESAR NATIONAL PARK, HARYANA (INDIA)

Parveen Kumar Vats[1], Deepak Rai[2]

[1]Pt.C.L.S. Government College Karnal
[2]Animal Behaviour and Wildlife Conservation Laboratory, Department of Zoology, Kurukshetra University, Kurukshetra, Haryana
Email: pkvats77@gmail.com, drbkuk@gmail.com

Biological resources are the basis of life in the tropical world. Biodiversity is the variety of all the genes, species and ecosystem which are found on planet earth. India is a mega biodiversity centre with different types of habitats ranging from rain forests on northeast to hot deserts of RajasthanBirds show variations greatly in their diversity, habitats, abundance and distribution throughout the globe. Due to their ecological role and recreational values birds are an important forest resource. The forests play a key role in maintaining relationship with nature and its ecosystem.The Kalesar national parkis one of the two national parks situated in Haryana on the foot of Shiwalik Range of Himalaya. This national park area has a very good potential for avian fauna and it is the only National park in Haryana having good natural forest supporting a large bio-diversity. The present study was conducted fortnightly from April, 2014 to June, 2017in this protected area. To evaluate seasonal variation in this national park various transects

including Line and Point count methodswere used along with avifauna of the study area. A total of 195 species of birds belonging to 131 genera and 59 families were recorded in different Roads/transects/habitats of Kalesar National Park, Haryana. During the present study, sixteen bird orders were observed and maximum number of bird species were observed in order Passeriformes (98) followed by Accipitriformes (16); Pelecaniformes (15); Charadriiformes (13); Coraciiformes (9); Columbiformes (7); Piciformes (7); Cuculiformes (7); Galliformes (5); Psittaciformes (4); Bucerotiformes (4); Anseriformes (3); Strigiformes (2); Gruiformes (2); Falconiformes (2) and Phoenicopteriformes (1).The data indicated that maximum of 59 bird species per visit was observed during the month of January, 2017 in winter season. Further, a minimum of 28 bird species per visit was observed during the month of September, 2016 in post monsoon season.

Key words: Kalesar; Species; Diversity; Point Count; Line Transect

P64: ENVIRONMENTAL POLLUTION AND ITSPORTECTION

Prity Kumari

P.G. Departments of environmental Science, A.N. College Patna

Industrial revolution of 19th century leads to environment disaster. The environmental problem assumed colossal importance with the transaction from the feudal system to industrial capitalism .Man's capacity to become master of the surroundings and his quest to enhance the quality of life has caused incalculable harm to human being and environment.Man has relentlessly explored the nature's resources but his exploration can safely by turned as "Ecocide" Nature reaction has been violent through slow. Today the entire world is worried about the deteriorating and depleting condition of environment .The protection and improvement of environment has become a major issue with effect of well being of the people and economic development Atmosphere it. Pollution has become the first enemy of mankind .The protection, preservation and enhancement of environment for the present and future generation is the responsibility of all.

Key words: Environment; Pollution; Atmosphere; Resources; Disaster; Industrial

P65: HIGH ALTITUDE TIMBERLINE OF THE INDIAN WESTERN HIMALAYA: A CASE STUDY OF HIMACHAL PRADESH

Priyanka Sah[1], Subrat Sharma[1], Shaik Rehana[2]

[1]G. B. Pant National Institute of Himalayan Environment & Sustainable Development
Kosi-Katarmal, Almora -263643, Uttarakhand
[2]International Institute of Information Technology Gachibowli, Hyderabad, Telangana
Email: priyankasah07@gmail.com

The Himalayan region presents the highest timberline in the Northern hemisphere which is sensitive to climatological and anthropogenic changes.Mountains of Himalaya rise abruptly, resulting diversity of landscapes and ecosystems. The present study analyses timberline and topographical influences of mountainous terrain along altitudinal gradient in Indian western Himalayan region. Timberline mapping covering the entire state of Himachal Pradesh was done by using satellite imageof 30m resolution. Based on their locations, two types of timberline, Continuous timberline (CT)and summit enclosing timberline (SET) have been described.The total length of timberline in Himachal Pradesh was notes as about 3,257 km, of which CT type accounted for about 91%, and SET type, the rest. The 3200-3800m elevation range accounted for 81 % of total timberline length of CT type. In CT type the mean timberline elevation of segments ranged from 2491m to 4081m mean sea level.The peak distribution of SET type timberline was at a bit lower elevation band than continuous timberline type. Of the total length of SET type, about 90% occurred between 3000-3600mmean sea level.SET covered with alpine meadows are common feature in this part of Himalayas where forests grow up to considerably high elevations. In such cases climate warming is expected to drive the accumulation of species around the summits under the influence of global warming. It can be deducted that complexities of topographic features in the mountains positively influence the distribution of timberline which may react sensitively to climate warming and anthropogenic changes in different behaviours.

Key words: Climate Change; Himalaya; Timberline; Topography

P66: HEXAVALENT CHROMIUM REDUCTIO----N POTENTIAL OF ASPERGILLUS SP. ISOLATED FROM COMMON EFFLUENT TREATMENT PLANT OF TANNERY INDUSTRIES

Priyanka, SK Dwivedi

School of Environmental Science (SES), Babasaheb Bhimrao Ambedkar (A Central) University, Lucknow, UP

Present study deals with the isolation and characterization of a Fungi capable for the effective reduction ofCr(VI) from tannery wastewater. The Cr(VI) reduction experiment performed at 50, 100, 200,and300 mg/L of Cr(VI) concentrations, the fungi showed 95.33% and 90.98% reduction at 50 and 100 mg/L at24 and 96 h, respectively. However, at 200 and 300 mg/L concentration of Cr(VI), only 83.62% and 61.28%reduction were achieved after 120 h, respectively. The SEM analysis revealed that fungal cells exposed to Cr(VI)showed increased cell size in comparison to unexposed cells, which might be due to either the precipitation oradsorption of reduced Cr(III) on fungal cells. Thisfungusalso be used as a potentialagent for the effective mycoremediation of several other metals.

Key words: *Aspergillus sp.;* Hexavalent chromium; Mycoremediation; Tannery industry; SEM

P67: ASSEESSMENT OF GROUND WATER QUALITY OF VILLEGES SURROUNDING JODHPUR WITH SPECIAL REFERENCE TO NITRATE

Garima Sharma, Pallavi Mishra

Department of Chemistry, J. N. V. University, Jodhpur - 342001, Rajasthan
Email: pallavianuk@gmail.com

Jodhpur district comes under the arid zone of the Rajasthan state. It is the second largest urban agglomerate of the State and has a developed industrial centre. The textile processing and stainless steel re-rolling industries generate industrial waste effluent, which contains toxic elements. There are number of other sources of nitrate contamination of ground water such as, human and animal waste, industrial wastes from food processing, fertilizer processing industries & septic tanks. We have done ground water analysis of several water samples collected from rural areas adjoining Jodhpur. Analysis is based on the parameters viz. pH, TDS, EC, TA, TH, Ca^{2+}, Mg^{2+}, F^- & No_3^- . Samples were collected from hand pumps, open wells & bore wells. .Excess limits of fluorides & nitrates were reported. Their remedial measures are also discussed.

Key words: Ground water; nitrate; fluoride; Jodhpur villages; bio adsorbents

P68: THE BURNING AMAZON RAINFORESTS: ITS CAUSES AND RESULTS

Rajpreet Kaur, Davinder Kaur

Department of Management, I.K. Gujral Punjab Technical University,Jalandhar, Main Campus, Kapurthala-144603, India

In this paper, the Amazon rainforest accounts for more than half of the planet's remaining rainforestand is home to more than half the world's species of plants and animals. It is referred as the "Lungs of the Earth". It is providing more than 20 percent of the total oxygen

on the Earth. The intentional burning of the amazon rainforest for the purpose of land clearance is amounting to various threats to not only Latin American countries but to the whole world in form of changes in climate, high temperatures, extreme droughts, air pollution and so on.

Key words: The Amazon Rainforest; Fire; Climate; Environment

P69: ASSESSMENT OF HEAVY METALS IN CEREALS GROWN IN THE JODHPUR CITY

Rajshri Soni, Pallavi Mishra

Department of Chemistry, J. N. V. University, Jodhpur - 342001, Rajasthan
Email:pallavianuk@gmail.com

We have studied heavymetal toxicity in the cereals grown in the agricultural fields of Jodhpur around Jojari River. Due to scarcity of water, farmers are using untreated industrial effluents and sewage water. There are many textile plants and other industries which discharge their effluent without any treatment in to the JojariRiver,which has become a polluted stream.We have collected samples from Basni, Dangiyawas, Sangaria, Salawas and Vinayikiya where maximum use of effluent water for irrigation was observed. We have analyzed the concentration of Cd, Cr, Pb and Cu in these samples. Study revealed alarmingly high concentrations of lead and cadmium toxicity inthecereals well above the WHO and FAO recommended permissible limits of these metal ions in the cereals.

Key words: Cereals; Jojari River; industrial effluent water; metal toxicant; AAS

P70:TREE DIVERSITY AND COMPOSITION IN HIGH ALTITUDE FORESTS ALONG ALTITUDE GRADIENT, WESTERN HIMALAYA

Renu Rawal, Ranbeer S Rawal

G.B. Pant National Institute of Himalayan Environment and Sustainable Development, Kosi-Katarmal, Almora, Uttarakhand, India

Tree species diversity is responsible for structural complexity and environmental heterogeneity, and also determinant of diversity and composition of forest ecosystems. Many studies have established that altitude plays key role in regulating species richness patterns and composition in mountain regions. Considering this, aattributes of vegetation have been described across systematically sampled 100 m altitude bands along elevation gradient (2100-3200 m). A total of 105 plots (50 m x 50 m) including 1050 random quadrats for trees and saplings and 2100 quadrates for seedlings were assessed from three altitudes transect using standard phytosociological methods. The study has provides systematic information on distribution and regeneration pattern of 39 tree species (35 angiosperm and 4 gymnosperms) around the timberline. Tree species richness, density of sapling and seedling decreases, while tree density did not follow the uniform pattern along the elevation gradient. Total Basal Area (TBA) follows a unimodal pattern with mid-elevational peak along the elevation gradient. The regeneration pattern was quite good at lower elevation ranges as evident by maximum number of saplings and seedlings compared to higher forested zone. The study observed that forest community structure and regeneration is largely governed by ecological factors and degree of disturbance.

Key words: Altitudinal gradient; Elevation; Species richness, Population structure, Regeneration, Indian Himalayan Region

P71: PLANT-MICROBE INTERACTION IN HEAVY METAL TOXICITY

Ruchira Das, Anjali Gupta, Sharanya Banerjee, Doutrina Das, Puja Agnihotri

Department of Microbiology, St. Xavier's College (Autonomous), Kolkata.
Email: ruchira15814@gmail.com

The present study aims on utilizing natural in abitant of paddy fields, *Azolla* sp., along with a suitable As(V)-resistant bacterial consortia consisting of rhizosperic bacterial strains R1 (As-LD_{50} value 2000 mg/l) and S3C2 (As-LD_{50} value 30 mg/l) isolated from As-polluted soil, for As(V) mitigation in a semi-natural set-up. *Azolla microphylla* exposed to As(V)-stress was found to withstand upto 7 mg/l of As, but in presence of As-resistant consortia at same As(V) concentration, 76.17%. As content in the medium and symptoms of As-toxicity were effectively reduced. Presence of consortia increases 29.72% biomass-productivity of the plant, production of phenolics and flavonoids, owing to enhanced chlorophyll and carotenoid synthesis as well as better defense against oxidative stress.

Key words: Mitigation, Consortia, Bioremediation, Phenolics, Flavonoids

P72: GROWTH OF HIMALAYAN CEDAR UNDER FUTURE CLIMATE CHANGE SCENARIO IN WESTERN HIMALAYA

Rupesh Dhyani, Rajesh Joshi

G.B. Pant National Institute of Himalayan Environment & Sustainable Development
Kosi-Katarmal, Almora-263643, Uttarakhand

Trees strongly affect Earth's carbon cycles, creating our ability to predict productivity of forest associated with increasing temperature. The climate of the Himalayan region is affected by the changing climatic scenario on regional as well as global scale. Present studyused tree-ring width data of Himalayan cedar (*Cedrus deodara*) collected from the Kumaun region, Western Himalaya. Based on this data a tree ring chronology extended back to 16th century

AD i.e. from 1602 AD to 2015 AD was developed. To detect the future growth dynamics of *Cedrus deodara*, the climate limited tree radial growth was projected by regression model by using two representative concentration pathway (RCP) 4.5 and 8.5 up to 21th century for the Kumaun Himalaya.Under RCP 4.5, radial growth of *Cedrus deodara* is projected to be decrease by 0.004mm/year.The finding of this study could be used to predict regional forest dynamics in the future.

Key words: Himalayan region; *Cedrus deodara;* Tree ring width; representative concentration pathway

P73: MALATHION REMOVAL BY ELECTROCOAGULATION PROCESS USING ALUMINIUM ELECTRODES

S Sai Santosh, Jami Ashok, Meena Vangalapati

Department of Chemical Engineering, Andhra University, Visakhapatnam, AP, India

The main purpose of this work was to assess the removal of the pesticide Malathion from aqueous solution in batch mode using the electrocoagulation process. The effects of operational parameters such as pH, pesticide concentration, current density, salt concentration, and distance between electrodes on the Malathion removal efficiency have been investigated in a laboratory scale study. The effects of current density and the supporting electrolyte on electrical energy consumption were also investigated. The present work is carried out with initial parameters of initial pH as 6, an initial pesticide concentration of 50 mg/L, current density of 20 mA/cm^2, salt concentration of 5000 mg/L, temperature of 27°C, and distance between electrodes of 2 cm.. The final results under optimum conditions were observed at Time: 80 min, Voltage: 20 volts, Distance between electrodes: 2 cm pH: 12. with the overall malathion removal efficiency of 95% by electro coagulation process.

Key words: Malathion, Electro coagulation, aluminium electrodes

P74: ANTIMICROBIAL ACTIVITY AND ANTIOXIDANT PROPERTY OF GUAVA LEAVES

Samriddha Dutta, Nayonika Rahut, Paramita Adhikari, Srabanti Basu

Department of Biotechnology, Heritage Institute of Technology, Chowbaga Road, Anandapur, P.O. East Kolkata Township, Kolkata, India

Guava (*Psidium guajava*) is a plant commonly found in tropical countries including India. Medicinal properties of the fruits have been widely explored but few reports are available on medicinal of the leaves. The present study attempts to check the antibacterial activity and antioxidant properties of guava leaves. Guava leaf powder was made by drying the leaves in hot air oven at 60°C. Guava leaf (1%, w/v) extract was prepared from the guava-leaf powder in warm water and propylene glycol. Both the extracts were tested against *Staphylococcus aureus* and the aqueous extract was found to be more effective. When extract was compared with neem (*Azadirachta indica*), tulsi (*Ocimum sanctum*) and turmeric (*Curcuma longa*), extract of guava leaf was found to be more effective. Growth curve shows growth inhibition of *Staphylococcus aureus* in presence of guava leaf extract. The antibacterial activity was found to be retained when checked after 1 month. The antioxidant activity was tested with DPPH; 5 mg of leaf extract was found to be equivalent to 2 mg of ascorbic acid.

Key words: Guava leaf; *Staphylococcus aureus*; growth inhibition; antioxidant property

P75: DISTRIBUTION OF TREE COMMUNITY IN RELATION TO ENVIRONMENTAL FACTORS ALONG AN ALTITUDINAL GRADIENT IN NORTH WESTERN HIMALAYA, INDIA

Shinny Thakur[1], Anil Kumar Yadava[2] and R.S. Rawal[1]

[1]G.B. Pant National Institute of Himalayan Environment and Sustainable Development, Kosi-Katarmal, Almora-263643, Uttarakhand, India
[2]Department of Forestry and Environmental Sciences, S.S.J. Campus Kumaun University, Almora- 263601
Email:shinnythakur@gmail.com
mailto:pkewlani0@gmail.com

Tree species diversity is varying due to change in altitude as well as environmental factors. Therefore, diversity of tree species along an altitudinal gradient are controlling natural investigates for testing the ecological and evolutionary responses to the environmental factors. The present study analyses the distribution of tree diversity in relation to 12 environmental factors. A total of 37 tree species were observed in the study area. The Shannon diversity index (H) is peaked at mid-elevation between 1200 and 2200 m, with diversity declining both at lower and higher elevation ranges. A multiple regression analysis were performed to know the best environmental predictor of tree species diversity. Among the all environmental factors, elevation, Water holding capacity, maximum temperature, minimum temperature ,wind speed and disturbance index are considered best predictors($p<0.05$) of tree species diversity. The study concluded regional processes, along with variation in climate and sample size, mutually explain variation in local diversity trees.

Key words: Diversity; altitudinal gradient; environmental factors; temperature; water holding capacity; Shannon diversity index

P76: ASSESSMENT OF DRINKING WATER QUALITY THROUGH HYDRO-CHEMICAL ANALYSIS IN BHUSANOOR VILLAGE IN KALABURAGI DISTRICT, KARNATAKA

AM Smitha, V Praveena Kumara, Seema Shastri, B Mahalingam

Central University of Karnataka, Kalburgi-585367, Karnataka, India.
Email: praveenakumarav@gmail.com

The main source for drinking water in the village is groundwater, which is consumed directly without any purification. Hence, a study was carried out to assess the quality of groundwater through hydro-chemical analysis. Through the field survey, sample water was collected from fifteen locations around our study area in Bhusanoor Village, which mainly used by the people for drinking purpose and the location of each spot was collected using a handheld GPS. The sample water was further analyzed in the lab to get the proportion of PH, TDS, SO4, Fluoride, bicarbonate, Magnesium, Total Hardness and Chloride. The result of Hydro-Chemical analysis of fifteen locations illustrates that, PH, TDS, SO4 are in desirable level in all the locations whereas other parameters were in desirable, permissible and impermissible level, notably none of the location was in a desirable level of fluoride and twelve locations among the fifteen was in impermissible level. The result of these fifteen locations was further interpolated using Inverse Distance Weightage method in GIS for 1000 hectors that includes all the settlements of the village. The result of the study illustrates that, the groundwater in the village is not at all suitable for drinking purpose due to higher concentration of Fluoride. Bhusnoor village had Sugar factory, we thought this was one of the major reasons of higher concentration fluoride and it's also effect to the groundwater. Therefore, it is recommended that, it is necessary to purify the groundwater for drinking or if the same scenario continues, the people of the village may face severe health problems in the future.

Key words: Groundwater; GPS; Analysis; Field Survey

P77: PHOTOCATHODIC MICROBIAL FUEL CELL: A LOW COST SUSTAINABLE ALTERNATIVE TOWARDS ELECTRICITY GENERATION IN RURAL AREAS

Smriti Mehrotra, Bhawana Pathak

School of Environment and Sustainable Development, Central University of Gujarat Sector-30, Gandhinagar, Gujarat, 382030, India

Microbial Fuel Cell is gaining attention worldwide as a synergistic biological approach towards treatment of wastewater and electricity production. These bioelectrochemical devices utilize the metabolic activity of microorganism present in wastewater, lignocellulosic biomass and organic waste for extracting electric current. They can be employed in small devices as power generators. Besides its various advantages, MFC faces many challenges of low current, power density and its economical use. The nature of anode and cathode material is also a significant factor for regulating its efficiency. The paper highlights various substrates used at anode, cathode their substantial performances, limitations and suggests enhancements to overcome practical challenges. It proposes the utilization of solar driven photosynthetic organism as algae at cathode which facilitates the cathodic reactions faster as they act as an efficient oxygenators. Utilization of these organism increases the efficiency, prevents the system from cathodic toxicity via Platinum catholyte and its expensive cost. Recent advances in this work suggest the utilization of anaerobic microbes forming biofilm at anodic half-cell and phototrophic biofilm at cathodic half-cell which depends on anodic feedstock. The biomass formed at cathode can also be recovered and reused in same system as a close loop which will reduce the cost as well. It also suggests the replacement of costly membrane through low cost earthern pots. Hence, this study illustrates a self-sustainable, efficient energy generation model consuming waste and biomass for enhanced electricity production through Microbial fuel cell.

Key words: Microbial Fuel Cell; Photosynthetic organism; algae; electricity; sustainable; rural area

P78: INTERACTION OF MARINE ALGA *CLADOPHORA SP.* WITH ASSOCIATED BACTERIA IN ENVIRONMENTAL SUSTAINABILITY

Souradip Mukherjee, Anushka Nath, Rishi Basu, Sampurna Dasgupta, Madhurima Sarkar, Nirnisha Pramanik, A Mitra

Department of Microbiology, St. Xavier's College (Autonomous), Kolkata
Email: souradipalpha@gmail.com

The filamentous green macroalga*Cladophora sp.* is found to be associated with many bacteria in water bodies worldwide as along the Tajpur coast of Bay of Bengal. The objective of this study was to determine how presence of bacteria affect the growth of *Cladophora*. The mutual interactions of the alga and the bacteria were observed using co-culture based techniques from which algal biomass and chlorophyll content analysis indicates that the alga is symbiotically dependent on the bacteria. Hence, high levels of bacterial pollution along coastal regions promote the growth of *Cladophora* thus damaging the indigenous ecology of the region.

Key words: Cladophora; chlorophyll; biomass; ecology; macroalga

P79: EFFECT OF CHROMIUM ON GERMINATION, GROWTH AND BIOCHEMICAL CHARACTERISTICS OF *TRITICUM AESTIVUM* L.

Sudeshna Khatua, Surjendu Kumar Dey

P. G. Department of Environmental Science, Fakir Mohan University, Vyasa Vihar, Balasore- 756020, Odisha

Chromium is considered a serious environmental pollutant, due to its wide industrial use. The contamination of environment by Chromium has become a major area of concern. Cr is highly toxic to plant and is harmful to their growth and development. In this experiment the

wheat seeds(*Triticum aestivum* L.) were exposed to four different concentrations of hexavalent Cr(0, 0.5, 1, 2 and 4mM) in the form of $K_2Cr_2O_7$. The seeds were exposed to Cr and after 24 h, the number of seeds germinated were counted. It was found that with increase in Cr concentration there was decrease in the germination percentage and the maximum inhibition was 23% at 4mM Cr. Root elongation and coleoptile growth were measured at 48 h. The root elongation was more sensitive than the coleoptile growth. In another experiment wheat seedlings were grown in presence of Cr(0.5 - 4 mM) for 7 days and growth, dry weight and fresh weight were determined in root and shoot tissues. It was found that with increase in Cr concentration there was decrease in root length, shoot length, dry weight and fresh weight. The root growth was more sensitive than the shoot growth. Total chlorophyll contents decreased considerably in response to Cr concentration. The present study represents that the seed and seedling of wheat has potential to counteract the deleterious effects of chromium metal.

Key Words: Germination; Total chlorophyll; Coleoptile growth; Dry weight; Fresh weight; Root length; Shoot length

P80: BIO-NANO TECHNOLOGICAL APPROACHES FOR DEGRADATION AND DECOLORIZATION OF DYE BY MANGROVES PLANTS

Supriya Vaish

School of Environment and Sustainable Development, Central University of Gujarat Gandhinagar,Gujarat, India

Mangroves are the series of shrubs and small trees having greater tolerance against salt concentration. Mangroves are having very rich diversity of plants with medicinal benefits, source of wood, large CO_2 sequestration property. Mangrove ecosystems are exposed to a variety of contaminants and anthropogenic agents. Wastewater run-offs, industrial effluents, atmospheric and marine activities are major contributors in this regard. Dyes are an important class of organic pollutants and are well known for their hazardous effects on life in general and human beings in particular. They are rich in organic compounds, colors, and heavy

metals containing residues of various dyes and chemicals. In order to reduce the negative effects of dye contaminated wastewater on humans and the environment, the wastewater must be treated carefully before discharge into main streams. Effluents from these industries always remain a concern and major environmental issues for our ecosystem. Considering many flaws of phyisco-chemical treatment processes for remediation of industrial effluents, Bio-technological approaches i.e. bioremediation, phytoremediation and advance nano-bioremediation is the emerging areas to remediate the environmental contaminants and is the cost effective, ecofriendly and produce less toxic compounds. Advanced remediation technologies are promising technology for the removal of dye from water and soil. The present chapter focuses on bio-nanotechnological approaches for the degradation and decolorization of dyes. Adsorption using chemically treated mangrove bark will be highlighted with the implication in environment clean up.

Key words: Mangroves plants; Dyes; Bio-nanotechnology; Remediation; decolorization; ecofriendly and environment sustainable approaches

P81: CATIONIC SURFACTANT REMOVAL FROM DOMESTIC WASTE WATER BY ACTIVATED CORN COB POWDER

Tejaswi Mareedu, Meena Vangalapati

Dept of Chemical Engineering, AUCE (A), Andhra University, A.P., India

Direct and indirect releases of large quantities of surfactants to the environment may result in serious health and environmental problems. Therefore, surfactants should be removed from water before water is released to the environment. Using powdered activated Corn cobs as adsorbent may be an effective technique to remove surfactants. In this study, the removal of surfactants by adsorbent was investigated and the influences of the operating parameters on the effectiveness on adsorption rate were studied. Cetyl trimethyl ammonium bromide (CTAB) has been widely used in synthesis of gold nanoparticles (e.g., spheres, rods, bipyramids), mesoporous silica nanoparticles (e.g., MCM-41), and hair conditioning products. The present research work is to investigate the optimized conditions for removal of cationic surfactant

from domestic waste water using activated Corn cob powder .The initial concentration of cationic surfactant in domestic waste water is 426ppm. The optimum conditions for removal of cationic surfactants were Time of 90min, Adsorbent dosage of 1%(W/V) , pH-7 and at 30! temperature obtained. From the obtained optimal conditions the removal efficiency was 90.6 %.

Key words: Surfactants; Pollutants; Activated Corn cobs; Optimization; Domestic waste water

P82: MICRO LEVEL DECISION SUPPORT SYSTEM FOR RURAL COMMUNITY DEVELOPMENT OF INDUKURPET MANDAL, SPSR NELLORE DISTRICT, ANDHRA PRADESH BY USING GEOSPATIAL TECHNOLOGIES

P Vamshi Krishna Reddy, M Anji Reddy, K Bangaku Naidu

Centre for Environment, Jawaharlal Nehru Technology University Hyderabad-500085, Telangana, India
Email: reddy.pvkr@gmail.com

Geospatial technology has developed a significant pace over the last two decades and will play key role in development of nation particularly in agricultural sector. Agriculture and horticulture are the main occupation of the people of the SPSR Nellore district of Andhra Pradesh in general and the present study Mandal area, Indukurpet Mandal in particular. The Indukurpet Mandal is one of the cyclone prone areas of Andhra Pradesh State and is affected by number of previous cyclones. In view of this a detailed study is conducted to evaluate the land and soils for its suitability to various cropping patterns and also to provide early warning system to minimize the damage to the crop yields. The spatial database consists of drainage map, hydrogeomorphology map, land use/land cover map, classification of soils, soil quality data and agrometeorological data on ArcGIS platform. The spatial data is analysed with special reference to suitability of land for different crops. Based on the agrometeorological data and the data obtained from automatic weather stations located in Mypadu village of Indukurpet Mandal, the location specific advisories are suggested. A method, of disseminating

the information to the farmers as and when require, is also developed. this work helps to create the archival of the digital data of all the 14 villages in the Mandal which can be used for micro level planning and decision making process by administrators. The geospatial technologies are found to be a technique that provides greater flexibility and accuracy for handling digital spatial database. The combination of remote sensing and GIS and field data proves that it is a powerful combination to apply for land-use suitability analysis and to evolve early warning system for reducing the damage to the crop yield. The suitable crops identified are like Paddy, Green gram, Black gram, Banana, Mango, Coconut and Sapota. This decision support system can also be used to evaluate the carrying capacity of the area for its shortcomings and therefore to improve the productivity.

Key words: Rural Development; Geospatial Technologies; Agriculture; Horticulture; Indukurpet Mandal; SPSR Nellore

P83: REVIEW ON HIGH ALTITUDE GRASSLANDS OF UTTARAKHAND

Vandana Bisht, Subrat Sharma

G. B. Pant National Institute of Himalayan Environment and Sustainable Development
Kosi - Katarmal, Almora, 263643 Uttarakhand
Email: vndnabisht007@gmail.com

High altitude grasslands have developed relatively on steep slopes at an elevation where the climate is too cold and severe for tree growth. This paper is an attempt to overview of the most research work has been done for the high altitude grasslands of Uttarakhand. Many studies on high altitude grasslands have been focused on overgrazing (31% of total reviewed researches), biomass accumulation (24% of total reviewed researches). Other parameters like vegetation analysis, net primary productivity, and status of medicinal plants and conservation of these areas have also been done. Thus, the review might be inferred to identify the gaps for further research and management option for the sustainability of the high altitude grasslands.

Key word: Alpine meadows; High altitude grasslands; alpine grasslands

P84: CHEMICAL DESIGNING OF SMART NANOCOMPOSITES TOWARDS WASTE WATER TREATMENT

Vipin Jain, Puja Tomar, Nimisha Jadon

School of Studies in Environmental Chemistry, Jiwaji University, Gwalior
Email: nimisha09@yahoo.com

Conducting polymers like polypyrrole has triggered enormous research activities due to its high-electrical conductivity and stability. Magnetic-chitosan/polypyrrole nanocomposites via in situ chemical polymerization using $FeCl_3$ as an oxidant is prepared. Characterization of the developed nanocomposite has been done by SEM, TEM, FAB, IR etc. Removal of dyes under UV radiation in aqueous medium by nanocomposites is examined. The nanocomposites exhibit high adsorption capacity. After adsorption nanocomposite is easily separated from the reaction solution using external magnetic field which is very useful for practical application. And has high efficiency for the removal of a wide group of pollutants.

P85: EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON CHLOROPHYLL CONTENTS IN LEAVES OF ONION (*ALLIUM CEPA*) AND BLACK NIGHTSHADE (*SOLANUM NIGRUM*)

K. Gnanamani[1], A. Vijayalakshmi[2]

Department of Botany, Avinashilingam Institute for Home Science and, Higher Education for Women, Coimbatore, Tamilnadu
Email id: avijayalakshmi85@gmail.com, kgnanamani1994@gmail.com

A pot culture experiment was conducted with onion (*Allium cepa)* and black nightshade (*Solanum nigrum)* as the test crop to evaluate the efficacy of sugarcane trash and sugarcane bagasse. Seven treatments were incorporated in our present study. The maximum chlorophyll content 'a', 'b' and total chlorophyll contents were observed in T_5 - C_5 (pre-decomposted

sugarcane bagasse *Trichoderma asperelloides* and earthworm (*Eudrilus eugeniae*) treatment in onion crop and T_6- C_6 (pre-decomposted sugarcane bagasse *Trichoderma asperelloides* Microbial consortium 5t/h) treatment in black nightshade. A significant increase in chlorophyll contents were noted at 30 and 60 DAS ('a','b' and total chlorophyll). It is slightly reduced in 90 DAS.

Key words: T- Treatment, Chlorophyll, Days after sowing, Sugarcane trash, Sugarcane bagasse.

P86: REMEDIATION OF WASTEWATER USING MICROALGAL CONSORTIA

Dig Vijay Singh, DP Singh

Department of Environmental Sciences, Babasaheb Bhimrao Ambedkar University, Lucknow, UP
Email: ranarjptvijay@gmail.com

Several toxic pollutants released in untreated wastewater not only pose threats to freshwater availability but also to flora and fauna residing in the freshwater ecosystem. Conventional techniques used are inefficient as well as expensive but using microalgal consortia is sustainable and ecofriendly approach towards wastewater remediation. Microalgal consortia improve physico-chemical properties; recover nutrient resource and removes heavy metal contamination from wastewater in efficient manner. Thus, using microalgal consortia can become boon for wastewater remediation as mixture of several microalgae are capable to thrive under extreme environmental condition thereby helps in achieving goals of sustainable environment.

Key words: Microalgae; Wastewater; Consortia; Sustainable

SYMPOSIUM - II:

PROMOTING ENVIRONMENTAL CONSCIOUSNESS IN DEVELOPING INDIA

P87: POLLINATOR COMMUNITY AND DIVERSITY IN AN URBAN AREA OF BENGALURU, KARNATAKA

Vinutha R Bhatta[1], A Naresh Kumar[2]

[1]*Department of Zoology, Jyoti Nivas College Autonomous, Bengaluru, Karnataka*
[2]*Department of Zoology, Periyar University, Sale, Tamil Nadu*

Urbanization and urban expansion especially in a developing country like India pose the greatest impact on biodiversity. Urban areas consisting of decorative plants, small vegetation patches and weeds provide a useful habitat for insect pollinators within an otherwise inhospitable urban environment. Thus a study on bee community and diversity was conducted in the urban area of Bengaluru, Karnataka. Bees visiting the native flowering plants and grasses were collected and identified. Majority of the identified bees were Apidae members, (*Apis cerana, A florea, A dorsata, Xylocopus vilocea, Xylocopus pubescens, Ceratina benghami, Tetragonula iridipennis, Amegilla sp*). *Lithurgus sp, Megachile sp, Heriades sp* belonging to family Meghachillide and *Halictus sp, Nomioides sp, Seladonia sp, Lasioglossum sp* from Hallictidae family were also recorded. Diversity of native bees can be protected in the urban areas by scientific management of pollinator-friendly floral resources as well as safer nesting sites. Sustainable development can thus prevent the loss of important pollinators in the urban areas.

Key Words: Pollinators; diversity; Urban area; Bengaluru

P88: STATUS OF AVIFAUNA IN RURAL PONDS OF DISTRICT KURUKSHETRA, HARYANA, INDIA

Vipin Boora, Parmesh Kumar

Department of Zoology, Institute of Integrated & Honors Studies, Kurukshetra University, Kurukshetra 136119, Haryana
Email: boora299@gmail.com

Small sized, man-made, perennial and primarily rain-fed ponds occurring widely in the rural landscape of Haryana, India provide suitable habitats and food resources for a wide variety of resident and migratory birds. Bird surveys were conducted in four rural ponds of Kurukshetra District, Haryana, in northern India from April 2019 to September 2019 to determine status of avifauna. Point counts and direct observations were used to record bird species. A total of 64 bird species belonging to 52 genera, 35 families and 13 orders were identified. Ardeidae with a representation of 8 species was the most diverse bird family in the study area. Of the species documented, 57% ($n = 37$) were migrants and 43% (n = 27) were residents. All the recorded bird species are listed as least concern category in the IUCN Red List. Comb Duck (*Sarkidiornis melanotos*) and Brahminy Kite (*Haliastur indus*) are listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The occurrence of migrants and special-status species documents the importance of these rural ponds as key habitats for birds in India. However, anthropogenic and developmental activities in and around these ponds are posing significant threats to avifauna. The present study is expected to provide a baseline for future research on conservation and management of bird species associated with rural ponds.

P89: ELUCIDATING THE PHYTOCHEMICALS OF *AVERRHOA CARAMBOLA* L. TO MITIGATE THE ENVIRONMENTAL INDUCED OXIDATIVE STRESS

Kanchan Joshi[1], Sudhir Kumar[2], Almas[2]

[1]Department of Botany, SurajmalAgarwal Private KanyaMahavidyalaya,Kichha
[2]Department of Food Technology, Surajmal Agarwal Private Kanya Mahavidyalaya, Kichha

Environmental pollutants have been implicated for generation of free radicals. Dietary phytochemicals have been acclaimed as an effective tool for neutralizing environmental pollutants induced oxidative stress. *Averrhoa carambola* L. (Oxalidaceae) is one such eccentric creation of nature with illustrious biological action. The present study evaluated the presence of different phytochemicals and FRSA of fruit of *A. carambola* L. The antioxidant potential was tested at varying concentration (0.1-0.5 µg/ ml) and found to be dose dependent. Maximum (75.42 %) and minimum (61.35%) inhibition was found at 0.5 µg/ ml and 0.1 µg/ ml respectively with IC_{50} value of 2.46 µg/ ml. The phytochemical analysis revealed the presence of diverse group of pharmacologically relevant compounds (flavonoids, phenols, alkaloids, glycosides, tannins etc.) and thus proves the efficacy to upgrade the eminence of life.

Key words: Free radical; oxidative stress; phytochemicals; antioxidant; carcinogen; *Averrhoa carambola*

P90: WATER QUALITY AND NATURAL PROTECTIVE MICROBE IN A HOLY WATER BODY IN PUNJAB

Aditi Das, Shreya Chakraborty, Sayantika Chakraborty, Shilabrata Banerjee, Amritesh Sarkar, Arup Kumar Mitra

Department of Microbiology, St. Xavier's College, Kolkata
Email: Aditi.kol6@gmail.com)

The aim of the study is to investigate resistance against pathogenic microbes extracted from a holy water body in Punjab where thousands of people take a bath everyday which could make the water potential source of infection, and also the cause of humans being resistant toward those microbes. Even though many people dip in that pond containing pathogenic organisms which may come from human bodies as well as from air or water, still something neutralizes their pathogenic effect or prevents their growth in human body. The main aim of this investigation was to detect that cause which prevents the microbial growth for which water samples were collected from the water body and these were separately inoculated in suitable media and incubated as per need. The observations were tabularized (Characterization, Colony Counts, Phage titration and pathogenicity) and analyzed which provided us the conclusion, that a certain species of Actinomycetes prevented the growth of the organisms obtained from the sample like *Bacillus sp , E. coli* and *Proteus*. Moreover bacteriophage was also found having potential antibacterial activity. Since bacteriophages mainly grow in marine water bodies but as discussed above the water sample was from a in land lentic system and thus it may also have some adverse effects against those pathogens. Thus the water continues to be free of infection even if it is used for bathing purpose by thousands of devotees everyday.

P91: PHENOLOGY AND SOIL CHARACTERISTICS OF FORESTS OF MAJOR TREELINE SPECIES IN THE GARHWAL HIMALAYA

Pradeep Singh, GCS Negi

G.B. Pant National Institute of Himalayan Environment & Sustainable Development, Kosi- Katarmal, Almora, Uttarakhand

The high altitude limit of forests and trees, commonly known as treeline represents conspicuous vegetation boundaries and most sensitive to climate change. In this study on treeline phenology in Tungnath, Garhwal Himalaya (altitude, 2955–3334 masl) in Uttarakhand data was collected on tree stand level micro-climatic conditions, timing of major phenophases, leaf and shoot growth phenology and soil nutrients in four major tree species (*Abies spectabilis, Betula utilis, Quercus semecarpifolia, Rhododendron arboreum*) and a krummholz species (*R. campanulatum*). Meteorological data reported for this site revealed that the mean monthly atmospheric temperature during growing period (June–September) has increased at the rate of 0.11 °C yr in the last two decades, which is several-fold higher than other reports for this region. Leaf bud-break occurred in most of the species in May and June however, the proportion of marked tree population in bud-break phase at the time of first observation in April varied considerably across the species from 10% to 50%. Leaf initiation and leafing in the treeline species was delayed by about two months, compared to the mid-altitude tree species indicating that temperature is a limiting factor in plant growth at high altitudes. The treeline species were characterized by short growing period (2–4 months), lower period of steady-state in peak leaf mass and rapid leaf mass loss. Total soil nitrogen in the treeline forests varied from 0.37% to 0.60%, total soil carbon from 5.4% to 7.4%, and C:N ratio from 11.7 to 14.6. In general, soil carbon and soil N tended to decrease with elevation indicating the leaching effect of nutrients with increasing altitude. Study showed that the broadleaf deciduous species *Betula utilis* was more sensitive to inter-annual climatic variation and early snow melt. It is expected that with the increasing rate of warming in Tungnath the phenological behaviour of treeline species would change markedly in future leading to changes in ecosystem structure and functioning that requires further detailed studies.

Keywords: Treeline vegetation; Krummholz; Phenology; Soil Characteristics; Garhwal Himalaya

P92: COMPARATIVE STUDY OF NITRILASE ENZYMES: A COMPUTATIONAL APPROACH

Priya Kumari, Raju Poddar

Birla Institute of Technology, Mesra, Ranchi, Jharkhand - 835215

Nitriles are becoming a major precursor of many industries which is a very toxic ad carcinogenic. Apart from the toxicity, it is being rigorously used in synthetic rubber, agriculture, cosmetics, dyes, pharmaceuticals, plastics and textile industry. This toxic compound gets accumulated in the environment after its usage leading to pollution. Nitrilases ('green catalysts') are industrially important enzymes expressed widely in both prokaryotes and eukaryotes that belong to nitrilase superfamily that consists of 13 branches. Commercially, nitrilases, nitrile hydratases and amidase are major nitriles metabolizing hydrolytic enzymes employed for the biotransformation of nitriles into corresponding carboxylic acid and in bioremediation of nitriles pollutants. A large ensemble-based dataset was utilized from bacteria, fungi, plants and animals. We studied the coding gene sequences, amino acid sequences of the nitrilases from different species and discovered conserved motif linked with related other species. The inferred evolutionary tree shows nitrilase gene clusters are shared among bacteria, fungi and plants. Structural analysis (molecular dynamics simulation, principal component analysis (PCA), dynamic cross correlation (DCCM), root mean squared inner product (RMSIP), and free energy surface (FES)) revealed that the folding of catalytic sites is similar among species; however, the loop region varies. We provide evidence based on PCA that the nitrilases are clustered into different clades due to variation inside chains. The results are consistent with the hypothesis that bacterial nitrilases are in ecological and evolutionary relationships with fungi and plants during plant-pathogen interaction to a large extent. This compact and detail results also open new dimensions for further studying and improvement of industrially important nitrilase enzymes.

Key words: Toxicity; green catalyst; biotransformation; bioremediation; structural analysis

P93: CHANGES IN PHYSICOCHEMICAL CHARACTERISTICS OF *PYRACANTHA CRENULATA* DURING RIPENING

Pushpa Kewlani, Indra D Bhatt, Veena Pande

G.B. Pant National Institute of Himalayan Environment and Sustainable Development, Kosi-Katarmal, Almora-263643, Uttarakhand
Email: pkewlani0@gmail.com

Pyracantha crenulata is admired for its high nutrient and antioxidant properties. The effects of ripening on the physicochemical, enzyme activity and antioxidant capacity of *P. crenulata* were evaluated at the six different ripening stages. The fruit weight was in the range of 0.052–0.44 g, fruit length 2.64–6.46 mm, fruit diameter 3.19–7.64 mm. Morphological parameters showed significant $p<0.01$ correlation with physico chemical properties and enzyme activity. During the ripening stages of *P. crenulata* enzyme activity showed increased in H_2O_2, catalase and peroxides while decreased in proline content. The enzyme activity showed significant ($p<0.01$) correlation with carbohydrate, total sugar, reducing sugar protein, nitrogen, phosphorus and thiamine. The results of physicochemical showed that the carbohydrate, reducing sugar, total sugar, protein, thiamine, phosphorus and nitrogen content increased with ripening time while free amino acid decreased. Antioxidant capacity showed positive correlation $p<0.01$ with total phenolic, amino acid and proline content.

Key words: Ripening; physico-chemical; enzyme activity; *Pyracantha crenulata*

P94: CHROMIUM TOXICITY ALTERS THE ANTIOXIDATIVE EFFICIENCY OF GERMINATING WHEAT SEEDS

Sudeshna Khatua, Surjendu Kumar Dey

P. G. Department of Environmental Science, Fakir Mohan University, Vyasa Vihar, Balasore-756089, Odisha
Email: surjendufmu@rediffmail.com

Chromium has many industrial applications because of which huge amount of Cr are found in the different components of the environment as pollutants. Out of its different valence states the Cr(vi) is physiologically more toxic. Since it has no role in plant growth and development, presence of it in the soil is expected to have toxic effect during different stages of plant growth and development including germination stage. In this study wheat seeds (*Triticum aestivum* L.) were exposed to different concentrations of Cr(vi) (i.e., 0.5, 1.0, 2.0 and 4.0 mM) for 24 h and germination percentage along with some physiological parameters of germinating embryonic tissues were analyzed. $K_2Cr_2O_7$ has been taken as hexavalent chromium for this study and the physiological parameters like ascorbic acid content, soluble protein content, activities of peroxidase and superoxide dismutase (SOD), along with lipid peroxidation level were determined. It was found that with increase in Cr concentration there was decrease in germination percentage, ascorbic acid content where as the activities of peroxidase, SOD and soluble protein content of embryonic tissues were increased. The increased SOD activity scavenges off the toxic superoxide radical but at same time it increases the H_2O_2 level inside the tissues as a byproduct of SOD mediated dismutation reaction. Even though peroxidase activity has been found increased, its efficacy cannot be attributed to the decomposition of hydrogen peroxide and the increased peroxidase activity is usually considered as an indication of stress situation. Further ascorbate, an important low molecular antioxidant of the cell, was decreased. The lipid peroxidation level was increased which is a direct indication of imposition of oxidative stress stuation. All the results suggest that the Cr toxicity imposes oxidative stress in germinating seeds which may affect the subsequent growth and development of the seedling. Therefore remediation of soil contaminates with Cr is highly essential before sowing the seeds.

Key words: Ascorbate; Peroxidase activity; Lipid peroxidation level; Soluble protein; SOD

P95: COMPERISON OF AMBIENT AIR QUALITY & EFFECT ON HEALTH (DUE TO USE OF FIRE CRAKERS) IN AN AROUND KOLKATA DURING KALI PUJA-2018

Sanjoy Mukherjee, Chitralekha Sengupta, Barna Majumder

Email:sanjoymukherjee08@gmail.com

Particulates, alternatively known to as particulate matter (PM) or fine particles and also called soot, are tiny subdivisions of solid matter suspended in a gas or liquid. In contrast, aerosol refers to particles and/or liquid droplets and the gas together.Fraction Size range PM_{10} (thoracic fraction) <=10 ìm, $PM_{2.5}$ (respirable fraction) <=2.5 ìm, PM_1 <=1 ìm ,Ultrafine (UFP or UP) <=0.1 ìm, PM_{10}-$PM_{2.5}$ (coarse fraction) 2.5 ìm – 10 ìm. A particle with an aerodynamic diameter of 10 micrometer moves in a gas like a sphere of unit density (1 gram per cubic centimeter) with a diameter of 10 micrometers. The large number of deaths and other health problems associated with particulate pollution was first demonstrated in the early 1970s and has been reproduced many times. PM pollution is estimated to cause 22,000-52,000 deaths per year in advanced or semi advanced country.The effects of inhaling particulate matter that have been widely studied in humans and animals now include asthma, lung cancer, cardiovascular issues, and premature death. The size of the particle is a main determinant of where in the respiratory tract the particle will come to rest when inhaled. Because of their small size, particles on the order of ~10 micrometers or less can penetrate the deepest part of the lungs. Larger particles are generally filtered in the nose and throat and do not cause problems, but particulate matter smaller than about 10 micrometers, referred to as PM_{10}, can settle in the bronchi and lungs and cause health problems. It increses during festive season therefore, it is suggested to prevent fire crakers as far as possible especially sound generating fire crakers. For better environment and to get healthy life prevention of various pollutants are essential if we take certain measure like diluting the chemical formation which is generally used in this unorganised sector as there is no code or IS specification for different fire works. Provision of definite place (specific open area) in the locality for the user of fire crakers. It is to be designed in such a way that the Light emiting fire crakers should reach above 50 m height in the sky. It may be applicable if we can arrange for some diluter in design which will dilute the pollutent after burning so that its effect will be minimum.

P96: EMF EXPOSURE FROM X AND KU BAND RADAR ON OXIDATIVE STRESS BIOMARKERS IN MILITARY PERSONNEL

Sarika Singh[1], Neeru Kapoor[2]

[1]Banasthali Vidyapith, Tonk, Rajasthan - 304022, India; [2]DIPAS, DRDO, Lucknow Road, Timarpur, New Delhi-54

The present cross-sectional study intended to outline the effect of electromagnetic field (RF-EMF) exposure from X and Ku band radar on oxidative stress biomarkers in occupationally exposed military personnel. 166 male military personnel divided randomly into three groups: control (n=68), exposure group I (X-band, 8-12 GHz, n=40) and exposure group II (Ku-band, 12.5-18 GHz, n=58) participated in the study. Oxidative stress biomarkers were measured in fasting blood samples. In exposure group I, glutathione peroxidase (GSH-Px) activity declined significantly when compared to controls. Significant increase in GSHwas observed together with no significant change in MDA, and total antioxidant status (TAS). In exposure group II, highly significant increase in GSH-Px activity, GSH and TAS were observed together with no significant difference in MDA in comparison to control. The study reflects RF-EMF ability to influence the oxidative stress biomarkers in both the exposure categories.

Key words: EMF; Oxidative Stress; Ku band; Military

P97: ALTITUDINAL DISTRIBUTION OF TREE COMMUNITY IN REPRESENTATIVE HIMALAYAN STATES

Vikram S Negi, Amit Bahukhandi

G.B. Pant National Institute of Himalayan Environment and Sustainable Development, Kosi-Katarma, Almora, Uttarakhand

It is well established that altitude plays key role in regulating species richness patterns and composition in mountain regions. Plant communities and species diversity often show distinctive responses to elevation gradient, and therefore the mountain region are storehouses of global

biodiversity. Present study is an attempt to understand the altitudinal distribution of tree community in representative Himalayan States i.e. Sikkim and Uttarakhand. The results of forest inventories, revealed a total of 75 tree species belonging to 31 families Teesta valley in Sikkim, while 29 species belonging to 21 families from Bhagirathi valley in Uttarakhand. Tree species richness peaked between 1300-1500 m asl in Sikkim and 2400-2500 m asl in Uttarakhand; corresponding to transition zones between tropical-subtropical and subtropical-temperate forests, respectively. Good, fair, poor regeneration of tree species contributed 10.2%, 43.5%, 30.3% respectively in the Sikkim and 9.2%, 57.8%, 24% respectively in Uttarakhand. The tree density increased upto 3000 m in both the region, while it was decreased after 3100 m. Species with better regeneration on upper distribution limits have been recognized as probable species for upward shifts. Present information may be useful for formulation of mitigation strategies and conservation of gene pool upon which livelihood of many rural communities depends in the Indian Himalayan Region.

Key words: Species richness; Population structure; Regeneration; Altitude; Himalayan Region

P98: IDENTIFYING OF SOLID WASTE DESPOSIBLE POINTS IN MYSORE CITY USING MORPHOMETRIC ANALYSIS

Amin, Arun Das

Department of Geography, University of Mysore

Mysore city is located in the southern part of India in Karnataka. It is known for its planning and clean. Being located on the undulating topography on the ridges of Cauvery and Kabini water dividing land, Mysore city exhibits the geomorphological significance of its location. The city has gained its historical importance by the rulers of Mysore dynasty. Being, a princely state under the British period the Wodeyars of Mysore with the help of British engineer and great technocrats like Sir. M. Vishweshvarraya. The city was planned from time to time and it as emerged as one of the planed city of India from the time of Krishnaraja wodeyars rule. At present Mysore city is under the planning machinery of MUDA (Mysore Urban Development Authority). From time to time MUDA is preparing CDP (Comprehensive Development Plan) for the future growth of the city. Despite the urban land use planning for

the present and for the future, in the recent years the city has been greatly disfigured by dumping of solid waste generated from derelict materials. Most of the times the debris were illegally dumped along the road side and also in the low-lying places which has created barrier across the stream paths or totally vanishing of the existing stream paths. This type of dumping material and there by conversion of stream part and dry lake lank into dumping sites is one of the dangerous development from the point of view of flood as well as loosing valuable land for wrong use. The stream paths are the balancer of surface and underground water. And it is also like the veins of the storm water discharge. These stream paths have been carved by the nature from millions of years. Without understanding the significance of this stream path, posing obstacle to the easy flow of water leads to imbalance in the natural distribution system of rain water in the region. From this point of view research analysis has been done using morphometric tools to establish, which are the suitable sites for dumping of derelict material, without damaging the existing stream paths. Secondly this paper will analyze the basis of selection of the solid waste disposable points and how best it is in comparison to the unmonitored dumping sites. In general, this paper will be useful for beatifying Mysore as well as reduce man emanated obstacles to the easy flow of water and also solid waste hazard.

P99: IMPACT OF SODIUM NITROPRUSSIDE ON PROLINE ACCUMULATION IN RICE UNDER SALT STRESS

G Hemalatha

Department of Seed Science and Technology, Imayam Institute of Agricultural Technology (Affiliated to TNAU),Thuraiyur
Email: hemi7654@gmail.com

Most of the crop plants are sensitive to salinity especially, in rice field the yield and their growth has been declined day by day. The seed priming is one among the promising seed quality enhancement techniques which, improves the performance of crop under stress condition. In the present investigation, the salt tolerant (TNAU Rice TRY 3) and sensitive (ADT(R)49) varieties were taken and imposed the seed with priming agents *viz.*, SNP @

80 ìM, H_2O_2 0.25% and Jasmonic acid@ 75 ìM. High accumulation of proline content was noticed in the SNP treatment due to presence of temporary storage compound "S-Nitrosocysteine".

Key words: SNP; Salinity stress; seed priming; S-Nitrosocysteine

P100: ELECTROCOAGULATION FOR THE REMOVAL OF TETRACYCLINE FROM POTABLE WATER

Shweta Kumari, R Naresh Kumar

Department of Civil & Environmental Engineering, Birla Institute of Technology, Mesra, Ranchi, Jharkhand- 835215, India.
Email: rnaresh@bitmesra.ac.in

Electrocoagulations with aluminium anode and iron cathode were used for the removal of tetracycline in batch mode. Time, voltage and electrode spacing were varied to determine the effect of these parameters on removal efficiency. All the experiments were performed using constant dose of tetracycline at 50 mg/l. Optimal time was 135 min, which led to 96.25% tetracycline removal. Optimum voltage was 12 V which resulted in 98.38% removal, compared to 97.09%, 92.76% removal of tetracycline from water at 9V & 6V respectively. The effect of electrode distance on removal efficiency was also studied. For this electrode spacing was varied at 2 cm, 2.5cm, 3cm, 3.5cm & 4 cm and removal efficiency was 98.39%, 96.67%, 94.04%, 94.54 & 95.04%, respectively. The operating cost of electrocoagulation was also calculated and found to be 34.6 Rs/m^3 at 2 cm, demonstrating that this method is very efficient for tetracycline removal from water. Also, sludge generated through this process was minimum. The results show that electrocoagulation can be an effective process for removal of tetracycline from water.

Key words: Tetracycline; electrocoagulation; electrode spacing; voltage

P101: STUDIES ON PHYSICOCHEMICAL PARAMETERS TO ASSESS THE WATER QUALITY AT SELECTED SITES OF RIVER GANGA, WEST BENGAL, W.B

M Roy, F Shamim, D Ghosh, P Dey

Dept. of Environmental Science, Vidyasagar University, Midnapur, West Bengal 721102
Email: misharoy.india@gmail.com

The river Ganga is one of the most important and sacred rivers of India. During the past few decades, the massive pollution load has resulted in degradation of its water quality. The present study, reports the seasonal changes in water quality of river Ganga in different ghats of W.B, India. Water samples were collected during both low and high tide from 10 different ghats (including pilgrim ghats and ferry ghats) and analyzed for physicochemical parameters *viz.* temperature, pH, electrical conductivity, turbidity, total dissolved solids, total alkalinity, dissolved oxygen, biochemical oxygen demand, Chemical oxygen demand, free CO_2, chloride, arsenic, hardness, NPK and MPN. Seasonal variation in the result is observed and the value diverges during low and high tide. The results reveal turbidity, BOD, COD and MPN results are higher during the post-monsoon season and above the recommended level. The TDS value is found to be a little high during the post-monsoon season (260 mg/l). No traces of arsenic and fluoride were detected during the whole study. However, the NPK load was quite high suggesting heavy discharge of both anthropogenic wastes and fertilizers in the river. The results were compared with the WHO surface water quality standards. The experiential values of major parameters were slightly higher than the WHO limits. The result suggests the immediate implementation of proper sewage management practices before discharge and restrictions should be made on various anthropogenic and religious activities to restore the water quality of this river for a healthy living.

Key Words: River Ganga; Physico chemical parameters; Water quality; Pollution

P102: COMPARATIVE STUDY OF CERTAIN PHYTOCHEMICAL PROPERTIES, ANTIOXIDANT ACTIVITY, NUTRIENT CONTAIN OF TWO MEDICINALLY IMPORTANT PLANTS *AMARANTHUS TRICOLOR L.* AND *CHENOPODIUM ALBUM L.* OF DARRANG DISTRICT, ASSAM

Seema Jyoti, Mitali Baruah, Leena Saikia

Department of Zoology, Mangaldai College, Assam

From ancient times huge number of population is depending on the traditional practitioners, who use locally available medicinal plants to meet their primary health care needs. Leaves of *Amaranthus tricolor L.* and *Chenopodium album L.* collected from Darrang district of Assam were analysed for phytochemical constituents, antioxidant activity and nutrient content. Data showed that tannin, saponin, flavinoid, phenol, cardiac glycoside were present in all the two samples. Where alkaloid, reducing sugar were absent in *Chenopodium album L.,* anthraquinin were absent in both samples. All the two plants have good amount of antioxidant property and nutritive value. The result revealed that the both primary and secondary metabolite contain in the two plants with different varies.

Key words: *Amaranthus tricolor L.*; *Chenopodium album L;* Antioxidant activity; Nutritive value

P103: RESIDUE, DISSIPATION AND DECONTAMINATION OF THIAMETHOXAM AND FLUBENDIAMIDE IN TOMATO AND CABBAGE

RH Naik, VSangameshwar, MS Pallavi, H Arunkumar, M Bheemanna

University of Agricultural Sciences, Raichur-584 104, Karnataka, India.
Email: harientomology@gmail.com

Vegetables constitute the major component of human diet which contains vitamins carbohydrates, proteins, antioxidants and minerals needed for a balanced diet. The insect pest infestations necessitated the application of chemical pesticide for protection of yield and which further warrants the consumption of vegetables. To record the residue and dissipation pattern of thiamethoxam and flubendiamide in tomato and cabbage ecosytem, a supervised field trial was conducted. The initial deposit of thiamethoxam was 0.853 and 1.61 mg kg^{-1} and flubendiamide was 1.023 and 2.01 mg kg^{-1} at recommended and double the recommended dose in tomato; whereas the initial concentration were in the range of 0.246 to 0.482 and 1.023 to 3.180 mg kg^{-1} and dissipated to half of its concentration at 1.93 and 2.01 days at recommended dose and 2.03 and 2.11 days at double the recommended dose in cabbage. Dissipation of thiamethoxam recorded its concentration below LOQ on 10th day after application and it was 15 day for flubendiamide to dissipate below its LOQ. Decontamination of thiamethoxam and flubendiamide was attended with household processing methods such as washing with tap water, acidic and alkaline solutions, tamarind solution, salt water, peeling and cooking singly or in combination were proved an effective means in reducing dietary consumption of pesticide residues in tomato and cabbage. The reduction of thiamethoxam residues in tomato fruits due to different treatments ranged from 84.80-91.92 % and reduction in flubendiamide residues in tomato fruits due to different treatments ranged from 80.35-95.48 %. Reduction of thiamethoxam and flubendiamide residues in cabbage heads due to different treatments ranged from 2.42-72.58 % and 90.43-99.23 %, respectively. For both the vegetables, dipping in two per cent salt solution followed by boiling for 5 min resulted in significantly maximum reduction thiamethoxam and flubendiamide residues.

Key words: Vegetables; thiamethoxam; flubendiamide; LOQ; pesticide residue; decontamination

P104: OCCURRENCE OF PERMANENT ALGAL BLOOMS IN A POND WITH SPECIAL REFERENCE TO FACTORS RESPONSIBLE FOR ITS PRODUCTION AT DISTRICT ROHTAS, SASARAM

Rajani Kumari, Dinesh Kumar Yadav

PG Deptt of Botany, Magadh University, Bodh-Gaya
Email: rajnising65@gmail.com

The aim of this research was to analyze the key mechanisms and responsible factors related to theharmful algal blooms in a shallow eutrophic pond Sasaram during the year 2018. The pond is regularly used for dumping of domestic solid wastes and waste water, regular dumping of domestic sewage, the pond has become highly eutrophic having dense algal blooms caused by cyanobacteria. High concentration of phosphorus and nitrogen were the two major factors to promote the growth of algae and cyanobacteria. Permanent cyanobacterial blooms were characterized. Good growth of *Anabaena* and *Mycrocystis* were observed during the course of study.

Key words: Harmful algal blooms; Cyanobacteria; Phosphate; Nitrate; Eutrophic

P105: HEALTH EFFECTS AND CHARACTERSTICS OF GASEOUS POLLUTANTS IN THE ATMOSPHERE OF A REGIONAL STATION IN CENTRAL INDIA

Harendra K Sharma, Banwari Dandotiya

SOS in Environmental Science, Jiwaji University Gwalior, India
Email: banwaridandotiya@gmail.com

This study was initiated to ascertain whether gaseous air pollutants can influence the pulmonary function, respiratory tract infection and effects on other related organ systems of regular exposed urban residents. The investigation was conducted to determine the effect of various

exposures to SO_2 and NO_2 on residents of urban area of Gwalior City. From the study it was concluded that vegetation may be an important sink for many gaseous air pollutants in this urban observational area because a greenery rich area is taken as control in this study. It is reported previosly gaseous air pollutants exposure influence pulmonary function, respiratory track infections, blood pressure and many other harmful problems. The aim of this study was to examine the association between gaseous air pollutant exposure and health effects and also characterizes the spatiotemporal variations of gaseous air pollutants at four sites in Gwalior urban area. The investigations lasted for 1 year: March 2017 through February 2018. The concentrations of NO_2 and SO_2 were systematically monitored according to national ambient air quality guidelines provided by Central Pollution Control Board, India.

Key words: Gaseous Pollutants; Air pollution; Health Effects; Urban Area

P106: KINETIC, ISOTHERM AND THERMODYNAMIC STUDIES ON BIOSORPTION OF HEAVY METALS FROM AQUEOUS SOLUTION BY USING ACTIVATED CARBON

Harendra K Sharma, Irfan Rashid Sofi

School of Studies in Environmental Science Jiwaji University Gwalior, M.P
Email: irfanrashidsofi999@gmail.com

The performance of a activated carbon prepared chemically were investigated, via batch technique for the removal heavy metals from aqueous solutions. The effects of solution pH, contact time, temperature and initial concentration on the adsorption of heavy metal were studied. This study shows that activated carbon is an effective adsorbent for the removal of heavy metals from aqueous solutions, with the aim of detoxifying industrial effluents before their safe disposal onto water surfaces. The surface characterization of activated carbon were determined by Brunauer-Emmett-Teller (BET) analysis, FTIR spectrum, X-ray diffraction (XRD), Scanning electron microscopy (SEM), Transmission electron microscopy (TEM) and Thermogravitic analysis (TGA). Equilibrium isotherms are analyzed by Langmuir, Freundlich and Temkin isotherm models. Freundlich isotherm is found to represent better

the data. The adsorption process was found to follow a pseudo-first-order kinetic model. Different thermodynamic parameters Such as changes in standard free energy, enthalpy and entropy are also evaluated and the results suggest that the sorption reaction is spontaneous and endothermic in nature.

Key words: Activated carbon; Heavy metals; Adorption isotherm models; Kinetic model

P107: MORPHOLOGY AND ULTRASTRUCTUREOF THE FOLIAR GLANDS OF *HIBISCUS SURATTENSIS*LINN. AND*HIBSICUS SABDARIFFA* LINN. (MALVACEAE)

K Raghu, Y Naidoo

School of Life Sciences, University of KwaZulu-Natal, Private Bag X54001, Durban, 4000, South Africa

We described the glandular structures found on the foliar surfaces of two commonly consumed *Hibiscus* species. Leaves of *H. surattensis* and *H. sabdariffa* are known for providing astringency to curries and soups in various parts of the world and possess a wealth of ethnopharmacologicaluses. Here we examined the surfaces of the leaves, to identify and describe the specialized sites of secondary metabolite synthesis. Using light- and electron microscopy techniques, we demonstrated that the leaves of both species have two main types of secretory structure, the capitate trichome and the mucilage idioblast. Their histophytochemistry and ultrastructuralmachinery are explored.

Key words: Malvaceae; trichome; vacuole; mucilage

P108: MANGROVE ECOSYSTEM: A POTENTIAL RESOURCE FOR RURAL UPLIFTMENT AND SUSTAINABLE DEVELOPMENT

PriyankaKumari

School of Environment & Sustainable Development, Central University of Gujarat, Sector 30, Gandhinagar, Gujarat, India

Mangroves forest serves as interface between land and sea. These are most productive, good bio-indicators of environmental quality and health of any coastal ecosystem, protects soil erosion and long term carbon sink as carbon storing or carbon sequestration. Besides of these they serve as valuable nursery as well as commercial and recreational fishing industries.They support threatened and endangered species so that they also serve as tourism purpose. Mangroves are utilized as renewable resources, harvested for durable, water resistant wood, they have been used as building houses, boats, pilings and furniture.Dyes and tannins are extracted from mangrove barks, leaves have been used in tea, medicines, livestock feed and as a substitute for tobacco. Wood of the black mangroves and buttonwood trees has also been utilized in the production of charcoal. The production, transport and combustion of charcoal constitute a critical energy and economic cycle in the economies of rural village.The objective of this paper is to discuss the science and technological aspects to promote the self-sustainability and economic development in rural areas.Charcoal marketing and distribution is a sequence of business activities that involves the producer, supplier, wholesaler or retailer and the consumer.Charcoal production is one of the primary causes of deforestation, so that the business is associated with the felling of both mature and nearly- mature trees.In recent days beekeepers have set up their hives close to mangroves in order to use the nector in honey production.

Key words: Mangroves; Ecosystem; Sequestration; Rural Development

P109: EFFECT OF BIOCHAR AMENDMENT ON SOIL LABILE FRACTIONS OF CARBON AND SOIL SEQUESTER CARBON

Prakirti Kumari, Uma Melkania

Department of Environmental Science, CBSH, G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand 263145, India
Email: melkaniauma@yahoo.in

Biochar is considered as biomass originated charcoal when biomass is burned under low or no oxygen (pyrolysis). It serves as a tool for improving soil fertility and carbon sequestration. In pyrolysis conversion of organic waste to produce biochar takes place which is important way to enhance natural rates of carbon sequestration in the soil and also reduces farm waste. Converting biomass carbon to biochar carbon results in about 50% sequestration of carbon initial carbon as compared to the low amounts retained after burning (3%) and biological decomposition (10-20% after 10-15 years). Recognizing the benefits of biochar the present study was conducted to evaluate the characteristics of biochar derived from paddy straw. A series of laboratory experiments were conducted to study the effect of biochar on soil properties and carbon pool with the combination of crop residue of paddy and inorganic fertilizers. On comparing physico-chemical properties of crop residue and biochar high amount of carbon was present in biochar (70.85%) with wider C/N ratio of 68.12. Application of biochar in the soil at the rate of 4 t/ha had significantly improved the physico-chemical *viz.,* pH (7.22 to 7.48) and EC (from 0.26 to 0.36 dSm^{-1}); chemical properties *viz.,* soil organic carbon content (from 6.82 to 8.71 g/kg), available N (248.03 to 289.67 kg/ha), available P (21.72 to 28.60 kg/ha) and available K (171.19 to 191.68 kg/ha). Soil carbon stock generated by biochar amendment changed from 14.28 to 17.76 t/ha. Biochar application in soil can deliver tradable carbon reduction by sequestrating carbon in stable form deep inside the earth.

P110: STUDIES ON SEASONAL VARIATIONS OF PHYSICO-CHEMICAL PROPERTIES IN A FRESH WATER LAKE OF WARANGAL DISTRICT, TELANGANA STATE

V Rajani, G Benerjee

Department of Zoology, Kakatiya University, Warangal-506 009, Telangana State
Email: gbgsss@yahoo.co.in

In present work an attempt has been made to assess the physico-chemical parameters of Kamalapur Lake. The Study was carried out for a period of one year from June -2015 to May-2016. Water samples have been collected and analyzed using standard laboratory methods. The results of the analysis of water samples have shown that there is a variation in these parameters at the different sampling stations and some of these parameters vary during different seasons too. Temperature (26.7-31.5^{p} C), PH (7.35-8.05),TUR (6.8-7.9NTU), TDS (165-208mg/l), TA (140.7-162.6mg/l),TH (98.9-119.8mg/l), DO (6.01-6.64mg/l), BOD (3.4-4.8mg/l), COD (5.5-8.5mg/l), Chlorides (88.8-110.7mg/l), Sulphates (2.4-3.8mg/l), Phosphates (2.5-3.5mg/l), Nitrate (3.7-5.5mg/l) and CO_2 (1.55-8.15mg/l) were analyzed. The lake water is also used for fish culture and agriculture practices.

Key words: Kamalapur Fresh Water Lake; Physico-chemical parameters; Seasonal variation

P111: SEASONAL ABUNDANCE AND FAUNAL DIVERSITY OF MACROBENTHIC MOLLUSCA ALONG LOWER AND ESTUARINE STRETCH OF RIVER GANGA IN RELATION TO ENVIRONMENTAL PARAMETERS

S Roy, C Jhonson, RK Manna, A Roychowdhury, A Ray, NK. Tiwari, SD Gupta, S Mandal, BK Das

ICAR-Central Inland Fisheries Research Institute, Barrackpore, Kolkata, India
Email: basntakumard@gmail.com

Ganga river system is facing lot of anthropogenic influences impacting different aquatic communities especially sedentary benthic organisms attached with the river sediment. Recent seasonal study in lower and estuarine stretch of river Ganga from Buxar to Fraserganj recorded a total number of 25 Molluscan species comprising 19 Gastropods and 6 Bivalves. It was observed that the benthic molluskswere maximum during pre-monsoon season and the lowest during the winter. Through different diversity indices like Shannon Diversity Index (H), Simpson Dominance Index (D) and Margalef Index (d) has been estimated to correlate with the water and sediment quality parameters of river Ganga.

Key words: Macrobenthic Mollusca; River Ganga; Diversity index

P112: OXIDATIVE STRESS IN LEAD TOXICITY AND ITS AMELIORATION BY NATURAL THERAPY

Soumendra Darbar

Research & Development Division, Dey's Medical Stores Manufacturing Limited, 62, Bondel Road, Kolkata-700019, Wst Bengal
Email: dr.soumendradarbar@deysmedical.com

Environmental pollution lead to health risks like as diseases nearly in all organ systems. Lead (Pb) and its toxicity continues to be major health problem due to its interference with natural environment. In the present study, we have evaluated the safe and symptomatic effect of

Polyherbal composition (PHC) on lead nitrate ($PbNO_3$) mediated hepatic damage and its toxicity in mice. Oral treatment with lead nitrate ($PbNO_3$) at a dose of 50 mg/kg body weight daily for 45 days induced a significant increase in the levels of hepatic aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), acid phosphatase (ACP), cholesterol, lipid peroxidation, and iNOS. In parallel, hepatic protein levels in lead-exposed mice were significantly ($P<0.001$) depleted. Lead nitrate exposure also produced detrimental effects on the redox status of the liver indicated by a significant decline in the levels of liver antioxidants such as superoxide dismutase (SOD), catalase (CAT), glutathione (GSH) and glutathione peroxidase (GPx). After exposure to lead nitrate (50 mg/kg body weight), the animals received Polyherbal composition (PHC) (100 mg/kg body weight and 250 mg/kg body weight), which partially restored the deranged parameters significantly ($P<0.05$). Histological examination of the liver also revealed pathophysiological changes in lead nitrate-exposed group and treatment with PHC improved liver histology. The present study suggests that this Polyherbal composition (PHC) plays a protective role against lead induced hepatic damage.

Key words: Lead nitrate; Herbal composition; Hepatotoxicity; Hepatic enzymes; Oxidative stress

P113: ENVIRONMENTAL CONSERVATION FOR SUSTAINABLE AGRICULTURAL DEVELOPMENT IN THE GODAVARI BELT OF ANDHRA PRADESH, INDIA

T Ranga Rao[1], G Prabhakara Rao[2]

[1]Secretary, Green Geo Organization, Environmental Protection Society, Rajahmundry 533104, Andhra Pradesh
[2]Rubber Research Institute of India, Kottayam 686009, Kerala
Email: greeni.ranga@gmail.com; raogprao@gmail.com

India is a major agrarian nation and its rural population was depended upon agriculture and related activities for their livelihood. According to Desertification and Land Degradation Atlas of India 2016, nearly 30 per cent of India is degraded or facing desertification and

Godavari belt is no exception to this. Land area in the Godavari belt of Andhra Pradesh is suitable for the cultivation of major Agri-horticultural crops. Increasing desertification of these soils is a fundamental threat to agriculture and it will further precipitate the agrarian crisis in the area. Desertification has increased in 90 per cent of states in India. Improper sand mining in the Godavari river basin area also causes lower water table, affecting availability of sufficient irrigation water to the farming areas. Certain time-tested measures including environmental conservations are discussed to mitigate and adapt to the adverse environmental conditions for a sustainable agricultural development in the days to come.

Key words: Degradation; Environmental conservation; Sustainable agriculture; Water

P114: PHYSICO-CHEMICAL ANDMICROBIAL STUDY TO EVALUATE DRINKING WATER QUALITY OF CHITRAKOOT NAGAR PANCHAYAT AREA

GS Gupta, Amita Yadav

Department of Energy and Environment, Mahatma Gandhi ChitrakootGramodaya Vishwavidyalaya, Chitrakoot - 485334, M.P., India
Email: guptags21gmail.com

The present study was aimed to assess the physicochemical and microbial parameters viz., pH, temperature, turbidity, electrical conductivity (EC), total dissolved solids (TDS), dissolved oxygen (DO), Biochemical oxygen demand (BOD), Chemical oxygen demand(COD) and E.coli of drinking water of Chitrakoot Nagar Panchayat area (CNPA). Seventeen sampling stations were selected to analyze its drinking water quality in light of the above parameters. The above study revealed that water of the study area was found to have high value of EC, TDS. Since TDS, EC andpH, were considered asbasic physicochemical parameters of water quality so these were correlated with other parameters. The present study also quantified the microbial pollutants affecting the CNPA water quality.Water of six sampling stations was found to be positive with respect to presence of microbial population. Results of the study indicate that drinking water of the above area need treatment prior to its use.

Key words: Drinking water quality; Physico-chemical analysis; microbial analysis; Chitrakoot Nagar Panchayat

P115: OPETICAL CHARACTER RECOGNITION USING NEURAL NETWORK

AP Yadav[1], Adarsha Kumar[2]

[1]Dept. of Physics, Marwari College, Darbhanga, Bihar; [2]Dept. of Physics, L.C.S. College Darbhanga, Bihar
Email: drapyadav786@gmail.com

Neural Networks is now a subject of interest to professionals in many field and also a tool for many areas of problem solving. The results are astounding, even phenomenal with Neurala Networks and the effort is at times relatively modest to achieve such results. Image processiong, vision, financial market analysis and pattern recognition are among many areas of application of Neural Networks. The main purpose the paper is to use the Kohonen network model, which is required to recognize or categorize a few alphabetic characters using neural Networks. The Network will be trained to recognize various forms of same alphabet as written by different people as one. After training Network will be tested for its capability to generalize its knowledge obtained during training session to the form of trained characters, which it has never come across.

Key words: Epoch; ANN; Kohonen Neural Networks

P116: ECOLOGICAL DIVERSITY OF SPECIES AND ITS MEASUREMENT IN LOTIC ECOSYSTEM

J Mahadev, G Sugeetha, NS Pankaja

College of Agriculture, V. C. Farm, Mandya
Email: jmahadev999@gmail.com

Phytoplanktons are very important source of food for aquatic animals and serves as an early step in the food chain of large aquatic animals, especially fish. The present investigation deals with water quality and the diversity of phytoplanktons of eight lakes in and around Mysuru.

Diversity measures are more useful in lake ecosystem which harbour a large diversity of algal species within the genera. The application of species richness indices is very essential and it is necessary to apply models that describe the distribution of species abundance. The 9 diversity indices have been derived out of 10 indices using PAST software programme like Dominance, Simpsons, Shanon and Weiner, Menhinichs, Margalleaf richness, Equitibility, Fischer, Berger – Parkers dominance and Pielous eveness index. A total of 58 algal species have been identified and the high dominance of species was observed in Kukkarahalli lake and Yennehole lake, but possessed low diversity of species. On the other hand Phytoplanktons were uniformly distributed in all study areas. Karanji lake, Mandakalli lake and Bilikere lake were found to have high species richness. Calculating diversity index indicated negative correlation between pollution of the lakes and diversity of species. These studies helped us in understanding and enable us to plan meticulously for the restoration of the aquatic ecosystem. The investigation was based on data collected over a period of one year from April 2016 to March 2017.

Key words: Phytoplanktons; Diversity index; Species richness and Eveness; PAST software

P117: LACTATION INTOLERANCE OF ARSENIC

Moupiya Mandal[1], Sandipan Ghosh[2]

[1]Zoological Survey of India, M –Block, New Alipore, Kolkata-53
[2]Department of Transfusion Medicine and Blood Center, North 24 Parganas District Hospital, Kolkata 700124, West Bengal.
Email: moupiyamandal88@gmail.com

Breastfeeding is of paramount importance to healthy development of infants. It decreases the risk of RTI, diarrhea, adulthood obesity and diabetes, and improves cognitive development. Research conducted to assess the arsenic exposure through breast-milk in infants, shows that arsenic concentrations in breast-milk samples were low (median 1/kg), despite high arsenic exposures via drinking water (10-1100ìg/L in urine, 2-40ìg/L in red blood cells). The concentration in average infants urine was significantly higher (median 1.9 ìg/L) than exclusively breastfed infants (median 1.1ìg/L). This suggests that breastfeeding exclusively can protect infants from arsenic exposure during their critical development period.

P118: IDENTIFYING THE DISTRIBUTION AND ASSESSING THE POPULATION ECOLOGY OF THREATENED SPECIES: A CASE STUDY OF A RARE TREE *ELAEOCARPUS PRUNIFOLIUS* WALL. EX MÜLL. BEROL. IN NORTHEAST INDIA

Viheno Iralu

Department of Environmental Studies, Patkai Christian College (Autonomous), Chümoukedima 797103
Email: viheiralu@gmail.com; Ph- +91 8014526820

Predictive habitat distribution models have emerged as useful ecological tools for narrowing down the potential distribution sites for targeted field surveys of important species. In the present study, the potential habitat distribution of *Elaeocarpus prunifolius* Wall. Ex Müll. Berol. (Elaeocarpaceae) was assessed in the state of Meghalaya using maximum entropy (Maxent) algorithm. The model built using enhanced vegetation index (EVI), elevation data and 61 presence records had an $AUC_{partial}$ value of 0.99 and predicted 8.97% area of the state as potential habitat. The environmental variables *viz.* elevation and the EVI layers of May, June and July collectively contributed >85% to the model development. Population studies in the predicted regions revealed that the species occurred in 40 sites with a total density of 2370 individuals which includes 274 adults, 839 saplings and 1257 seedlings. Overall, the density in different dbh revealed a reverse *J*-shaped. A weak positive correlation was observed between the population of the species with disturbance (p>0.05) indicating the species ability to tolerate environmental disturbances. Extraction of fruits and selective logging of the species were the main threats observed. The study highlights the potential of species distribution models as potential ecological tools that can aid comprehensive exploratory study for threatened species.

Key words: Conservation; disturbance; threatened; MaxEnt; northeast India

P119: APPROACH OF REMOTE SENSÝNG AND GIS TECHNÝQUES ÝN LAND USE AND LAND COVER MAPPÝNG – PATNA (PMC), BÝHAR, INDÝA

Md Yasir Ahmad[1], Nikhat Hassan Munim[2]

[1]Magadh University, Bodh-Gaya, Bihar, India; [2] Dept. of Zoology, J.D. Women's College, Patna Magadh University, Bodh-Gaya
Email: yasgis@gmail.com

This paper investigates the Land use Land cover mapping of Patna (PMC), Bihar, India. We offer Geographic Information System (GIS) and Remote Sensing (RS) techniques delineated LULC classes of the study area. LULC has been classified through FCC Satellite image Resourcesat-2A LISS-IV with 5.8 metre spatial resolution data of the year 2017. To conclude,the entire PMC land use land cover has been classified intobuilt-uparea covers70.80 Sq Km is greater than others. Agriculture/ fallow, vegetationshas 31.7 sqKm while waste land constitutes around11.86 Sq Km andwater bodies covers low 5.8 Sq Km areawith an overall accuracy of 92%.

Key words: Land use Land cover; Remote sensing; GIS; FCC; Satellite Imagery; Patna Municipal Corporation (PMC)

P120: ECOLOGICALLY ENGINEERED STRATEGIES FOR THE MANAGEMENT OF ACID MINE DRAINAGE: AN OVERVIEW

Ravindra Kumar Singh[1], Manoj Kumar Pandey[2], Aruna Kumari[3]

[1]P. G. Department of Zoology, J.P. University, Chapra; [2]Dept. of Zoology, Ganga Singh College Chapra; [3]Dept of Home Science, L M V Hafizpur, Baniyapur Chapra
Email: manoj_pandey45@yahoo.com

Acid Mine Drainage (AMD) is a serious environmental pollution problem of the mining industry around the world. The treatment of AMD is one of the major concerns for the mining industry. Ironically, even under the best reclamation scenario it requires long-term

collection and treatment. Active treatment systems commonly used by the Indian mining industry at active mine sites require continual addition of alkaline chemicals like lime, hydrated lime, caustic soda, soda ash, etc. these chemicals besides being very expensive, also, lead to production of voluminous low-density sludge. The disposal of this sludge is again an environmental problem to be dealt with. These active treatment processes are often expensive both in terms of capital and operating costs. For the last three decades researchers, throughout the world, have been expressing their opinion that a better solution to long-term treatment of AMD lies in the use of other technology with the application of integrated biological processes in engineered ecologies, which are passive technologies. One of the highly effective passive technologies for ecological engineering approach is construction of wetland to effectively treat AMD. The problem of AMD exists at number of sites in India. The main aim of the present manuscript is to devise a new treatment technology for AMD in India. The need for this technology is because the current approaches are too expensive and impractical at the sources of AMD at abandoned mines contaminated water continues to be discharged day after day without any treatment.

Key words: Ecosystems; Constructed wetlands; Environmental contaminants; Biochemical processes; Substrate and Vegetation; Biological filters; Organic matter

P121: ECO-AUDIT OF ST. JOSEPH'S COLLEGE (AUTONOMOUS) – AN INITIATIVE TOWARDS GREEN CAMPUS

S Aishwarya Lakshmi[1], Ebenezer Wilson[2]

[1]Department of Environmental Science, Bangalore University, Jnana Bharathi, Bengaluru-560056; [2]Department of Environmental Science, St. Joseph's College, Bengaluru-560027

St. Joseph's College was established in September 1882 by the Fathers of the Paris Foreign Mission Missions Estrangers de Paris (MEP) and affiliated to Madras University as a Second Grade College. As this institution is more sensitive to environmental factors, more concepts are being introduced to make them eco-friendly. To preserve the environment within the campus, there are various viewpoints that the college is applying in order to tackle with their

environmental problems such as energy saving, recycling of waste, water usage reduction, conserving biodiversity within campus. Henceforth, eco campus is one such concept introduced to make educational institutions' environmentally sustainable.

Key words: Energy Audit, Biodiversity; Eco-friendly Practices; solid waste management; Water audit

P122: BIOSURFACTANT-ASSISTED BIOREMEDIATION OF PETROLEUM HYDROCARBON CONTAMINATED SOIL

Ajay Prakash, Rajesh Kumar

Department of Environmental Microbiology (DEM), School for Environmental Sciences (SES), Babasaheb Bhimrao Ambedkar University (A Central University), Vidya Vihar, Raebareli Road, Lucknow 226025 (U.P

Soil pollution due to petroleum oil is considered as major environmental problem in these days. Due to the complex heterogeneous mixture of aliphatic and aromatic hydrocarbons, petroleum hydrocarbons are carcinogenic and neurotoxic in nature. Soils getcontaminate through accidental oilspills or due to human activities and can cause serious health hazards and environmentalpollution including water and soil pollution. Soil contaminate by petroleum hydrocarbons generally showedlow seed germination, slow plant growth and productivity of the crop plants.Different technologies have been introduced for the remediation of petroleum oil contaminated sites,but all of them having some contradictions. Management of petroleum oil contaminated soil through biosurfactant is one of the most promising and new technique which have low toxicity, eco-friendly and better functionality under extreme conditions due to their biodegradable nature of biosurfactant.

Key words: Petroleum toxicity**;** Bioremediation**;** Biosurfactant**;** Petroleum-contaminated soil

P123: PHYLLOSPHERIC ACTINOMYCETES IN CONTROL OF FROG-EYE LEAF SPOT OF *GLYCINE MAX* (SOYBEAN PLANT)

Ankita Dutta Chowdhury[1], Swarnika Roy[1], Bikram Dhara[1], Meenakshi Mukhopadhyay[2]

[1]Department of Microbiology, St.Xavier's College (Autonomous), Kolkata;
[2]Department of Botany, Vivekananda College, Kolkata
Email:ankitadc29@gmail.com

Soybean plant (*Glycine max)* is economically important because of high protein content and massive use in the food industry. Unfortunately, the plant has not gained popularity in the state of West Bengal. In the present investigation, soybean plant phyllosphere has been studied with respect to different opportunistic organisms present and some of these organisms were isolated and characterized. Two of the organisms included *Cercospora sojina* identified on the basis of spore characteristics and disease symptoms and it's parasitic nature was established by Koch's Postulates. Simultaneously, an Actinomycetes was also detected and they had a distinct antagonistic relationship. Slide Bioassay definitely indicate this antagonism with the reduction of spore germination from 42.2% to 19.23% in the presence of the actinomycetes colony. Though the efficacy is not at par with common fungicide but still can be a future tool to arrest this dreadful disease.

Key words: Soybean plant; *Cercospora sojina*; Actinomycetes; Slide-Bioassay; Spor germination

P124: DISTRIBUTION PATTERN OF WOODY AND HERBACEOUS VEGETATION IN A MOUNTAINOUS RIPARIAN CORRIDOR ALONG NEERU STREAM, BHADERWAH, JAMMU AND KASHMIR

Anu Sharma, Neeraj Sharma

Institute of Mountain Environment, Bhaderwah campus, University of Jammu (Jammu & Kashmir), India
Email: anu0007sharma@gmail.com

Plant communities in a riparian zone may include some common elements from the adjoining buffers or true riparian plants which grow exclusively in that environment. Riparian corridors are related to longitudinal and lateral patterns of plant species distribution as well as to species flows and exchanges across ecotonal and ecoclinal boundaries. The spatial distribution of vegetation depends on multiple factors like physiography, hydrology, geo-morphology, climatic regime, substratum, light and temperature, etc. The problem under investigation describes the distribution pattern of riparian vegetation along an elevational gradient of 1300 m along Neeru stream, a major left bank tributary of river Chenab. The abundance to frequency ratio (A/F) of different species was computed using the Whitford's index. This ratio indicates regular (< 0.025), random (0.025 to 0.05) and contiguous (> 0.05) distribution. The results reveal that a large stretch of the riparian forest exhibits random followed by contiguous and (negligible) regular pattern validating the better chances of species survival with adequate resource availability. When analyzed for occupancy frequency distribution, the vegetation showed homogenous distribution in the riparian and heterogeneous distribution along the upland forests. The whole corridor as a single linear unit was observed to be homogenous with high frequency of occurrence observed for class C (41-60%) and class D (61-80%) at the mid elevation. The hierarchical clustering defines the extent of similarity among the plant associations in the riparian and upland buffers with more information on patterns of distribution. The riparian forests mainly comprised of Alder while the upland buffers are represented by conifers *Pinus roxburghii*, *Pinus wallichiana*, *Cedrusdeodara, Abiespindrow* and *Piceasmithiana* along the rising elevation in the study corridor. The

results revealed that most of the vegetation is random or contiguous in distribution with a small section showing regular distribution. *Alnusnitida* the dominant tree in the riparian zone showed more of a contiguous distribution with the evidence of random distribution at the lower and moderately higher elevations. The percentage of species encountered in all the five Raunkaier's frequency classes for riparian and for upland forests along the left and right banks as well as for the whole study corridor has been calculated. The frequency classes at 20% interval are represented as A=1-20%, B=21-40%, C=41-60%, D=61-80%, and E=81-100%.

Key words: Abundance; Frequency; Heterogeneous; Homogeneous; Plant associations; Riparian

P125: WOODY PATCHES EXPANSION IN HIGHER ALTITUDES OF KUMAUN HIMALAYA DUE TO CLIMATE CHANGE

Arti Joshi, Subrat Sharma

G. B. Pant National Institute of Himalayan Environment and Sustainable DevelopmentKosi-Katarmal, Almora-263643, Uttarakhand
Email: joshi.arti10@gmail.com

Altitudinal shift in upper limit of vegetation is associated with impacts of global warming as evident in many parts of the world, and are poorly understood in the Himalaya. In the present study, high resolution satellite images were used to map occurrence of woody vegetation and analyze distribution pattern towards high elevation beyond the timberline in Pindar watershed (running in South-North direction; two major sides of eastern and western flanges). Woody patches elevation ranged from ~3300-4000 m amsl and *Rhododendron campanulatum* (RC) and *Betula utilis*(BU)are the main woody species in these patches. Long term monitoring of these woody patches in a glaciated valley provides insight on expansion of woody species which can be used as indicator of climate change impacts on high altitudes of the Himalaya.

Key words: Climate Change Indicator; Woody patches; Remote Sensing; Long-Term Monitoring; Spatial Distribution

P126: REDUCTION OF GREEN HOUSE GAS IS NECESSARY AT HOUSEHOLD LEVEL TO PROTECT THE ENVIRONMENT

Avinava Kundu[1], Asish Prasad Kundu[2]

[1]Department of Chemistry, Central University of Punjab, City Campus, Mansa Road, Bathinda Punjab, India - 151001; [2]B. R. Ambedkar Institute of Rural Development, State Sanitation Cell. P & R D Department, Kalyani, Nadia -741235
Email: kundu.avinava@gmail.com; asisshpk@yahoo.com

Now a day's one of the greatest challenges facing the societies is the reduction of green house gas emissions and thus preventing the climate change. It is therefore very much required to replace fossil fuels with renewable sources of energy, such as biogas. Biogas can be produced from various types of organic wastes, like agricultural waste, kitchen waste including food waste. The production of biogas through AD offers major advantages over other forms of bio-energy production. In fact, it has been defined as one of the most energy-efficient and environmentally beneficial technology for bio-energy production. The biogas yield mainly depends on the composition and the biodegradability (under anaerobic conditions) of the waste. Beside energy production, the digestion of organic waste has some advantages including the reduction of odour release, decreased level of pathogen and of mineral fertilizer. The result reveals that bird droppings with animal manure mixture (used with food & kitchen waste) produces biogas 576 ml/gm kitchen waste at mesophilic condition.

Key words: Biogas plants, anaerobic digestion (AD); microorganisms; biodegradable kitchen and food waste; biogas from food waste; mesophilic

P127: ENVIS: A PLATFORM FOR ENVIRONMENT EDUCATION AND AWARENESS

Babita Kumari, Sunil Tripathi, Diwakar Saini, Amrita Awasthi, Vineeta Yadav, Vivek Srivastava

CSIR-National Botanical Research Institute, Rana Pratap Marg, Lucknow-226029, U.P. Email: babita.bit86@gmail.com

ENVIS, a program controlled by MoEF&CC, is being run by different centers situated nationwide. ENVIS-RP-NBRI aware persons about the environment especially on 'Plant and Pollution' through its website and outreach activities. This center also provides the knowledge of plant species suitable for planting to mitigate pollution at different sites; Roadside, Road divider, Greenbelt and Indoor through its developed app 'Green Planner'. Besides these awareness programs, ENVIS-NBRI is also involve to skill the youth from different states on two important topics related to environment, i.e., 'Pollution Monitoring: Soil Pollution' and 'Greenbelt Development for Industries' under the Green Skill Development Program (GSDP).

Key words: ENVIS; Awarness; Green Planner; Environment; Pollution

P128: REVIEW ON METHODOLOGIES FOR RECYCLING OF REFINERY WASTE SPENT CATALYST

Bansi B Kariya[1], Piyush B Vanzara[2]

[1]Lukhdhirji Engineering College, Morbi; [2]V.V.P. Engineering College, Rajkot

The catalyst used in refining processes gets deactivated in the due course of its utilization. The catalysts have to be regenerated after the catalyst activity decreases below its acceptable limit but this regeneration process is not always feasible because the activity of catalysts may decrease at very low level after few cycles of regeneration and spent catalyst are abandoned as solid waste. The treatment, transportation, storage or disposal of spent catalyst need

permit of environment regulation as spent catalyst is hazardous in nature. The spent catalysts are one of the cheap sources of metals such as Mo, Co, Ni, Va, etc. In this paper methods such as alkali leaching, acid leaching, chlorination, bioleaching, roasting with salts are used at laboratory scale is reviewed.

Key words: Spent Catalyst; regeneration; leaching; roasting

P129: SCREENING OF SECONDARY METABOLITES PRODUCED BY *STREPTOMYCES* SPECIES FROM THE SOIL SAMPLE FOR THEIR ABILITY TO PRODUCE ANTI – NEMATODAL, ANTIPROTOZOAL AVERMECTINS

P.G. Magdum, BA Jagtap, TM Jadhav, RJ Sharma

VPASC College, Baramati
Email: headbiotechdivision@gmail.com; rajesh_vpascc@yahoo.com

Many microorganisms indigenous to the soil, especially actinomycete namely Streptomyces species, produce biologically active secondary metabolites. The avermectins are newly characterized compounds with herbicidal, insecticidal, and active against certain nematodes and arthropods at extremely low doses, but have relatively low toxicity to mammals. Avermectins act on invertebrates by activating glutamate-gated chloride channels in their nerves andmuscles, disrupting pharyngeal function and locomotion. The study involves isolation, characterization of *Streptomyces species,* insulting them with nematodes, protozoa, eliciting them to produce secondary metabolites in broth. Purifying and assessing its anti – nematodal and antiprotozoal activity by bioautography.

Key words: Avermectin; Streptomyces; Bioautography

P130: APPROACH TOWARDS SOLID WASTE MANAGEMENT

Bhagyashri Adsul, Sachin Kulkarni[1], Rajesh Sharma[2]

VPASC College, Baramati
Email: headbiotechdivision@gmail.com; rajesh_vpascc@yahoo.com

Municipal wastes in India are about 75 to 85% organic. Uncontrolled dumping of waste is major health concern. Degradation by use of microbes is safe, efficient and economic. Enzymatic secretion by microbes as concern with biodegradation is an important strategy to overcome over waste related problems. Samples were collected from dumping ground and inoculated on biodegradable waste such as kitchen waste, garden waste and temple waste. The obtained inoculums where treated with biodegradable waste. After 45 to 60 days degraded compost where identified for several parameters such as physical, biochemical and chemical. The compost produced had a dark colour and volume of waste was produced. Amylase, protease and cellulase secretion of isolates indicate the ability to degrade waste. PH, N, organic carbon and moisture content where identified which are required to enhance soil fertility.

Key words: Municipal solid waste; degradation; microbial isolates; waste management; soil fertility

P131: ENERGY BUDGET OF AGRICULTURE SYSTEM OF MID HILL OF KUMAUN HIMALAYA

Bhawana Soragi, Subrat Sharma, Anil Kumar Yadava

G. B. Pant National Institute of Himalayan Environment and Sustainable Development
Kosi-Katarmal, Almora, 263 643 Uttarakhand
Email: bhawanasoragi4@gmail.com

About 75% of the total population of Uttarakhand State is dependent on the agriculture for their livelihood. Terraced slops covers about 80% of the hill agriculture land, which is completely dependent on the rain, whereas remaining 20% area lies in the valleys and plains,

which is fairly irrigated. Traditionally mixed cropping was done in the region with the help of organic fertilizers but with the passage of time farmers started intensifying the crops by ignoring the mixed cropping and organic fertilizers.The consistent supply oflabour and energy are the most significant requirements for substantialgrowth of agricultural productivity in Himalayan region. The annual energy input in agriculture was evaluated in terms of seed, labour (human and animal) and organic manure. Energy input in the form of manure accounted>90% of total energy input, while other inputs (<10%) are contributed in the formof seeds, and animal and human power for all the crops. Among the crops, manure and seed input was found maximum for wheat. Among the different inputs, human labour input ranged from 0.05 to 2.60 Gkcal and bullock labour from 0.02 to 1.28 Gkcal. The total energy output ranged between 1.39 to 39.74 G kcal for the different crops. The agronomic yield was highest for wheat and lowest for lentil. It was also observed that crop by- product values were more than agronomic yield values. The Agronomic yield in rainfed fields for the wheat (4.81Gkcal), Mustard (1.10Gkcal), Barley (1.30Gkcal), Finger millet (0.70Gkcal), Barnyard millet (1.32 Gkcal), Red kidney bean (2.04 Gkcal), Horse gram pulse (0.24 Gkcal) and Lentil (0.22 Gkcal). The study also highlighted the significance of traditionalcrops and factors responsible for their declining cultivation in themountain region.

Key word: Agricultural system; Cropping pattern; Crop cultivation

P132: TOWARDS THE SUSTAINABILITY: INVENTORY, DIVERSITY, USE OF EDIBLE WILD INSECTS IN SELECTED PARTS OF MEGHALAYA

Daniella Lamare[1], Mukesh Thakur[2], Randeep Singh[1]

[1]*Amity Institute of Forestry and Wildlife, Amity University, Noida, Uttar Pradesh, India*
[2]*Zoological Survey of India, Prani Vigyan Bhawan, M-Block, New Alipore Kolkata-700053*
Email: lamaredaniella9@gmail.com; randeep04@rediffmail.com

Wild edible insects are an important source of food and a part of traditional cultural practices of the tribal communities in Meghalaya. These insects are normally used by the tribal community and very little knowledge of them has been documented as to how valuable they can be in a diet. The present study was undertaken to collect, document and identify different wild edible insects found in Meghalaya and how they are being consumed or used by the local and tribal communities in the select part of Meghalaya India. The climate of Meghalaya is generally mild; warm and temperate. The state is inhabited by three main tribes - Khasis, Jaintias and the Garos. Inventory of the wild edible insects was conducted through a well structured questionnaire. The results revealed that wild edible insects were consumed by the local and tribal communities which belongs to the orders Lepidoptera (29%), Coleoptera (21%), Hemiptera (14%), Blattodea (7%), Diptera (7%), Orthoptera (7%), Odonata (7%) Hymenoptera (4%), Isoptera (4%), and one species of Isopoda. This study showed the importance of wild edible insects in a diet of local tribes and usefulness in relation to culturally and traditionally.

P133: PREPARATION AND CHARACTERIZATION OF ACTIVATED CARBON (A LOW-COST BIOSORBENT) FROM TAMARIND SEED COAT FOR THE REMOVAL OF FLUORIDE FROM AQUEOUS SOLUTIONS

Dasaiah Srinivasulu, Pavan Kumar Pindi

Department of Microbiology, Palamuru University, Mahabubnagar-509001, Telangana
Email: pavankumarpindi@gmail.com

The present work focuses on the effective removal of fluoride from aqueous solutions by *Tamarindus indica* activated seed coat. Batch biosorption experiments were carried out and the results revealed that biosorbent established the capacity to adsorb fluoride from aqueous phase. Fluoride biosorption was found to be reliant on the aqueous phase pH for fluoride uptake. The physicochemical properties of the biosorbent were examined using Fourier Transform Infra red spectrum and Scanning Electron Microscopy. Findings revealed that *Tamarindus indica* activated seed coat biomass can be used as an effective, for the removal of fluoride from aqueous solution as well as groundwater.

Key words: Biosorption; dose; contact time; initial fluoride; kinetics; Isotherms.

P134: BIOREMEDIATION OF ARSENIC THROUGH ITS CONVERSION TO LESS TOXIC FORMS USING A NOVEL BACTERIUM UNDER *in Vitro* CONDITIONS

D. Sengupta, D. Sardar, S. Chakraborty, S. Sadhukhan, S. Paul, A. K. Mitra

St. Xavier's College, Kolkata

Arsenic infiltration from soil to wateradversely affects human health and environment. Bioremediation by a novel extremophile S6C2, a firmicute, efficiently remediates arsenic by uptake, sequestration and changing it to less toxic arsenite forms.Phase transition reportedly producedmethylated arsine speciesvia a complex chemical reaction. A best fit condition for As

uptakeand metal mediated surface adsorption through isotherm studies were shown. Ribotyping revealed the extremophile to be *Exiguobacterium indicum.* Tolerancestudiesshowed high tolerance towards arsenic. Chemotrapping method to trap the volatilized arsine gases(methylated non-toxic forms of arsine gas). Its assay was done and reported in vitro.

Key words: *Exiguobacterium indicum*; Strain DSAM 62; Arsenic; Bioremediation; Arsine gas; Chemotrapping

P135: EASY AND LOW COST HOMEMADE SOLAR COCKER

Deepjyoti Deka, Faridul Islam, Dipankar Saharia, Ranjan Sarma

Department of Physics Mangaldai College, Mangaldai College, Assam, India

Email: Djdeka101@gmail.com

For food production people generally using LPG, fire wood etc. In this work we have contracted a simple solar cocker by making the use of a container, mirror, aluminum foil and a clear mirror which is found to be very cost effective as well as quite efficient.

Key words: Mirror; Black glass sheet; Prepare food; solar energy

P136: ELECTRICITY PRODUCTION FROM CONSERVED RAIN WATER

Dipankar Ojha, Simanta Saharia, Kangkan Sarmah

Department of Physics, Mangaldai College, Mangaldai-784125, Assam, India

Email: dipankarojha94@gmail.com

Rain water harvesting is a familiar process. Usually we used this conserved water for our household used to fulfill the needs of water. But we can use to the conserved water to produce electricity also. Here we are using the potential energy of the conserved water to produce electricity which is efficient for everyone.

Key words: Rain water harvesting; energy; waste material; agricultural use

P137: REMOTE SENSING AND GIS STUDY FOR CURRENT SCENARIO OF GANGA RIVER WATER POLLUTION IN KANPUR CITY, U.P., INDIA

Droupti Yadav, Aman Kumar Pal

Department of Environmental Science, I.B.S.B.T., C.S.J.M. University (Campus), Kanpur Nagar, U.P. India
Email:droupti.yadav@gmail.com

Ganga River is famous for its purity and its dynamic nature throughout the world. Ganga River and its tributaries is the lifeline for ground water recharging zones, water potential zones, biodiversity zones and eco-sensitive zones for the state of Uttar Pradesh and many other states of India. This technology also help in mapping and monitoring of the major environmental issues like pollution, disaster, infrastructure development in urban and rural areas (i.e. metro, railways, roads, hospitals, waste management sites, rehabilitations centre, waste collection sites, rain water harvesting stations, biomedical waste sites, eco-clubs etc.), population explosion, global warming, ozone depletion, sea level rise, glacier melting, change detection of land use/ land cover, etc. This study provide the zones of waste dumping along the Ganga river in Kanpur city through the RS & GIS and mapping of various causes of Ganga river water pollution over the period of time. RS & GIS based studies can be done easily and provide unbiased solutions for any environmental problems at local, regional, national and global level for sustainable development of any area. In the current study with the limited field checks and evidences on real time basis the major findings shows that continuous efforts of Government, non government organizations and individual is needed to understanding the futuristic planning and approach for clean Ganga movements. It would also help in shaping the initiative in positive directions and accountability of individuals towards clean Ganga achievement for sustainable development.

Key words: RS & GIS technology; Ganga River; Pollution; Sustainable development

P138: INTENSIVE STUDY OF HINDON AND KALI RIVER AT UTTAR PRADESH, INDIA BY USING POLLUTION INDEX AND ENVIRONMETRICS

Gaurav Singh[1,2], Neelam Patel[2], Tanu Jindal[1], Manju Rawat[1], Sumit Pal[2], Swatantra Kumar Dubey[3]

[1]Amity Institute of Environmental Sciences, Amity University Uttar Pradesh, Noida; [2]Water Technology Centre, ICAR-IARI New Delhi 110012; [3] Department of Earth and Environmental Sciences, IISER Bhopal - 462066
Email: singhgaurav.env@gmail.com

The pollution of the surface water bodies; especially rivers with heavy metals have been attracting considerable public attention over the past few decades. River Hindon and its tributary Kali are most important source of water for the urban and rural population of western Uttar Pradesh, India. Therefore, an intensive study was accomplished to assess the spatial and temporal variation of river water quality by determining environmental variables and heavy metal concentrations. The monitoring was done for the period of two consequent summer and winter season in 2017 and 2018. Ten sampling sites in Hindon and seventeen sampling sites in Kali River have been selected for sampling to emphasis on point and non point sources in whole river stretch. Environmental variables viz pH, EC, TDS, turbidity, BOD, COD, TA, TH, Ca, Mg, Na, K, HCO_3, Cl, SO_4, NO_3, PO_4, F, B and heavy metals i.e. Fe, Mn, Zn, Pb, Ni, Cu, Cr & Cd were analyzed. The relationship among measured environmental variables, water quality index (WQI), pollution index were examined. Apart from this, environmetrics such as principal component analysis (PCA) and cluster analysis (CA) were also investigated to assess the spatial-temporal variation in water quality to recognize the current pollution sources as well as validate the results. Present intensive studied indicate that Hindon and its tributary Kali are moderately polluted in upstream site in Saharanpur and further highly polluted in Muzaffarnagar, Meerut onwards. The result also reveals that water of the Hindon and Kali River is unfit for human use, irrigation and other life supporting activities which are mainly on account of direct discharge of untreated wastewater by industries

and municipal sources. Study suggested that there is an urgent need for proper management of safe disposal of effluents and their treatments to restore the river water quality.

Key words: Hindon; Kali River; environmental variables; Water Quality Index (WQI); Principal Component Analysis (PCA); Pollution index; Heavy Metals

P139: VERTICAL GARDENING: A FUTURE NECESSITY?

Himani Gaikwad, Kirti Sharma

University School of Environment Management, Guru Gobind Singh Indraprastha University, Dwarka, New Delhi, India
E-mail: himani.needhi@gmail.com

With the coming of modernization and urbanization, individuals are moving from rural to urban territories, thereby, urban populace is expanding step by step bringing about clogged urban areas and towns. All around the globe, countless structures are being developed adding many more in future. Urban landscaping is picking up fame these days as individuals are becoming more cognizant about green and clean condition. In 21st century, individuals are gradually starting to understand the need of green architecture where new aspects and innovations rose as far as green buildings. Breathing land into life and life to land is the need of the time and the progress from grey to green walls is just conceivable via landscaping. Since, there is no extent of horizontal expansion and only vertical space is accessible which can be changed over to vertical gardens. It will expand carbon capture and better climate change adaptation. Vertical gardens are also known as Green wall, Living wall or Bio wall.

Key words: Urban landscaping; Green wall; Green facades; Vertical gardens; Urbanization; Green architecture; Degradation.

P140: INNOVATIVE PLASMA TECHNOLOGY FOR TEXTILE PROCESSING AND WATER MANAGEMENT

Jayashree Venkatesh, KN Ninge Gowda

Department of Apparel Technology and Management, Bangalore University, Bangalore - 560001, India
Email: venkatesh.jayashree@gmail.com

The objective of eco-friendly textile processing is not only to use organic and nontoxic materials but also to reduce the consumption of water resource. Plasma treatment is a completely dry treatment that does not require any water. Further, this waterless treatment also enhances comfort property and product functionality. Plasma treatment is one of the innovative and versatile possibility capable of providing a large variety of processes by employing the different attributes of argon gas plasma for better comfort properties and managing water consumption in processing and dyeing. To study this yarn of 20 tex of pure bamboo knitted into single jersey fabrics was subjected to argon plasma treatment. The duration of the argon treatment has an effect on the surface modifications of fabric without altering the bulk characteristics. The duration of treatment on the comfort properties of 100% bamboo knitted fabrics was found to be insignificant. The SEM micrographs indicate that 20 minutes increases the etching, cracks, groves and crevices on the surface of the fibre which acts as an insulating medium inside the knitted structure of the argon plasma treated fabric and hence the treatment time tends to increase the thermal resistance of fabric. The paper also contributes to the water management and sustainable design area by providing an explanation of the product specific properties and attributes for niche items in infant clothing category.

Key words: Air resistance; Comfort property; Plasma treatment; Thermal resistance; Sustainable design; Textile; Water management

P141: SOLAR PV PLANT RE-POWERING: MISSION TRANSFORMATION

Jitendra K Sen, Ashish Nayyar, Dinesh Kr Sharma

Department of Mechanical Engineering, Swami Keshvanand Institute of Technology, Management and Gramothan, Jaipur (Rajasthan) India
Email: jitendrakumarsen@tvmpower.com

India is blessed with abundant soar energy (over 5000 trillion KWh/Year) which is many times more than the total energy consumption of the country, and if harnessed efficiently, the country is capable of producing trillion-Kilowatts of electricity. Solar energy is extremely beneficial as it is non-polluting and its generation can be decentralized. There is need to come together and take initiatives to create technologies for a greater use of these sources to combat climate change by reducing the emission of greenhouse gases. There are two basic type of solar PV plant repowering. The First is for existing plant and second is for extending the life of new plants at the end of their initial design life which is projected at about 20 to 25 years. In this study the solar PV plant design aspects along with its annual performance is elaborated. The various type of power losses (temperature, internal network, power electronics, grid connected etc.) and performance ratio are also calculated. The performance result of the plant are also compared with the simulation values obtained from PV-syst and SAM software. Building a robust system id somewhat at odds with building a cheap least cost system. The advantages are O&M labor and project risk are reduced as potential income is increased while dramatically reducing system defects, faults and failures. In other words, they have a superior plant availability throughout their life cycle. The growing energy demand in developing nations has triggered the issue of energy security. This has made essential to utilize the untapped potential of renewable resources. Grid connected PV System have become the best alternatives in renewable energy at large scale. Performance analysis of the grid connected plant could help in designing, operating and maintenance of new grid connected systems.

Keywords: Energy Security; Photo-Voltaic (PV); Re-Powering; PV Simulation Software; SAM; Performance Ration; Grid Connected PV System

P142: DECOMPOSITION AND CARBON RELEASE PATTERNS OF LEAF LITTER IN FIVE HOMEGARDEN TREES SPECIES IN KUMAUN HIMALAYA, INDIA

Kiran Bargali

Department of Botany, DSB Campus, Kumaun University, Nainital- 263002 (Uttarakhand)
Email: kiranbargali@yahoo.co.in

Leaf litter decomposition and carbon release pattern was assessed using litter bag technique in five homegarden tree species viz. *Ficus palmata, Ficus auriculata, Ficus hispida, Grawia optiva* and *Celtis austalaris*. In comparison to other species, *Ficus hispida* decomposed faster (150 days), while *Grewia optiva* took the longest time to decompose (210 days). The monthly relative decomposition rate (RDR) was maximum in *Ficus hispida* (0.009-0.02 $g^{-1}d^{-1}$) and minimum in *Grawia optiva* (0.008-0.004 $g^{-1}d^{-1}$). Carbon in the remaining litter was in the order *Ficus auriculata* (2.44 %) >*Ficus hispida* (2.43%) > *Grawia optiva (*1.90%)> *Celtis austaralis* (1.63%) >*Ficus palmata* (1.07%). Weight loss and time elapsed showed significant negative correlation with carbon release pattern. The productivity and yields of the food crops increased with additions of organic matter as mulching, which can contribute to sustainable soil fertility in homegarden agroforestry practices.

Key words: Decay coefficient; Litter decomposition; Mulching; Relative decomposition rate; Homegarden agroforestry.

P143: FLUORIDE REMOVAL FROM GROUNDWATER BY ADSORPTION ON BIOWASTE

Mahiya Kulsoom, Narendra Kumar

Department of Environmental Sciences, Babasahib Bhimrao Ambedkar University, Lucknow
Email: kulsoom.mahiya154@gmail.com

Fluoride is one of the essential micro-nutrient forhuman body,very trace amount of fluoride is beneficial for healthy bones and teeth inhuman body. Excessive fluoride in fresh water influences the metabolism of elements such as Caand P thus causing dental and skeletal fluorosis. The World Health Organization recommends from 0.5 to 1.5 mg/L in drinking water.Biowaste from agriculture, wheat straw, activated bagasse carbon of sugarcane,microalga like *Spirogyra*, waste funguscould be developed into a filtration technologythrough adsoptionforF⁻removal asan effective and eco-friendly method which is simple in design and operation.

Key words: Fluoride; biowaste; adsorption; groundwater

P144: DIVERSITY, DISTRIBUTION AND ABUNDANCE OF INSECTS IN PALLASSENA VILLAGE, PALAKKAD DISTRICT, KERALA, INDIA

N.Narmadha, M. Lekeshmanaswamy

PG & Research Department of Zoology, Kongunadu arts and science college (Autonomous), Coimbatore-641029, Tamil Nadu, India
Email: narmadha12121995@gmail.com

Insects are the world's most diverse group of animals on earth, in terms of both taxonomic diversity and ecological function. Insects represent the vast majority of species in terrestrial and freshwater ecosystem. They have adopted for almost every conceivable type of

environment from the equator to the arctic and from sea level to the snowfield of highest mountains, on land, in air and water and almost everywhere.The present study was carried out to document the insect species diversity, distribution and abundance in Pallassena Village, Palakkad district, Kerala from October 2018 to July 2019. A total of 70 species of insects belonging to 24 families with 8 Orders were surveyed.The order Lepidoptera has 8 families Nymphalidae, Papilionidae, Pieridae, Lycaenidae, Riodinidae, Hesperiidae, Erebidae, Geometridae with a total of 52 species of individuals which forms the dominant order were recorded followed by the order Coleoptera with 6 families Curculionidae,Caantharidae, Scarbacidae, Melodiae, Coccinellidae, Chrysomelidae and 7 individuals of insect species, Order Hymneoptera contains four family, Formicidae shows species, Myrmicinae family shows one species, family Apidae and Vespidae has two species, Order Hemiptera has 2 family with two individuals Mantidae family and Membracidae family, Order Orthoptera has 1 family. Family Acrididae with one individuals, similarly Order Diptera contains one family with one species Bibionidae family, Order Mantodea contains one family, Pentatomidae family one species, Order Odonata has one family. Coenagrionidae family with one species. The present study also recorded maximum insect species in Agro ecosystem (n=972) insect species followed by Open field with (n=869) species, Residential area has the minimum of insect species with (n=740) of insects. All the Orders of the families shows Diurnal activity expect the families Erebidae and Geometridae belonging to the order Lepidoptera shows the Nocturnal activity. According to monthly wise abundance, maximum of 387 species in the month of December where as 104 species in May were observed during the study.

P145: ECOLOGICAL NICHE MODELLING FOR PREDICTING THE POTENTIAL DISTRIBUTION OF THREATENED MEDICINAL AND AROMATIC PLANTS (MAPS) OF ALPINE REGION OF UTTARAKHAND, WESTERN HIMALAYA

Naveen Chandra[1], Gajendra Singh[1], Shashank Lingwal[1], M.P.S. Bisht[1], L.M Tewari[2]

[1]Utttarakhand Space Application Centre, 93/2, Vasant Vihar, Dehradun
[2] D.S.B Campus, Kumaun University, Nainital

Species distribution models (SDMs) are increasingly being used to understand rare and endangered species distribution, as well as the environmental pressures affecting them. Detailed knowledge of their distribution is critical for reporting its conservation status and provide the relevant information to management practitioners. In the present paper, we examine the potential distribution (niche) of ten threatened medicinal and aromatic plants (MAPs) (eg., *Aconitum heterophyllum, A. balfourii, Fritillaria roylei, Arnebia benthami, Picrorhiza kurroa, Pleurospermum angelicoides, Jurinea dolomiaea, Euphrasia himalaica, Bergenia stracheyi* and *Podophyllum hexandrum*) using MaxEnt modal. Landsat 8 data was used to generate various geospatial environment layers *viz*., slope, aspect, elevation, land use/land cover, vegetation types and geomorphology. Other then the geospatial variables Worldclim bioclimatic variables were used to predict the potential distribution of these species in 7833 km^2 (3000-5300 m) area of the state. To assess the availability of threatened MAPs species Rapid Mapping Exercise (RME) was carried out in 50 alpine meadows different habitats and laid 500 plots in 50 transects. The Occurrence data of the species achieved through extensive field survey/sampling (Rapid Mapping Exercise) during 2016-19 and from secondary sources (literature and herbaria). Jackknife test was used to evaluate the importance of the environmental variables for predictive modelling. Results revealed that all the species showed maximum preferable area in *Danthonia* grassy slopes, herbaceous and shrubbies habitats in west, east and south-east aspects between 15-35^0 slopes and 3000-4100m asl. The niche specificity of species has been argued to be one of the reasons of its limited distribution. Among the ten threatened species, the preferred

area at 0.7-1 (suitability value) covered maximum by *P. kurroa* (577 km^2) followed *by B. stracheyi* (422 km^2), *P. hexandrum* (395km^2), *J. dolomiaea* (319km^2), *E. himalaica* (313km^2), *F. roylei* (143km^2), *A. heterophyllum* (140km^2), *P. angelicoides* (135km^2), *A. benthami* (106km^2) while minimum is covered by *A. balfourii* (100km^2).The results show that five variables namely, aspect, slope, vegetation type, mean diurnal range and precipitation of wettest month are significant factors determining their suitable habitats. Based on field surveys the availability of threatened species range minimum (0.2 individual/m^2) for *A. benthami* and maximum for *J. dolomiaea* (6.8 individual/m^2) respectively. The findings can be applied in identification of additional localities where these threatened species may already exist, but has not yet been detected; the recognition of localities where it is likely to spread to; the priority selection area for reintroduction, cultivation and management of these species.

Key words: Niche modeling; Medicinal plants; Distribution; Alpine habitat

P146: PERTURBATIONS IN SEASONAL VARIATIONS OF DIATOM ASSEMBLAGES IN HYDROPOWER IMPACTED RIVER ALAKNANDA

Prakash Nautiyal, Neetika Sharma

Dept. of Zoology & Biotechnology, HNB Garhwal University, Uttarakhand
Email: neetika185@gmail.com

Owing to glaciers at source and monsoonal climate, the hydrology of Alaknanda varies seasonally. Power generation requirements cause abrupt fluctuations in discharge of serially impounded Alaknanda R. Eight sites were selected within and outside project area (HEP) to study the seasonality in diatom assemblages. The assemblages exhibit bare minimum seasonality; winter (intermittent) and monsoon at S3, early summer at S4, mid-winter to mid-summer at S5 and none at S8. These were considered as perturbations attributed to discharges held and released for generating electricity, hinting at unstable nature of communities in the river ecosystem impacted by serially impounded Alaknanda.

Key words: Diatoms; assemblages; seasonality; serial impoundment; Alaknanda

P147: MITIGATION OF PLASTIC WASTE BY USING FUNGUS

Nitesh Verma, Sharmita Gupta

Department of Botany, Faculty of science, Dayalbagh Educational Institute (Deemed University) Agra, Uttar Pradesh 282005
Email: drsharmitagupta123@gmail.com

Plastic is a broad name to all different forms of synthetic polymer which we use frequently in our everyday life. The indiscriminate use of polythene subsequently generates large quantities of waste in environment. Now a days it is very difficult to find an area that is unaffected by polythene waste. Numbers of different methods are used to get rid of this waste but problem still remains unsolved. One of the method is to use soil microorganisms to mitigate the polythene waste. In this study microbial degradation of LDPE was done in synthetic media for one month. Degradation of LDPE is analyzed through weight reduction, SEM and FTIR analysis. Degradation of LDPE by *A.terreus* is 8.1% after one month.

Key words: Biodegradation; LDPE; Synthetic media

P148: FOREST FIRES IN NORTH-WEST HIMALAYA: CASE OF PINE DOMINATED DISTRICT IN UTTARAKHAND

Nisha Bisht

GB Pant National Institute of Himalayan Environment and Sustainable Development Kosi-Katarmal, Almora, 263643 Uttarakhand
Email: nishaabishtt52@gmail.com

Uttarakhand, one of the mountainous states of north-western Himalaya, occupy 53,483 km^2 area, of which 86% is hilly and ~45% is under forest cover. Wildfiresareone of the major risks to the forests of this hilly state, and such fire events cause various damages to wildlife, flora, economy, and also to the local and reginal climate. Sal (*Shorearobusta*) in the foothill zone, and Pine (*Pinus roxburghii*) dominated forests in mid altitude zone are most

vulnerable forest types in the Uttarakhand state, however, in extreme years forests of high altitude are also affected by wildfires. Uttarakhand has preponderance of pine on the forested landscape which contribute to nearly 30% of the forested landscape, and together with Sal this contribution reaches to 52% of the total forest cover. These forests have witnessed maximum number of wildfire incidences in Uttarakhand in the last decade (2010-2019).Various attributes of wildfires (number, area affected, economic loss, etc.) werecollected for districtAlmorafor the last 10 year (2010-2019, and analysed for frequency, distribution, type, and per unit area loss, and type of management (van panchayat, reserve forest, civil forest), etc.Forest fire events variedconsiderably between the years 2010(90), 2011(5), 2012(32), 2013(5), 2012(32), 2013(5), 2014(25), 2015(8), 2016(116), 2017(54). Pre-monsoon months (late March to June) are considered fire season in this part of Himalaya. However, various mechanisms for fire protection and mitigation exists, there is need to strengthen the community linkages to prevent the wildfire.

Key words: Forest Fire; Pine Forest; Burnt area; Uttarakhand

P149: STUDY ON FLUOROSIS AND ITS REMEDIAL MEASURES USING GREEN TECHNIQUES IN SOME FLUOROSIS AFFECTED VILLAGES OF RAJAULI BLOCK OF NAWADA DISTRICT, BIHAR

Anil Kumar Singh, Peeyush Kumar

Department of Chemistry, A.N. College, Patna
Email:peeyush.kumar90@gmail.com

Fresh water is one of the most important resources needed to maintain life.However due to natural reasons and human activities the ground water has got contaminated in some places. The groundwater of some villages of Rajauli Block of Nawada District , Bihar has high concentration of fluoride.In most of the sources the level of fluoride is more than the permissible limit of 1.5mg/L. The water sources of Hardia Sector D, Singer Khas, Hanuman Nagar and Bhaunr are highly Fluoride contaminated.This has resulted into a medical condition called Fluorosis in the people living there. All the three types of Fluorosis- dental fluorosis, skeletal

fluorosis and non-skeletal fluorosis have been reported in the people living in these areas. The use of certain plants like Chakora(Cassiatora) and Drumstick (Moringa) as a nutritional supplement by the people has led to reduction in the severity of fluorosis.

Key words: Contaminated; fluoride; fluorosis; Cassia tora; Moringa; nutritional supplement

P150: REJUVENATION OF WATER BODIES BY ADOPTING NATURAL AND ENGINEERING TOOLS TO RECHARGE CATCHMENT AREA

Prachi, Ramandeep Kaur Arora

University School of Environment Management, Guru Gobind Singh Indraprastha University, Dwarka, Delhi – 110078, India
E-mail: prachivats1996@gmail.com

Rivers have environmental, social and economic significance despite this, yet they are continuously being neglected. Today the country is facing water crisis due to loss of watershed, lack of groundwater recharge, and deterioration of rivers, population increase, decreased precipitation and its improper consumption .Therefore, there is cry for improving the health of the rivers. Rejuvenation and revival of the rivers today is of utmost important to mitigate this problem. So, approaches like identification of recharge area, runoff collection in harvesting structures and artificial recharging of the groundwater are used for the rejuvenation purpose and to mitigate the water threat.

Key words: Water; Rivers; Recharge; Demand; Rejuvenation; Precipitation

P151: ROLE OF BIOINDICATORS IN ASSESSMENT OF ENVIRONMENTAL POLLUTION

Prashant Kumar[1], Pappu Kumar Rai[2], Umesh Kumar[3]

[1]Deptt. of Zoology, Ram Jaipal College, Chapra(J.P.U College Chapra); [2]Deptt. of Zoology, P.R. College, Sonpur; [3]Deptt. of Education, Govt. of Bihar

Naturally occurring Bioindicators are used to assess the health of the environment and are also an important tool for detecting changes in the environment. Bioindicators are living organism such as plants, planktons, animals and microbes, which are utilized to screen the death of the natural ecosystem in the environment. In this paper we have tried to explain the concept behind Bioindicators and Plankton. The health of aquatic flora is best reflected by plankton which acts as early warning signal.

Key Words: Bioindicators; alage; mosses microbes; Radioactive elements

P152: SEED GERMINATION AND GROWTH PERFORMANCE OF *PAEONIA EMODI* IN DIFFERENT ORGANIC MANURE UNDER DIFFERENT MICROCLIMATIC CONDITIONS IN WESTERN HIMALAYA

Praveen Joshi[1], Prem Prakash[2]

[1]G. B. Pant National Institute of Himalayan Environment & Sustainable Development, Kosi-Almora, Uttarakhand; [2]M.B.P.G. College Haldwani, Kumaun University, Nainital, Uttarakhand - 263139

Present study was conducted to assess the regeneration potential of *Peaeonia emodi* seeds and their growth performance under different microclimatic conditions (polyhouse, shade-net and open). Further, germination and growth performance was also assessed with the application of organic manure (i.e. biocompost and vermicompost) under different microclimatic conditions. Mature and dry seeds of *P. emodi* were collected from natural

population. The results reveal highest germination percentage (48.2±1.6%) under shade-net and minimum (32.2±2.4%) in open condition. Ten healthy plants of *P. emodi* were randomly selected for measuring growth performance. Maximum plant height (19.9±0.5 cm) and stem diameter (0.65±0.01 cm) was recorded under polyhouse condition. Furthermore, germination percentage (70.0±1.2%) and plant height (21.1±0.5 cm) were observed maximum with the application of biocompost. Above ground (10.8±0.4 gm) and below ground (9.7±0.19 gm) fresh weight were found maximum under shade-net while minimum in open condition. This study suggested that cultivation of *P. emodi* under protected condition using organic manures is most viable technique for large scale multiplication. Increased supply of nutrients due to various treatment and favorable soil environment created by the application of organics manures could have proportionately enhanced the growth which resulted in maintaining the plant quality under different treatments.

Key words: *Paeonia emodi;* germination; organic manure; polyhouse, shade-net

P153: USE OF WASTE PAPERS & SURGICAL BANDAGES ALONG WITH WASTE PLANT FIBERS TO MAKE HANDMADE PAPERS AND EMPLOYMENT GENERATION FOR RURAL PEOPLE

Rohit Shukla, Anupam Dikshit

Centre of Science and Society, IIDS, University of Allahabad, Prayagraj - 211002
Email: shuklarohit2792@gmail.com

Waste paper, industrial waste surgical bandage and waste plant fibers is one of the utmost types of solid waste that are dumped in huge quantities in rural area of India per year. This waste material become a saddle of Indian rural areas and creates environmental hazards. On the other hand, the waste management system is not so strong in Indian rural areas. Therefore, recycling of these wastes is the alternative option to reduce this saddle because handmade paper industries are best source to convert waste into wealth. However, there are a few small papers recycling options and factories in rural area of India and they linger as an informal sector because of high cost and lack of investment. To overcome this situation,

eco-friendly handmade paper production would be the effective solution. Therefore, it is requisite to develop a low cost method of handmade paper production from waste materials which is amassed from the rural areas of India that would be the economical and environment friendly recycling option. The objective of the study was to develop a low cost method for waste papers, surgical bandages and waste plant fibers recycling which is amassed from rural area of India. In this study, eco-friendly handmade paper production method was initiated. It was found that the range of thickness of produced handmade paper is from 0.129 to 0.1435 mm. On basis of thickness other characteristics or parameters of produced handmade paper such as GSM, burst index and tensile index are varied. GSM of this produced handmade paper is ranged from 250 to 350; burst index is ranged from 2.7 to 4 $kPam^2/g$ and tensile index is ranged from 55.13 to 65.53 Nm/g. It is also pointed that this method is very cost effective. On the basis of its production cost estimation; this method of handmade paper production requires low investment than the traditional paper making methods

Key words: Hazards; saddle; waste into wealth; lack of investment; eco-friendly handmade paper; low cost method; economical; GSM; environmental benefits

P154: NATURAL RESOURCES IN ENVIRONMENTAL DEGRADATION

SB Singh[1], Rakesh Kumar Ranjan[2]

[1]Department of chemistry, A.S College Bikramganj, Rohtas, Bihar
[2]School of Environmental Sciences, Jawaharlal Nehru University, New Delhi 110067
Email: kumaranish15@stu.upes.ac.in

This paper has attempted to document the many complexes linkages between human activities and its impact on the natural environment. A special emphasis has been given to the local resource management.

Key words: Biofuels; Sustainable development; Biomass, Local resource management.

P155: BIOREMEDIATION STUDY OF DAIRY EFFLUENT BY USING SPIRULINA PLATENSIS

Satish D. Kulkarni, Tejashri Auti

Department of Environmental Science, New Arts commerce and Science College, Ahmednagar-414001
Email: satishdkulkarni@gmail.com

Industrial pollution has been and continues to be a major factor causing the degradation of the environment around us, affecting the water we use, the air we breathe and the soil we live on. The exponential increase in industrialization. Spirulina Platensis cultivation in wastewater system is applicable for highly populated countries like India where waste is generated in high quantities and pose environmental problem. Spirulina Platensis species for domestic wastewater treatment was published in the year 1974 (Kosaric et al., 1974). Spirulina Platensis species were grown on large scale using secondary effluent of domestic wastewater treatment plant. According to Olguin et al., (2001) Spirulina Platensis has potential to reduce BOD of high carbon containing wastewater due to its mixotropic nature. The present study was concluded that the Spirulina platensis was cultivated on different concentration of dairy effluent yield better growth than control set and very efficient in COD/Phosphate/EC removal in all concentration. Study observed that chlorophyll, protein and carbohydrate content increases in Spirulina by using various concentration of dairy effluent as an alternative feed.

Key Words: Dairy effluent; Spirulina Platensis; Bioremediation; biomass growth

P156: PRODUCING BIOMASS UTILIZING ANTHROPOGENIC WASTE: ALGAE CAN HELP

Shantanu Kulkarni[1], Dishant Desai[1], Vinay Dwivedi[1], Hardik Chawada[1], Yogesh Chudasama[1], Debanjan Sanyal[1], Santanu Dasgupta[2]

[1]Research and Development, Reliance Industries Ltd, Jamnagar, India
[2]Research and Development, Reliance Corporate Park, Ghansoli, Mumbai, India
Email: debanjan.sanyal@ril.com

Industrially generated CO_2 and domestic sewage waste waterneed meaningful re-cycling towards creating a better environment. Microalgae has the potential to grow many times faster than land-based plant biomass utilizing these as nutrients. Nutrients in sewage waste water can reduce the dependency on fertilizers, thereby reducing the operational cost as well, during mass cultivation of algae. We have been conducting research on algae cultivation using anthropogenically evolved $CO_2$and sequestering itinto biomass. Lab scale study also showed that there was no significant difference in algae biomass growth between conventional cultivation media and primary sewage waste water.

Key words: Algae; CO_2; sewage; waste

P157: AGRICULTURAL LAND-SUITABILITY: AN ANALYSIS OF NALANDA DISTRICT, BIHAR

Shashi Sekhar[1], M Sahana[2], G Areendran[1], A Prakash[1]

[1]P.G. Department, Environmental Sciences, A. N. College Patna
[2]WWF-India, IGCMC-Division, New-Delhi

The analysis of Agricultural Land suitability is a way to assess the suitability of cropland. The aim of this study is to assessthe suitability of lands for agriculture in the Nalanda district of Bihar state. To acquire optimum benefit from landresources, it should beusedwisely with theproper management of cultivation techniques.Land suitability, assessment on Nalandadistrict

executed using the Analytical Hierarchy Process (AHP) method. Parameters likesoil textures, soil pH, slope degree, elevation, aspect, drainage density, river basin, distance to road (Euclidean distance) and land use land cover were used for the analysis of suitability of cropland. For determination of weights of each parameter, expert's opinions has taken, based on whichthe agricultural land suitability map was generated using a GIS-based model. In this study, we mark thatthere is economic and biologic productivity loss withunsustainable cropping patterns in irrigated land, which results from unscientific land uses with combination of anthropogenic activities and improper habitation such as soil erosion caused by water, deterioration of the soil's chemical,physical, biological and economic which ultimately leads to long-term loss of natural vegetation. One of the major problems of this district is loss of watershed function and other off-site effects.

Key words: Land Suitability; Suitability Parameters; GIS tools; AHP –Model

P158: REMOVAL OF METHYL VIOLET AND BRILLIANT GREEN DYES FROM AQUEOUS SOLUTION ON MAGNETIC/ ACTIVATED CHARCOAL/ Â-CYCLODEXTRIN /SODIUM ALGINATE POLYMER COMPOSITE GEL BEADS

Sushma Yadav, Anupama Asthana, Ajaya K. Singh

Department of Chemistry, Govt. V.Y.T. PG Autonomous College, Durg (C.G.)

The present work deals with the removal of hazardous water soluble cationic dyes like Methyl Violet (MV) and Brilliant Green (BG) from aqueous solution by the resulting new composite made up of magnetic (Fe_3O_4)/Activated charcoal(AC)/â-cyclodextrin(CD)/ Sodium alginate(Alg) polymer beads with excellent regeneration ability. The rate of adsorption was investigated under various parameters such as contact time, dosage, pH and temperature for the removal of these dyes. The removal rate of MV and BG was found 98.7% and 92.8% respectively. The adsorption kinetics of MV and BG were better described using a pseudo second-order model and Langmuir isotherm model showed a better fit to the equilibrium data of MV and BG. Most importantly, the adsorbent can be easily and efficiently regenerated for reuse with hardly any compromise of the removal rate.

Key words: Adsorption; Adsorption isotherm; Kinetics and nanocomposite

P159: ISOLATION, CHARACTERIZATION, AND APPLICATION OF *BACILLUS* SP. CTSI-07: CLIMATE CHANGE VIEWPOINTS

Swati Pattnaik[1], Devi P. Samantaray[1], Debasis Dash[2]

[1]Department of Microbiology, Odisha University of Agriculture and Technology, Bhubaneswar, Odisha, India; [2]Department of Botany, Odisha University of Agriculture and Technology, Bhubaneswar, Odisha, India

The contamination of soil with hexavalent chromium is a threat to agriculture and the environment. Hexavalent chromium resistant microbial-mediated fertilizers and polymers could impact on climate change by substitute chemical fertilizers and non-degradable polymer. *Bacillus,* the predominant soil bacteria are advantageous for their multifarious nature. On account of that, chromium resistant *Bacillus* sp. CTSI-07 was isolated from the Sukinda chromite mining site of Odisha and subjected to PGPR activities, biofilm & polyhydroxyalkanoates (PHAs) production. The *Bacillus* sp. CTSI-07 depicted ammonification; nitrogen fixation; siderophore; IAA, biofilm and PHAs production. These activities trigger plant growth; prevent infection; provide protection and increase the shelf life period of *Bacillus.* Additionally, PHAs production triumphs over the enslavement of petrochemical-based polymer; reduce CO emission, thereby protecting the environment.

P160: GREEN SKILL DEVELOPMENT PROGRAMME (GSDP) ON PREPARATION OF PEOPLE BIODIVERSITY REGISTER (PBR): A TOOL OF GENERATING LIVELIHOODS AND STRENGTHENING ACCESS AND BENEFIT SHARING MECHANISM

Vipin Chandra Sharma[1], Ravindra K. Joshi[2], Mahesha Nand[1], GCS Negi[1]

[1]G.B. Pant National Institute on Himalayan Environment and Sustainable Development, Kosi- Katarmal, Almora, Uttarakhand; [2]Wildlife Expert, Dharanaula, Almora, Uttarakhand

Even after 17 years of promulgation of the India's Biological Diversity Act, 2002, which mandates creation of Biodiversity Management Committee s (BMCs) and preparation of PBRs at the level of all the local bodies (village, block and district), more than 90% of BMCs are yet to prepare PBRs. Based on the scope and potential of generating livelihoods for youth in preparation of PBRs and meeting the objectives of Convention on Biological Diversity's Bon guidelines on Access to Genetic Resources and Fair and Equitable Sharing of Benefits Arising out of their Utilization, two courses (160 hours each) on Preparation of People's Biodiversity Register under GSDP were organized by the ENVIS Centre of GBPNIHESD in 2019 during the months of January (7-21) and February (12-26). Following the guidelines for the development of PBR of Uttarakhand State Biodiversity Board (USBB), an extensive curriculum comprising of onscreen deliberations (09 course modules) and hand's on and exposure visits (10 institutions) was developed. The course (s) ran across in Hawalbagh (07 villages) and Ramgarh blocks (02 villages) of Districts Almora and Nainital, respectively. A total of 35 persons (31 Male and 04 female) were trained from 11 districts of state Uttrakhand. It also engaged five trainees of PBR-I as master trainers for PBR-II, besides felicitating creation of BMC in village Papoli during PBR-I. In addition to the involvement of participants in preparation of PBRs (where being a part of Technical Support Group is mandatory) the skill sets attained/acquired during the course would be helpful to explore opportunities in different environment sectors.

Key words: GSDP; PBR; USBB and Technical Support Group

P161: PHOSPHATE SOLUBILISING POTENTIALS OF *TRICHODERMA* ISOLATES UNDER THE IMPACT OF SALINITY

Vishal Prasad and Shivani Chaudhary

Institute of Environment and Sustainable Development, Banaras Hindu University, Varanasi
Email: ways2good@gmail.com

The present study was aimed to evaluate phosphate solubilising potentials of isolates of*Trichoderma* under the influence of salinity. Three *Trichoderma* isolates characterised for phosphate solubilisation on Pikovskays's agar media exhibited clearing of media in comparison to the opacity of the control plate (without inoculation). Out of 3 isolates, 2 were *Trichodermaharzianum* (TH1 and TH2) and 1 was *Trichodermaviridae* (TV). All isolates also indicated production of organic acid in the media by producing a change in colour of the media from purple to yellow. When challenged with salinity (100 mM and 250 mM) in P-solubilising NBRIP media TH2 exhibited highest amount of soluble phosphate (18.16 mg/L) at 100mMNaCl concentration on 9th day of inoculation followed by TH1 and TV which showed significant amount of soluble phosphate under salt stress.

Key words: Phosphate solubilisation; Organic acid production; Salinity; *Trichoderma*

P162: PROMOTING CERTIFIED SEED PRODUCTION IN RAINFED AREAS AND AUGMENTING SOLAR POWERED IRRIGATION IN MOUNTAINS: A CASE STUDY FROM UTTARAKHAND

Ripu Daman Singh[1], Pankaj Tewari[2], Pratap S. Nagarkoti[3], S.K. Upadhyaya[3]

[1]Kumaun University, Nainital; [2]Aarohi, Satoli Nainital; [3]Central Himalayan Environment Association (CHEA), Nainital; [3]Deputy Project Director, GRAMYA-II, Almora
E-mail: ripuds4777@gmail.com; pankutewari@gmail.com

Half of the country's engagement in the agricultural activity accounting 18% of the GDP, it is imperative to generate environmental mindfulness among individuals for improved agricultural productivity and sustainable development in a developing country like India. The hilly and mountainous areas in India vastly distributed all over the country with a larger area located in the Himalayas, extending upto 2,500 km in length and 250 to 400 km in breadth. Access by the poor to natural resources (land, forests, water, pastures, etc.), in Himalayas is essential for sustainable poverty reduction. The livelihoods of rural people without access, or with very limited access to natural resources are vulnerable because they have difficulty in obtaining food, accumulating other assets, and recuperating after natural or market shocks or misfortunes. Traditional rainfed agriculture is the major and dominant activity in the hill economy, which confronts multiple risks and uncertainty. Quality seed of traditional millets and pulses play a key role for quality and quantitative production and by significant folds and thus, is one of the most economical and efficient inputs to agricultural development in rainfed areas. Generation and transfer of improved technologies are critical prerequisites for agricultural development particularly for an agrarian based economy such as of India. Agriculture, particularly crop farming, has a greater effect on the rural poor who spend more than a half of their incomes on food. When there are different seed sources available and farmers get access to them there is high probability of adoption of improved varieties. It also supplements seed replacement which is very poor. In addition to promote high value crops in the mountain regions for high income per unit area, this requires irrigation facilities. The study showcase the pilot made on

Certified Seed Certification through cooperative participation and its relevance in context of rainfed areas by developing 39 marginal farmers as leaders in Dhauladevi Development Block, Almora, Uttarakhand under GRAMYA-II (a project supported by World Bank) . It draws attention to the many ways in which easy access to certified seed that contribute in dynamic livelihood systems, which are characterized by a shift from mainly subsistence production to market-oriented farming. To fulfill the demand of water for various human uses, the choices for driving water pumps are usually limited to PV pumps or a fuel driven engine, usually diesel as there are no power grids. The present study analyses the feasibility of Solar PV water pumping systems over diesel pumps for irrigation purposes at Dhaspad, in Dhauladevi Development Block, Almora, Uttarakhand (29° 34¹ 21.31º North, 79° 50¹ 26.07º East) at an altitude of 2050 m.a.s.l. under GRAMYA-II. The paper discusses how the Sustainable Livelihoods Approach can be a useful holistic framework to show linkages between assets, livelihood strategies and the use of certified seeds. An overview of these linkages can aid planners and policy makers in achieving both goals of increasing food security and poverty reduction in rural areas of Indian Himalayas in changing climate and pace of development. Similarly, the study showed the advantages of use photovoltaic energy over that of the diesel operated pumps in terms of the net present cost and the cost of energy. It also concluded that diesel pumps are typically characterized by a lower capital cost but a very high operation and maintenance cost, while at the opposite, Solar PV pumps have considerably higher capital cost but very low ongoing operation and maintenance costs. The study also undertakes the analysis of existing policies and programmes promoting solar powered irrigation in India while exploring its key drivers and limitations. However, the study also observes that there are some critical limitations in the schemes influencing promotion of solar pumping such as inadequate service after sales, inflexible loan repayment system, firm collateral requirements, and circumscribed participation of empanelled manufacturers/ entrepreneurs. While keeping this in mind, study proposes suggestions which could direct the course of future programmes in the promotion and scaling up of solar irrigation pumps in the mountains.

Keywords: Agriculture; Certified seed; Cost analysis; Improving livelihood; Irrigation; Marginal farmer; Solar pumps

P163: ANALYSIS OF BIOCHEMICAL RESPONSES OF SESUVIUM PORTULACASTRUM (L.) L. TO COPPER EXPOSURE

Vinayak H. Lokhande[1,2], Vikas Y. Patade[3], Sudhakar Srivastava[4], Penna Suprasanna[1], Manoj Shrivastava[5]

[1]Nuclear Agriculture & Biotechnology Division, BARC, Trombay, Mumbai; [2]Department of Botany, SSCCAC&S Bodkenagar, Junnar, Pune, Maharashtra; [3]DRDO-DIBER Field Station, Pithoragarh; [4]Institute of Environment and Sustainable Development, BHU Varanasi; [5]CESCRA-NRL, Indian Agricultural Research Institute, New Delhi
Email: sudhakar.srivastava@gmail.com

The present work evaluated the biochemical responses of *Sesuvium portulacastrum* (L.) L. plants to copper (Cu) exposure (100-500 ìM) for 30 d in field conditions. Plants demonstrated maximum of 254 ìg Cu g-1 DW at 500 ìM. The root dry weight was not significantly affected at 500 ìM while shoot dry weight decreased significantly. Total soluble proteins, photosynthetic pigments, malondialdehye, proline and glycinebetaine showed decline beyond 100 ìM. Total non-protein thiols did not show significant effect while cysteine showed a significant decline beyond 100 ìM. *Sesuvium* plants may be used in phytoremediation purpose at low Cu concentrations (100–250 ìM).

P164: MUTATING ZOOGLOEA RAMIGERA FOR DEGRADING ORGANIC MATTER IN INDUSTRIAL EFFLUENTBY TRICKLING FILTER

Rutuja B Survase, Tanuja B Survase, Rajesh J. Sharma

Department of Biotechnology, VPASC College, Baramati
Email: surwasetanuja@gmail.com

Zoogloea ramigera was identified in situ microscopically on the basis of the presence of finger like zoogloeal structures. Zoogloea ramigera is gram negative, aerobic bacterium from the genus of Zoogloea which occurs in organically enriched aqueous environments like

activated sludges. Mutations induced by the use UV radiation. A mutation is permanent alteration sequence of nitrogenous bases of a DNA molecule. The result of a mutation is generally a change in the end product specified by that gene. Ultraviolet light is a kind of radiation that can cause genetic mutation. The shorter the wavelength of radiation, the higher the energy of radiation and thus the more than the radiation can inflict. The mutants are assessed for their capacity of degradation of organic waste. The organism capable of degradation was used.

Key words: *Zoogloea ramigera;* Gram-negative bacteria; MacConkey agar; Mutation; UV radiation; Trickling filter plant

P165: CHANGE DETECTION ANALYSIS OF SODIC LAND USING REMOTE SENSING & GIS TECHNOLOGY IN UNNAO DISTRICT, U.P., INDIA

Droupti Yadav[1], Banwari Lal[2], Lakshmi Vikram[1]

[1]Department of Environmental Science, I.B.S.B.T., C.S.J.M. University (Campus), Kanpur Nagar, U.P.; [2]Remote Sensing Applications Centre, Lucknow, U.P.
Email: droupti.yadav@gmail.com

In the era of climate change, science & technology the space based technology (Remote sensing and GIS techniques) which minimize time and cost effective play a vital role for the mapping and monitoring of land degradation, waste land and sodic land. In order to utilize these waste land and sodic lands for higher productivity, reclamation efforts are being made by the different government and non-government agencies. The reclaimed area would utilized for crop production, fruit production, forestry and fish rearing by utilizing existing ponds and the rest is covered in building, threshing floor, channels, roads, etc. which help in improving the quality of agriculture production globally. Soil salinity affects the quality of land surface especially soil profile (top horizon 'O') and it's a very serious environmental hazards of developing countries based on agro-economy. The adverse impacts of the green revolution, excessive use of pesticides in agricultural field and seepage from the irrigation canal, soil salinity is the major land degradation cause in the state of Uttar Pradesh. Unnao

district is famous for the Nawabganj bird sanctuary (Biodiversity zone) ecotourism region and major source of economy. It lies between Latitude 26°8' N & 27°2' N and Longitude 80°3' E & 81°3' E and surrounded by various districts like north (Hardoi), East by Lucknow, south by Rae Bareli and on the west by the Ganga which separates it from Kanpur & Fatehpur. It covers an area of 4,558 Sq.km with an elevation of 125 meters height. The Ganga, Kalyani and Sai are the main rivers of the district. To study the change detection analysis of sodic land used Geo coded IRS-1C LISS III sensor data at 1:50,000 scale for visual interpretation. Monitoring and mapping of sodic land in Unnao district through remote sensing & GIS technologies using ARC MAP 10.5 provided the data of reduction of sodic land in Unnao area. Theses sodic sited can be used for further reclamation for alternative techniques to improve the soil health and use land for sustainable developmental projects or infrastructural developments.

Key Words: RS & GIS; Sodic Land; Environment; Sustainable Development

P166: ESTABLISHMENT OF CAPRA HIRCUS MYOMETRIUM AND EVALUATION ANTIFERTILITY EFFECT OF *BUTEA MONOSPERMA* SEEDS USING HISTOPATHOLOGICAL TECHNIQUES

Swapnaja S Kulkarni, Nikita S Jadhav, Vaishnavi H Pisal, Rajesh J Sharma

Department of Biotechnology, VPASC College, Baramati
Email: nikitajadhav1632001@gmail.com

Growing population of India is a major concern. According to the Indian census, carried out in 2011, the population of India was exactly 1,210,193,422, which means India has crossed the 1-billion mark. This is the second most populous country of the world after China. The two main reasons for the population explosion are higher birth rate and fertility rate. Government is promoting use of contraceptives but these come with side effects for instance birth control pills are female hormone that cause nausea, breast tenderness, weight gain, mood swings and breakthrough bleeding etc. In this study we suggest the use of Butea monosperma seeds as antifertility agent. The antifertility effect has been evaluated on Capra

hircus myometrium established in the lab. Treatment the myometrium with seed extract The seed extract induced decrease in thickness of Surface epithelium, diameter of uterine glands, diameter of gland cell and thickness of layer of myometrium according to exposure in time dependent manner.

P167: WILD EDIBLE FRUITS AN ALTERNATIVE RESOURCE FOR NUTRITIONAL SECURITY FROM SIKKIM HIMALAYA

Sandeep Rawat[1], Pema Bhutiya[1], Devendra Kumar[1], Indra D Bhatt[2]

[1]G.B. Pant National Institute of Himalayan Environment and Sustainable Development (GBPNIHESD), Sikkim Cegional Centre, Pangthang, Gangtok, Sikkim; [2]GBPNIHESD Kosi-Katarmal, Almora, Uttarakhand
Email: sandeep_rawat15@rediffmail.coom

Wild edible fruits form an important constituent of traditional diets in the Himalaya. Sikkim state located in Himalayan biodiversity Hot-spot area is rich in unique biodiversity and support valuable resources to inhabitants. Wild edible fruit species are valuable resources in several other ways pertaining to social, economic and ecological services. In current study, more than 50 species documented in the region and Rosaceae was found as a dominant family. Some fruit species were found socially and commercially important and also have medicinal uses such as *Rubus ellipticus*, *Diploknema butyraceae*, *Terminalia chebula*, *Spondias axillaris*, *Elaegnus latifolia* and Berbaris species in the studied areas. Nutritional analysis of targeted Rosaceae species revealed that these species are rich source of carotenoids (*Rubus ellipticus*), anthocyanins (*Rubus nevius* and *Fragaria nubicola)*, ascorbic acids, phanolics and flavonoids besides their micro and macro-nutrients. These fruits were found rich in antioxidants measured by different in-vitro assays and demonstrated their utility as a natural antioxidant to reduce free radical mediated disorders. These fruits have a great potential to contribute towards food and nutritional security in climate change scenario.

Key words: Wild edibles; Food security; Nutritional security Himalaya; Antioxidants.

P168: EXPLORING *IN VITRO* ESTABLISHMENT AND PHYTOCHEMICAL PROFILING IN *CEROPEGIA KARULENSIS*: AN ENDANGERED MEDICINAL PLANT OF WESTERN GHATS: AN APPROACH FOR CONSERVATION AND SUSTAINABLE UTILIZATION

Meena Pandey[1], Ramesha H Jayaramaiah[1], Bhushan B Dholakia[1], Sachin A Punekar[2], Ashok P Giri[1]

[1] *Plant Molecular Biology Laboratory, Division of Biochemical Sciences, CSIR-National Chemical Laboratory, Pune 411008, Maharashtra, India*
[2] *Biospheres, Eshwari, 52/403, Lakshminagar, Parvati, Pune 411 009, Maharashtra, India*

There is a rising attention in medicinal plant-based remedies as a source for herbal commercial products. These are vanishing at a high speed. Medicinal Plant Research focuses on the propagation, cultivation and processing of medicinal plants, especially those species that are highly utilised. Many of these medicinal plants including the endemic species are often harvested unsustainably from their natural population. The present study focus on *Ceropegiakarulensis,* is an endemic and critically endangered high value medicinal plant of the Western Ghats from India. Exploitation and poor regeneration of this species using seed and tubers has narrowed its distribution and propagation. There is a need to develop *in vitro* propagation methods for *C. karulensis* to alleviate these problems. Here, we optimized callus induction, somatic embryogenesis and microtuberization from different seedling explants. Highest callus proliferation was recorded with 2 µM 6-benzylaminopurine and 1 µM 2,4-dichlorophenoxyacetic acid. Somatic embryos derived from cotyledonary leaf explants were more proliferative than root explants. The combination of 2 µM 6-benzylaminopurine, 2 µM naphthalene acetic acid and 7% sucrose in MS media resulted in highest microtuberization. Further, gas chromatorgraphy-mass spectrometry based metabolic profiling was carried out from native wild plants and *in vitro* callus tissues which identified various metabolites such as alkaloids, fatty acids, esters alcohols etc. Overall, our results suggest that the production of various secondary metabolites found in *C. karulensis*is not affected by *in vitro* propagation and could be utilized in the conservation strategies for this plant.

P169: MAKE A DIFFERENCE THROUGH ENVIRONMENTAL EDUCATION

Rohini Dhage, Meena Pandey

D. Y. Patil International University, Akurdi, Pune, Maharashtra

The future depends on the sustainable work we do today. It is based on moral values and principles. The goal is considering people's welfare today and develop the nation without compromising the needs of tomorrow.Ending poverty, improving the quality of education, healthcare, better sanitation as well as conserving natural products over synthetic ones is necessary. In order to have healthy and developing communities, natural resources and a non-toxic environment is essential. We must bring changes in people's knowledge, attitude, skills and make people aware of their responsibilities towards conservation of natural resources. Creating opportunities for economic prosperity and enhancing the liveability should go hand in hand with environmental responsibilities and conservation. Therefore, the present work is focusing onimproving people's life and conserving the environment with the flow of the world.

P170: PERSPECTIVES AND PROMOTING SUSTAINABLE DEVELOPMENT THROUGH DISASTER MANAGEMENT

Sweta Kumari, Meena Pandey

D. Y. Patil International University, Akurdi, Pune, Maharashtra

Disasters arises due environmental extremes which are unavoidable entities of the world.Natural disasters are calamitous for the societies they impact, as they are capable of producing wreckage and damages.It involves widespread human, material, economic and environmental losses. It's big existential issue which may be faced by future generation therefore we need to control itto exist on Earth.Some cities like Pune, is prone to flood and landslides due to encroachment on river bedswithnever-ending human activities leading to local geographical change. If this happens continuously, then at some time we will lose all our resources.So, the present study focuses on disaster management and sustainable development to conserve resources not only for this generation for our future generations also.

P171: SMART FARMING USING THE INTERNET OF THINGS AT CHITTOOR DISTRICT, ANDHRA PRADESH STATE, INDIA

N. Sravanthi

Central University of Karnataka.Kalburgi-585367, Karnataka, India
Email: sravanthi8297@gmail.com

This paper will be explained agriculture plays a vital role in the Chittoor district. Farmers are the backbone of the Indian economic system. Farming in our country is using mundane ways. The fact that most of our farmers lack proper knowledge makes it even more erratic. Total geographical area 15152 Sq.Km and an annual rainfall of 934 mm. The comparative area distribution of different land use. The major land use / land cover categories (2015 - 16)that have been identified Builtupland (416.05Sq.Km) , Agriculturalland (7810.94Sq.Km), Forest (4259.90Sq.Km), Wastelands (1943.84Sq.Km) and Water Bodies (719.97Sq.Km) A large portion of farming and agricultural activities are based on the predictions, which at times fail. Farmers are getting losses from failure crop and they are committed suicide. Since we know the benefits of proper soil moisture and its quality and irrigation in the growth of crops, such parameters cannot be ignored and its reach to farmers. Smart Farming' is an emerging concept that refers to managing farms using modern information and communication technologies to increase the quantity and quality of products while optimizing the human labor required. Therefore have come up with a new idea of smart farming using IoT. Our idea tries to digitalize farming and agricultural activities so that the farmers can check on the requirements of the crops and accurately predict their growth. The implementation of our project largely depends on the awareness among the farmers. The objective of the project to improve crop production by collecting the real-time status of the crop and also to improve agriculture in remote areas using smart farming.

Key words: Crop rotation; Land use; Rainfall; Farming; IoT

P172: LARGE FLOODS DUE TO LOW INTER-EFFECTS OF SUN, MOON, EARTH

Krishna Mohan Agrawal

Superintending Engineer (Retd.), Irrigation Department, U.P.
Email: k.mohan5000@gmail.com; k_mohan50@rediffmail.com

Large floods in year-2019, are due to lowered effects of space masses, in a 12-year cycle. All space-masses rotate and revolve, so does Earth. It rotates most at the Equator and least at the Pole. Thus a fast moving lava lump at the Equator moves to the Pole, and separates from Earth, to revolve as Moon. This Moon exerts centrifugal forces on Earth, as pull, causing tides, storms etc., the Moon being overhead. These inter-space mass forces cause wide spread wind-water and snow storms and rain falls, too. The Sun, Moon and the Earth revolve in Egg-shaped orbits, making traces of fast and small speed of revolution, in each of their orbits. Thus these centrifugal and centripetal forces, increase and decrease during each cycle. During the 1st fortnight of August, 2019, it is a time of lowered or minimized motion of all, the Sun, Moon and the Earth, once in 12-years, and thus time of low centrifugal-centripetal forces on one another, making clouds and rains come down to Earth, making large scale flooding all over, in several States, in India. It strengthens my presentation 'Kerala floods due to mutual Sun, Moon, Earth low effects, at 106th Indian Science Congress, 2019, and my 'Law of convergence of masses, 99th Indian Science Congress-2012, too.

Key words: Centrifugal, Centripetal, Earth, Equator, Orbits, Sun, Wind

P173: ADVANCED SPECTROSCOPIC STUDIES OF METAL IONS DETECTION FROM INDUSTRIAL SAMPLES TIRUPATI, ANDHRA PRADESH, INDIA

Katepogu Raju, Goda Maheswaramma

S.V.College of Engineering, Tirupati-517507, A.P.
Email:envirosvu@gmail.com

Toxic heavy metals and especially lead (Pb), cadmium (Cd) and mercury (Hg) can easily transmit to humans through consumption of contaminated water around the studied areas. The present research was done to the concentrations of Pb, Cd and Hg in different location of industry samples. To determine toxicity of metal concentrations of Pb, Cd and Hg by a graphite furnace atomic absorption spectrometric method. The mean analytical methods were 88%, 93%, and 96%, for Hg, Cd and Pb, respectively. The mean Cd, Pb and Hg contents obtained from samples ($S_1 – S_4$) were 3.62±0.35 ppb (range: 0.06-14.03 ppb), 11.73±1.09 ppb (range: 0.12-33.62 ppb) and 4.35±0.42 ppb (range: 1.03-10.38 ppb), respectively. The highest concentrations of Cd, Pb and Hg were found in raw effluent water samples (4.05±0.38, 12.36±1.21 and 5.76±0.53 ppb, respectively), while raw water samples the lowest concentrations of heavy metal toxicity on diversity changes around the living organisms. S_1, S_2, S_3 and S_4 the highest concentrations of Cd, Pb and Hg. All samples were collected an industrial out let period and the highest concentrations of Cd, Pb and Hg heavy metals ($P<0.05$). The mean concentrations of Cd and Hg heavy metals were lower than the allowed limits announced by the standard organizations, while those of Pb were higher. These results highlight the importance of periodically monitoring levels of Cd, Pb and Hg heavy metals in various analyzed data conclude that to reduce the source reduction by the rule of 3R concept and BIS Standards.

Key words: Cadmium; Lead; Mercury; UV-VIS Spectrophotometer

107TH INDIAN SCIENCE CONGRESS

January 3-7, 2020, Bangalore

VI

LIST OF

PAST SETIONAL PRESIDENTS

LIST OF PAST SETIONAL PRESIDENTS

Indra D. Bhatt	2019
Subrat Sharma	2018
Swati Gupta Bhattacharya	2017
GDMishra	2016
Kashinath Bhattacharya	2015
Pitamber Prasad Dhyani	2014
SBMahto	2013
BK Tiwari	2012
G Bagyanarayana	2011
SP Gautam	2010
MG Tiwari	2009
VK Verma	2008
PC. Pandey	2007
Malay Chattarjee	2006
Shelly Bhattacharya	2005
JS Singh	2004
Kasturi Dutta	2003

107TH INDIAN SCIENCE CONGRESS

January 3-7, 2020, Bangalore

VII

AUTHOR INDEX

INDEX

A17: Regeneration status of protected and disturbed forests of Ranikhet, Uttarakhand (Kumaun Himalayas)

Prateek Verma, Uma Melkania

A18: Sustainable forest management for biodiversity conservation and sustained livelihood option for rural people of Jharkhand
Sanjeev Kumar

A19: Chemical composition of the essential oil from the leaves of *Endostemon obtusifolius* (E.Mey. ex Bnth.) N. E. BR
Y Naidoo, CTSadashiva

A20: Communities for conservation: let the water flow
Sanjay Kr. Uniyal

A21: Exploring prospect for delineation of field margin vegetation using RS and GIS
Sunil Nautiyal, Mrinalini Goswami

A22: Cultivation of medicinal plants in Chaudas valley: linking with rural livelihood
Indra D. Bhatt, Amit Bahukhandi

A23: Conservation of forest biodiversity in ancient Indian culture
Kashinath Bhattacharya

A24: Studies in environmental sciences: variability of all India summer monsoon rainfall, climate change, global warming and environmental effects
R Suseela Reddy

A25: Effects of anthropogenic disturbances on diversity-distribution of woody plants in Reiek forest, Mizoram, India
B P Mishra

A35: FULBRIGHT- Nehru fellowship opportunities in the U.S.
S Lalitha Nagesvari

ORAL PRESENTATIONS

R01: *Cassia angustifolia* - an economic importance with special references to Thar Desert
Poonam Singh Jakhar, Achala Ram Choudhary

R02: New approaches to water projects in India
Ranjit Singh, Gayatri Pandey, Chandan Kumar Soni

R03: A review of plant biodiversity in various regions of India
Ranjeet Singh

R04: Assessing spatial relationships of vps vis-à-vis forest fires using exploratory spatial data analysis
Stutee Gupta, T. Dharamaraj, Shikha Anand, Vishesh Mathur, T. Ravi Sankar

R05: Methanol blending as a renewable fuel in automotive industries towards minimizing vehicular air pollution: challenges and opportunities in Indian automobile industries
A G Matani

R06: Removal of chromium from aqueous medium by bentonites
Ashok Kumar Jha

R07: An assessment of water quality for drinking purpose in Agra city India
Ashish Kumar

R08: Adsorption of hexavalent chromium using calcinated eggshell
B. Santhaveerana Goud, Prathibha D, Alen Sukumar

R18: Identification and characterization of natural dies from *Jatropha curcas*, *Terminalia chebula*, *Camellia sinensis* and *Musa paradisiacal* of darrang district, Assam
Kangkan Medhi

R19: Spectrophotometric analysis of poorly water soluble drugs: an eco-friendly pharmaceutical application of hydrotropic solubilization technique
Kavita Sharma, Ketan Soni

R20: Impure aqua and environment
Meenu Verma

R21: Study of the awareness about aids/HIV among the students of R. N. college Hajipur Bihar
Rakesh Mohan, Sushma Kumari, Vijay Kumar, Suchitra Kumari

R22: Coastal vulnerability assessment, adaptation and mitigation opportunities across climate hotspots in Kerala, India
Shyam S. Salim, R. Naryanakumar

R23: Efficacy of marine isolate *Acinetobacter baumannii* in textile dye degradation
Sneha Unnikrishnan, Karthikeyan Ramalingam

R24: Diversity and seasonal variation of wetland birds in sacred wetlands of Kurukshetra, India
Parmesh Kumar, Archna Sharma

SUB-SECTION: PROMOTING ENVIRONMENTAL CONSCIOUSNESS IN DEVELOPING INDIA

R32: Calcite solubilizing activity of *exiguobacterium aquaticum* CS6 isolated from marble slurry dumped in sukher, Udaipur, Rajasthan, India
Harshada Joshi

R33: Value chain promotion of chyura (*Diploknema butyracea*) for sustainable development in mountains: an opportunity for marginal farmers of Uttarakhand for sustaining livelihoods
Pankaj Tewari, Ripu Daman Singh, Pratap S. Nagarkoti

R34: Integrated springshed management approach: linking science, policy, and practice for building environmental consciousness & water sustainability in Himalaya
Rajesh Joshi, RS Rawal

R35: Environment-friendly rural housing technologies by CSIR-CBRI, Roorkee for development of rural India
Atul Kumar Agarwal

R36: Physico-chemical advantages of pyridine based polybenzimidazole membrane for polymer electrolyte membrane fuel cell
Md. Nazrul Islam

R37: Suitability of industrial sugarcane bagasse waste on production of oyster mushrooms
T Saha, S. Das, S Biswas, S Das, D Datta, S Sau, S Kundu, E Ghosh, Arup Mitra

R38: Diversity of mangrove plants in relation to palaeoenvironment during Holocene period in Bengal basin, India
Nimai Chandra Barui

R39: Prey preference by critically endangered vulture species in Moyar valley, Tamilnadu
Ramasamy Venkitachalam

R48: Pinnales of river Ganga and their implications in water pollution
Sachendra Kumar Tripathi

R49: Biodiversity of insects and behavioral study in Periyanaickenpalayam village, Coimbatore district, Tamilnadu, India
J Sornapriya

R50: Agro-ecosystems sustainability in India by adopting the eco-consciousness of agricultural farming practices of Israeli irrigation
M Jaya Kumar Jacob, P Brahmaji Rao

R51: Electrochemical sensors for trace determination of pollutants
Nimisha Jadon

Poster Presentations

P01: Environmental journalism, environmental ethics and environmental policy
Sanjay Verma

P02: Comparative studies of some ponds of deoghar district of jharkhand
Ashok Kumar, Rajesh Kumar Bishen

P03: Alteration in agricultural practice under changing coastal ecosystem
Biplab Ghosh
P04: Analysis of human body as energy conversion plant for sustainable development
Dinesh K Sharma, Meenakshi Sharma

P05: Social cognition towards environment among teacher trainess in Puducherry
JA Ebenezer, C Vijayapriya

P06: Antibiotic resistant bacteria isolated from urban environmental soil from west Bengal
Jhulan Basu, Pranab Giri, Priyanka Bhowmik

P07: Reduce chemical pollution on soil
KV Subba Reddy

P08: Treatment of heavy metals bearing effluents using biochar developed from jute caddies
Lata Ramrakhiani, Swachchha Majumdar, Sourja Ghosh

P09: Recycling of groundnut shell and vegetables waste as biofertilizer for the cultivation of pigeon pea
Rajasri Ramesh, Vijayalakshmi Annamalai, Karthiya Velmurugan, Gnanamani Kittan, Pinky Raihing, Silpa Melathra

P10: Ethnobotanical investigation of aromatic and medicinal plants used by the Muslim community of Manipur, India
Md. Riyajuddin Khan, A. Kikim

P11: integrated in-vivo cultivation model to screen lipid and growth of green oleaginous microalgae
Prachi Singh, SK Soni, M Gupta

P12: Sustainable utilization of biodiversity vis-à-vis eco-friendly value addition to biomass
Raj Dev Rawat

P13: *Lantana camara*: its negative impact and effective controlling measures in India
Ramandeep Kaur Arora, Prachi

P14: Comparitive study on native *Bos taurus indicus* and exotic *Bos taurus* breed cowdung substrates to support the reproductive potential and compost quality of earthworm *Eudrilus eugeniae*
Rini Joseph, P Kathireswari

P15: Study of extremophilic characteristics of bacteria isolated from Yamunotri
Rohini Bhattacharjya, Anish Chakraborty, Srijan Bhattacharjee, Bedaprana Roy, Sampurna Ghosh, Sahesta Akram, Arup Kumar Mitra

P16: Significance and relevance of periodic table in innovative researches
Rajesh Kumar Bishen, Hashmat Ali

P17: Global cooling: its impact on environment in north Bihar
Shahnaz Jamil

P18: Applying statistical tools for the assessment of surface water quality in Mahoba, U.P., India
Swati Gupta, Poonam Mehrotra

P19: Natural disasters impact on human rights – a review of the study
T KonaiahP

P20: Declining bengaluru urban lakes and its sustainable future
Veenashree, N Nandini, M Kumar

P21: Current status of Egyptian vulture (*Neophron percnopterus*) at Jorbeer, Bikaner (Rajasthan)
Balram Sain, Ravi Parihar, Devaram Meghwal

P22: Effect of chelants supply in zinc contaminated soil on growth, grain yield and some biochemical constituents in mustard
Isha Verma, SN Pandey

P23: Indigenous wild edible fruits used as commercialization of Kangpokpi district of Manipur, north-east India
A. Kikim, Md. Riyajuddin Khan

P32: Estimation of phthalic acid esters by microwave assisted extraction and ultra high performance liquid chromatography in soil of Patna, Bihar, India
Aseem Kumar Anshu, Preety Sinha

P33: Phytochemical and nutritional characterization of selected medicinal plants of north Gujarat
Asha Humbal

P34: Distributional pattern of forest types and major tree species in North West Himalaya
Ashish Kumar, Subrat Sharma

P35: Isolation and characterization of keratinase from feather degrading soil bacteria
Ashish S Wani, Govinda R. Jadhav

P36: Woody vegetation and timberline mapping of permanent monitoring site at Sinthan (Jammu & Kashmir)
Avantika Latwal, Subrat Sharma, Shaik Rehana

P37: Treatment of real waste water by heterogeneous fenton process using a graphene oxide nanoparticle
Ayesha Hashmi, Ajaya Kumar Singh

P38: A study on effect of solar wind plasma parameters
Balveer S. Rathore, Rammohan S. Bhadoria, D. C. Gupta

P39: Studies on pollution ecology of *Benthic foraminifera* from the visakhapatnam harbour channels, east coast of india
Bangaku Naidu Kilaparthi, Anji Reddy Mareddy

P40: Glycine-modified zinc oxide nanoparticles as catalysts for auramine-O-dye abatement by a heterogeneous fenton process
Bhawana Jain, Ajaya K Singh

P41: Evaluating the deodorizing and decolorizing potential of agarose entrapped immobilized microbial consortia DB1, DB2, DB3, DB4 and RN1, RN2, RN3, RN4
Darshana Badve, Reshma Nalage, Rajesh Sharma

P42: Risk assessment of sludge treated soils in relation to transfer of metals to human food chain
Debasis Golui

P43: Holistic management of algal pathogen found in ornamental tea variant
Debodyuti Sadhukhan, Debapriya Maitra, Bikram Dhara, Debdatta Das, Prapti Victoria Rozario

P44: Measures of social organization in blackbuck, *antilope cervicapra* (L. 1758) in semi-arid habitat of Haryana (India)
Deepak Rai, Jyoti

P45: Biomonitoring of a perennial pond using benthic-macroinvertebrate
D. K. Paul, Sumona Sanyal, D. Sayantan

P46: A survey of Bhiwapur fish market in Chandrapur, Maharashtra
D. M. Gaidhane, Sadaf Siddiquei, M. Subhas

P47: Seasonal variation of fluoride accumulation in agricultural crops at Unnao district, Uttar Pradesh
Gayatri Singh, Geetgovind Sinam, Babita Kumari, Kriti, Shekhar Mallick

P48: Distribution of leopard and its prey species in Kalesar National Park, Haryana
Janam Jai Sehgal, Rajiv Kalsi, Randeep Singh

P49: Assessment of antioxidation potential, lipid peroxidation, cytotoxicity and DNA damage of microbial pigment
Kajal Satpute, Arti Kale, Rajesh Sharma

P50: Urbanisation and its impact on birds
Kirti Sharma, Himani Gaikwad, Deepali Bansal, Ananya Das

P51: Comparative evaluation of the phytoremediation in Ni and Cd contaminated soil from e-waste
Kriti, Kumkum Mishra, Shekhar Mallick

P52: Impact of climate change on floral biodiversity of high altitudes wetlands of Himalaya
K.S. Kanwal, RS Rawal

P53: Assessment of traffic noise pollution in Bankura-a semi urban town of West Bengal, India
M Roy, P Dey, D Ghosh, F Shamim

P54: Calcium carbonate saturation index and physico – chemical factors influencing phytoplankton in examined water bodies of Mandya district
J Mahadev, G Sugeetha, KV Shivkumar, NS Pankaja

P55: Role of music in generating environmental awareness
Mamta Rani Thakur

P56: Irrigation water content influence on isoproturon persistence and mobility through numerical modeling
Manika Gupta, NK Garg, Prashant K Srivastava

P57: Assessing vulnerability as an interaction of exposure and resilience in a multi-hazard prone district through a composite index – A case study of South 24 Parganas, West Bengal
Manisha Bhor, Keya Mitra

P58: Ecological study with density dependent parameter of Bahiara wetland of Saran, Bihar
Md. Suleman, Ravindra Kumar Singh

P69: Assessment of heavy metals in cereals grown in the Jodhpur city
Rajshri Soni, Pallavi Mishra

P70: Tree diversity and composition in high altitude forests along altitude gradient, western Himalaya
Renu Rawal, Ranbeer S. Rawal

P71: Plant-microbe interaction in heavy metal toxicity
Ruchira Das, Anjali Gupta, Sharanya Banerjee, Doutrina Das, Puja Agnihotri

P72: Growth of Himalayan cedar under future climate change scenario in western Himalaya
Rupesh Dhyani, Rajesh Joshi

P73: Malathion removal by electrocoagulation process using aluminium electrodes
S Sai Santosh, Jami Ashok, Meena Vangalapati

P74: Antimicrobial activity and antioxidant property of guava leaves
Samriddha Dutta, Nayonika Rahut, Paramita Adhikari, Srabanti Basu

P75: Distribution of tree community in relation to environmental factors along an altitudinal gradient in north western Himalaya, India
Shinny Thakur, Anil Kumar Yadava, R.S. Rawal

P76: Assessment of drinking water quality through hydro-chemical analysis in Bhusanoor village in Kalaburagi district, Karnataka
A.M. Smitha, V. Praveena Kumara, Seema Shastri, B. Mahalingam

P77: Photocathodic microbial fuel cell: a low cost sustainable alternative towards electricity generation in rural areas
Smriti Mehrotra, Bhawana Pathak

P87: Pollinator community and diversity in an urban area of Bengaluru, Karnataka
Vinutha R. Bhatta[1], A. Naresh Kumar[2]

P88: Status of avifauna in rural ponds of district Kurukshetra, Haryana, India
Vipin Boora, Parmesh Kumar

P89: Elucidating the phytochemicals of *Averrhoa carambola* L. to mitigate the environmental induced oxidative stress
Kanchan Joshi, Sudhir Kumar, Almas

P90: Water quality and natural protective microbe in a holy water body in Punjab
Aditi Das, Shreya Chakraborty, Sayantika Chakraborty, Shilabrata Banerjee, Amritesh Sarkar, Arup Kumar Mitra

P91: Phenology and soil characteristics of forests of major treeline species in the Garhwal Himalaya
Pradeep Singh, GCS Negi

P92: Comparative study of nitrilase enzymes: a computational approach
Priya Kumari, Raju Poddar

P93: Changes in physicochemical characteristics of *Pyracantha crenulata* during ripening
Pushpa Kewlani, Indra D. Bhatt, Veena Pande

P94: Chromium toxicity alters the antioxidative efficiency of germinating wheat seeds
Sudeshna Khatua, Surjendu Kumar Dey

P95: Comperison of ambient air quality & effect on health (due to use of fire crakers) in an around Kolkata during kali puja-2018
Sanjoy Mukherjee, Chitralekha Sengupta, Barna Majumder

P96: EMF exposure from X and Ku band radar on oxidative stress biomarkers in military personnel
Sarika Singh[1], Neeru Kapoor[2]

P97: Altitudinal distribution of tree community in representative Himalayan states
Vikram S. Negi, Amit Bahukhandi

P98: Identifying of solid waste desposible points in Mysore city using morphometric analysis
Amin, Arun Das

P99: Impact of sodium nitroprusside on proline accumulation in rice under salt stress
G. Hemalatha

P100: Electrocoagulation for the removal of tetracycline from potable water
Shweta Kumari, R Naresh Kumar

P101: Studies on physicochemical parameters to assess the water quality at selected sites of river Ganga, West Bengal, **WB**
M Roy, FShamim, D Ghosh, P Dey

P102: Comparative study of certain phytochemical properties, antioxidant activity, nutrient contain of two medicinally important plants *Amaranthus tricolor L.* and *Chenopodium album L.* of darrang district, Assam
Seema Jyoti, Mitali Baruah, Leena Saikia

P103: Residue, dissipation and decontamination of thiamethoxam and flubendiamide in tomato and cabbage
RH Naik, V Sangameshwar, MS Pallavi, H Arunkumar, M Bheemanna

P104: Occurrence of permanent algal blooms in a pond with special reference to factors responsible for its production at district Rohtas, Sasaram
Rajani Kumari, Dinesh Kumar Yadav

P105: Health effects and characterstics of gaseous pollutants in the atmosphere of a regional station in central India
Harendra K. Sharma, Banwari Dandotiya

P106: Kinetic, isotherm and thermodynamic studies on biosorption of heavy metals from aqueous solution by using activated carbon
Harendra K. Sharma, Irfan Rashid Sofi

P107: Morphology and ultrastructure of the foliar glands of *Hibiscus surattensis* Linn. and *Hibsicus sabdariffa* Linn. (Malvaceae)
K Raghu, YNaidoo

P108: Mangrove ecosystem: a potential resource for rural upliftment and sustainable development
Priyanka Kumari

P109: Effect of biochar amendment on soil labile fractions of carbon and soil sequester carbon
Prakirti Kumari, Uma Melkania

P110: Studies on seasonal variations of physico-chemical properties in a fresh water lake of Warangal district, Telangana state
V Rajani, G Benerjee

P111: Seasonal abundance and faunal diversity of macrobenthic mollusca along lower and estuarine stretch of river Ganga in relation to environmental parameters
S Roy, C Jhonson, RK Manna, A Roychowdhury, A Ray, NK Tiwari, SD Gupta, S Mandal, B K Das

P120: Ecologically engineered strategies for the management of acid mine drainage: an overview
Ravindra Kumar Singh, Manoj Kumar Pandey, Aruna Kumari

P121: Eco-audit of st. Joseph's college (autonomous) – an initiative towards green campus
S Aishwarya Lakshmi, Ebenezer Wilson

P122: Biosurfactant-assisted bioremediation of petroleum hydrocarbon contaminated soil
Ajay Prakash, Rajesh Kumar

P123: Phyllospheric actinomycetes in control of frog-eye leaf spot of *Glycine max* (soybean plant)
Ankita Dutta Chowdhury, Swarnika Roy, Bikram Dhara, Meenakshi Mukhopadhyay

P124: Distribution pattern of woody and herbaceous vegetation in a mountainous riparian corridor along neeru stream, Bhaderwah, Jammu and Kashmir
Anu Sharma, Neeraj Sharma

P125: Woody patches expansion in higher altitudes of Kumaun Himalaya due to climate change
Arti Joshi, Subrat Sharma

P126: Reduction of green house gas is necessary at household level to protect the environment
Avinava Kundu, Asish Prasad Kundu

P127: ENVIS: a platform for environment education and awareness
Babita Kumari, Sunil Tripathi, Diwakar Saini, Amrita Awasthi, Vineeta Yadav, Vivek Srivastava

P137: Remote sensing and GIC study for current scenario of Ganga river water pollution in Kanpur city, U.P., India
Droupti Yadav, Aman Kumar Pal

P138: Intensive study of hindon and Kali River at Uttar Pradesh, India by using pollution index and environmetrics
Gaurav Singh, Neelam Patel, Tanu Jindal, Manju Rawat, Sumit Pal, Swatantra Kumar Dubey[3]

P139: Vertical gardening: a future necessity?
Himani Gaikwad, Kirti Sharma

P140: Innovative plasma technology for textile processing and water management
Jayashree Venkatesh, K.N. Ninge Gowda

P141: Solar pv plant re-powering: mission transformation
Jitendra K Sen, Ashish Nayyar, Dinesh Kr Sharma

P142: Decomposition and carbon release patterns of leaf litter in five homegarden trees species in Kumaun Himalaya, India
Kiran Bargali

P143: Fluoride removal from groundwater by adsorption on biowaste
Mahiya Kulsoom, Narendra Kumar

P144: Diversity, distribution and abundance of insects in Pallassena village, Palakkad district, Kerala, India
N Narmadha, M Lekeshmanaswamy

P145: Ecological niche modelling for predicting the potential distribution of threatened medicinal and aromatic plants (maps) of alpine region of Uttarakhand, western Himalaya
Naveen Chandra, Gajendra Singh, Shashank Lingwal, M.P.S. Bisht, L.M Tewari

P146: Perturbations in seasonal variations of diatom assemblages in hydropower impacted river Alaknanda
Prakash Nautiyal, Neetika Sharma

P147: Mitigation of plastic waste by using fungus
Nitesh Verma, Sharmita Gupta

P148: Forest fires in north-west Himalaya: case of pine dominated district in Uttarakhand
Nisha Bisht

P149: Study on fluorosis and its remedial measures using green techniques in some fluorosis affected villages of Rajauli block of Nawada district, Bihar
Anil Kumar Singh, Peeyush Kumar

P150: Rejuvenation of water bodies by adopting natural and engineering tools to recharge catchment area
Prachi, Ramandeep Kaur Arora

P151: Role of bioindicators in assessment of environmental pollution
Prashant Kumar, Pappu Kumar Rai, Umesh Kumar

P152: Seed germination and growth performance of *Paeonia emodi* in different organic manure under different microclimatic conditions in western Himalaya
Praveen Joshi, Prem Prakash

P153: Use of waste papers & surgical bandages along with waste plant fibers to make handmade papers and employment generation for rural people
Rohit Shukla, Anupam Dikshit

P154: Natural resources in environmental degradation
S.B. Singh, Rakesh Kumar Ranjan

P155: Bioremediation study of dairy effluent by using *Spirulina platensis*
Satish D. Kulkarni, Tejashri Auti

P156: Producing biomass utilizing anthropogenic waste: algae can help
Shantanu Kulkarni[1], Dishant Desai, Vinay Dwivedi, Hardik Chawada, Yogesh Chudasama, Debanjan Sanyal, Santanu Dasgupta

P157: Agricultural land-suitability: an analysis of Nalanda district, Bihar
Shashi Sekhar, M. Sahana, G. Areendran, A. Prakash

P158: Removal of methyl violet and brilliant green dyes from aqueous solution on magnetic/ activated charcoal/ â-cyclodextrin /sodium alginate polymer composite gel beads
Sushma Yadav, Anupama Asthana, Ajaya K. Singh

P159: Isolation, characterization, and application of *Bacillus* sp. CTSI-07: climate change viewpoints
Swati Pattnaik, Devi P Samantaray, Debasis Dash

P160: Green skill development programme (GSDP) on preparation of people biodiversity register (PBR): a tool of generating livelihoods and strengthening access and benefit sharing mechanism
Vipin Chandra Sharma, Ravindra K. Joshi, Mahesha Nand, GCS Negi

P161: Phosphate solubilising potentials of *Trichoderma* isolates under the impact of salinity
Vishal Prasad and Shivani Chaudhary

P162: Promoting certified seed production in rainfed areas and augmenting solar powered irrigation in mountains: a case study from Uttarakhand
Ripu Daman Singh, Pankaj Tewari, Pratap S. Nagarkoti, SK Upadhyaya

P163: Analysis of biochemical responses of *Sesuvium portulacastrum* (L.) L. to copper exposure
Vinayak H. Lokhande, Vikas Y Patade, Sudhakar Srivastava, Penna Suprasanna, Manoj Shrivastava

P164: Mutating zoogloea ramigera for degrading organic matter in industrial effluentby trickling filter
Rutuja B Survase, Tanuja B Survase, Rajesh J Sharma

P165: Change detection analysis of sodic land using remote sensing & GIS technology in Unnao district, U.P., India
Droupti Yadav, Banwari Lal, Lakshmi Vikram

P166: Establishment of *Capra hircus* myometrium and evaluation antifertility effect of *Butea monosperma* seeds using histopathological techniques
Swapnaja S. Kulkarni, Nikita S. Jadhav, Vaishnavi H. Pisal, Rajesh J. Sharma

P167: Wild edible fruits an alternative resource for nutritional security from Sikkim Himalaya
Sandeep Rawat, Pema Bhutiya, Devendra Kumar, Indra D. Bhatt

P168: Exploring *in vitro* establishment and phytochemical profiling in *Ceropegia karulensis*: an endangered medicinal plant of Western Ghats: an approach for conservation and sustainable utilization
Meena Pandey, Ramesha H Jayaramaiah, Bhushan B Dholakia, Sachin A Punekar, Ashok P Giri

P169: Make a difference through environmental education
Rohini Dhage, Meena Pandey

P170: Perspectives and promoting sustainable development through disaster management
Sweta Kumari, Meena Pandey

P171: Smart farming using the internet of things at Chittoor district, Andhra Pradesh state, India
N. Sravanthi

P172: Large floods due to low inter-effects of sun, moon, earth
Krishna Mohan Agrawal

P173: Advanced spectroscopic studies of metal ions detection from industrial samples Tirupati, Andhra Pradesh, India
Katepogu Raju, Goda Maheswaramma