33rd Conference

of the Indian Institute of Geomophologists (IGI)
An Online International Conference

FOCAL THEME

Geomorphology and Environmental Sustainability

02-04 December, 2021

Prof. Sangita Srivastava
Vice Chancellor, University of Allahabad
Patron

Prof. A.R. Siddiqui
Convener

Prof. Anupam Pandey
Co-Convener

Dr. Ashwajeet Chaudhary
Organizing Secretary

Organized by:

Department of Geography
University of Allahabad, Prayagraj - 211002, U.P. (India)

ABSTRACT BOOK

Anandiben Patel
Governor, Uttar Pradesh

Raj Bhavan
Lucknow - 226 027

17 November, 2021

Message

I am indeed happy to learn that the Department of Geography, University of Allahabad, Prayagraj is organizing 33rd Conference of the Indian Institute of Geomorphologists on the theme 'Geomorphology and Environmental Sustainability' from 2nd to 4th December, 2021.

It is a matter of great satisfaction that the University is engaged in conducting Conference on such an important topic. I do hope that the efforts will bear fruits.

I extend my best wishes for the success of the event.

Anandi Patel

(Anandiben Patel)

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धर्मेन्द्र प्रधान
ଧର୍ମେନ୍ଦ୍ର ପ୍ରଧାନ
Dharmendra Pradhan

सत्यमेव जयते

मंत्री
शिक्षा; कौशल विकास
और उद्यमशीलता
भारत सरकार
Minister
Education; Skill Development
& Entrepreneurship
Government of India

MESSAGE

It gives me immense pleasure to know that the Department of Geography, University of Allahabad, Prayagraj is organising the "33rd Conference of the Indian Institute of Geomorphologists (IGI)" on the theme of 'Geomorphology and Environmental Sustainability'.

The decision to hold the online conference on such a relevant topic is commendable when the whole world is facing environmental issues like climate change, pollution, environmental degradation, resource depletion and global warming. We are aware of the fact that due to massive industrialisation, hasty deforestation and viciously growing consumption of fuel, electricity and water, or planet is getting hotter, the air becoming more polluted, and water getting scarcer. I hope that the discussions that will be held during the conference on Environmental Sustainability and the role of Geomorphology to overcome the present problems will be beneficial to the world.

I am confident that the online conference will conduct a scholarly enquiry about ways and means to maintain the necessary momentum of development and conservation of the environment as well. I congratulate the organisers and the participants and wish the conference a grand success.

(Dharmendra Pradhan)

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प्रो. धीरेन्द्र पाल सिंह
अध्यक्ष
Prof. D. P. Singh
Chairman

सत्यमेव जयते

ज्ञान-विज्ञान विमुक्तये

विश्वविद्यालय अनुदान आयोग
शिक्षा मंत्रालय, भारत सरकार
University Grants Commission
Ministry of Education, Govt. of India

MESSAGE

I am pleased to know that the Department of Geography, University of Allahabad, Prayagraj is organizing 33rd Conference of the Indian Institute of Geomorphologists (IGI) on the theme "*Geomorphology and environmental Sustainability*" during 2nd to 4th December, 2021.

The conference will bring all the Earth Scientists dealing with Geomorphology and allied disciplines on a common platform under the banner of IGI, encourage young research scholars doing research in geomorphology with emphasis on research related to human societies and its welfare such as environmental geomorphology, urban geomorphology, hazards and disasters etc., which will enable policy makers, scientists, engineers to understand hazards and take necessary steps for their mitigation. I am sure that the deliberations to be held at the conference would be helpful to the researchers.

I extend my best wishes to the organizers of the conference as well as to the participants.

D P Singh

(Prof. D.P. Singh)

5th November, 2021

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Ashishkumar Chauhan
Managing Director & CEO

BSE
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Message

I am pleased to know that the Department of Geography, University of Allahabad is organising a three day 33rd Online International Conference of the Indian Institute of Geomorphologists (IGI) on the theme Geomorphology and Environmental sustainability. The entire world has suffered increasingly due to a global pandemic over last two years. Unfortunately, we could see those things that we had never imagined even in our dreams. (Theme).

I am delighted that the conference is being organized in this backdrop that shows the resilience of Indian society and achievement of Indian science along with the hundred of health care worker at any level.

I congratulate the organizers for selecting this appropriate theme for deliberation. I am sure that this conference will provide a platform for all the stakeholders to discuss and deliberate upon different approaches to suggest how we can sustain ourselves from climate change and disasters. I hope that the deliberations of the conference on the very relevant theme of Environmental Sustainability will be beneficial to the world and the discipline of Geomorphology will play a key role in solving the problems that the present world is facing.

I extend my best wishes for the success of the conference and the publication of the souvenir of the occasion

I wish the conference great success.

With regards,

Ashishkumar Chauhan.

S&P BSE SENSEX

इलाहाबाद विश्वविद्यालय

सीनेट हाउस, प्रयागराज (उ.प्र.)- 211 002, भारत

(संसद के अधिनियम 2005 द्वारा स्थापित केन्द्रीय विश्वविद्यालय)

University of Allahabad

Senate House, Prayagraj (U.P.)- 211 002, India

(A Central University established by an Act of Parliament in 2005)

Professor Sangita Srivastava
Vice-Chancellor

प्रोफ़ेसर संगीता श्रीवास्तव
कुलपति

25th October, 2021

MESSAGE

I am delighted to know that the Department of Geography, University of Allahabad, Prayagraj is organizing the 33rd Conference of the Indian Institute of Geomorphologists (IGI) from December 02-04, 2021 under the leadership of Prof. A.R. Siddiqui. The theme of the conference "Geomorphology and Environmental Sustainability" is very relevant in times when the world has just experienced an unprecedented pandemic in recent history. Environmental sustainability is the need of the hour. We have to make the world a safe and secure place, not only for homo-sapiens, but for all other species on the earth, find new horizons and seek out and adopt new practices to minimize and prevent such disasters from happening. We have to save the planet, putting our heads together, in the problem, as you all are doing through this conference is the only way **'Out'**.

I am sure, this Conference will bring out new knowledge, which will be sustainable and of inclusive in nature.

I wish all the academicians good luck and I hope they shall be enriched by their participation.

(Sangita Srivastava)

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Message

It gives me immense pleasure to inform you that the 33rd edition of the international conference of the Indian Institute of Geomorphologists (IGI) is being organized and hosted by the Department of Geography, University of Allahabad from December 2-4, 2021.

The conference has 15 varied sub-themes which, deal with issues like climate change and extreme weather events that are reflected in different geomorphogical hazards impacting the lives and livelihoods of so many people. This is the most important feature of this year's conference as it gives special importance to hazards and disasters. While most casual observers group all hazards under one unit, this conference recognizes their uniqueness and has different sessions for geomorphological hazards, hydrological hazards etc. Sessions on geomorphological mapping of these hazards and their impact assessments will help in coping with problems and associated economic issues. Fluvial, arid, semi arid, glacial, periglacial, coastal processes are also some of the recurrent themes in geomorphology and these geomorphic processes bring significant change in physical and human environments.

I wish this conference a grand success and convey my greetings and congratulations to faculty member of Department of Geography, University of Allahabad for organizing this international event.

Date: November 26, 2021

(Prakash Chauhan)

दक्षिण बिहार केन्द्रीय विश्वविद्यालय

Central University of South Bihar

(A Central University Established By an Act of Parliament)

प्रो० कामेश्वर नाथ सिंह
कुलपति
Prof. Kameshwar Nath Singh
Vice Chancellor

Tel. : 0631-2229501
Email : vc@cub.ac.in
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MESSAGE

It gives me immense pleasure to learn that the Department of Geography, University of Allahabad, Prayagraj is organizing 33rd Conference of the Indian Institute of Geomorphologists (IGI) from 2nd December, 2021 to 4th December, 2021.

I feel delighted to congratulate Dr. A.R. Siddiqui, Head, Department of Geography, University of Allahabad for organizing Conference on the theme - "***Geomorphology and Environmental Sustainability***". This conference will encourage researcher, practitioner, scholars and other stakeholders in making them capable in creating new ideas, new techniques and pragmatic approaches towards resolving the issues. It will also contribute in developing the concept of Sustainable Development as a tool to bring development, not only to meet the present generation need but also to meet the future generation need.

I am sure that the theme of Conference will be widely discussed and the participants will have meaningful interaction and exchange of information during the course of the Conference.

I wish the organizers of the Conference and the participants a grand success.

(Prof. Kameshwar Nath Singh)

Place : Gaya
Date : November 25, 2021

जामिया मिल्लिया इस्लामिया
(केन्द्रीय विश्वविद्यालय)
मौलाना मोहम्मद अली जौहर मार्ग, नई दिल्ली-११००२५

JAMIA MILLIA ISLAMIA
(Central University)
Maulana Mohammad Ali Jauhar Marg, New Delhi-110025
(ACCREDITED "A" GRADE BY NAAC)

جامعہ ملیہ اسلامیہ
(مرکزی یونیورسٹی)
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प्रोफेसर नजमा अख़्तर
कुलपति

Professor Najma Akhtar
Vice Chancellor

پروفیسر نجمہ اختر
شیخ الجامعہ

Vice Chancellor's Message

The theme of the conference "Geomorphology and Environmental Sustainability" is very pertinent to the contemporary time. The role of various landforms and processes that shape the earth's surface need to be explored and geomorphologist all over the globe are engaged in this herculean task. They explore the dynamics of changing landforms and its impact upon the humans in different ecosystems. The need of sustainable environment is very prime to existence of human beings. The changing dimension of environment due to global warming and climate change has significantly impacted the humans as well as the interaction of humans with their environment. Thus, climate change and global warming has entrusted upon the scientific community a very significant work to explore this rapidly changing relationship between environment, geomorphic processes and its impact upon the human society. The better understanding of this complex yet very important relationship is necessary for a sustainable future. The present conference is therefore a need of the time and very important for the scientific discourse.

I congratulate the Department of Geography, University of Allahabad, Prayagraj and Indian Institute of Geomorphologists to organize this academic event. I wish the conference to be highly successful and hope the scientific discussions and deliberations will help to give significant inputs for global efforts in this important field of knowledge.

Najma Akhtar

(Prof. Najma Akhtar)

Prof. Talat Ahmad
FNA, FASc, FNA Sc, JC Bose National Fellow

Vice Chancellor
University of Kashmir
Hazratbal Srinagar - 190006
Jammu and Kashmir (India)

November 24, 2021

MESSAGE

It is indeed a matter of joy to learn that the Department of Geography, University of Allahabad, Prayagraj, India is going to organize 33rd Conference of the Indian Institute of Geomorphologists (IGI) on a contemporary theme "Geomorphology and Environmental Sustainability" from December, 02-04, 2021. The department of Geography has chosen a well thought focal theme for the conference because in recent decades the challenging issues of climate change, global warming and occurrences of extreme weather events have diverted the attention of the Earth Scientists, Climatologists, Environmentalists, Policy Makers and Researchers all over the globe. I am sure that the conference will prove instrumental in bringing together different experts on one platform for suggesting proven measures to achieve environmental sustainability through geomorphologic interventions.

My best wishes to the Department of Geography, University of Allahabad for the conference and best of luck for all its future endeavours.

Prof. Talat Ahmad

International Association of Geomorphologists

To
Prof. A. R. Siddiqui
Convener, 33rd IGI Conference
Department of Geography
Allahabad University, India

INAUGURAL MESSAGE

I am glad to know that the Department of Geography, Allahabad University, is going to organize the 33rd Annual Conference of the Indian Institute of Geomorphologists (IGI) and virtual International Seminar on 'Geomorphology and Environmental Sustainability', during December 2-4, 2021. In recent years, the Indian Institute of Geomorphologists (IGI) has been one of the most active National Scientific Members of the International Association of Geomorphologists (IAG) as proved by a series of successful initiatives that have been promoted to support our discipline in India and worldwide.

Geomorphic changes have been taking place since Precambrian Era. The rates of such changes were different during the Earth history because of changing climate and environmental conditions. During the Anthropocene, such changes have increased drastically because of human intervention posing serious threats and sustainability implications. Thus, geomorphic understanding is of utmost necessity, and geomorphologists should play a major role in land-use planning and environmental sustainability. From this point of view, the theme of the Seminar is of topical importance.

The whole Conference is arranged with 15 sub-themes. I am confident that the discussions in all sub-sessions will effectively find some means of preserving the Earth and its livelihood. I do not doubt that the organizers will organize the Conference in a befitting manner.

On behalf of the International Association of Geomorphologists (IAG), I wish the Conference a great success.

Modena, 27 November 2021

Prof. Mauro Soldati
IAG President

International Geographical Union--Union Géographique Internationale
Michael E Meadows, President
Department of Environmental & Geographical Science
University of Cape Town, Rondebosch, 7701, Cape Town, South Africa
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The publication just a few weeks ago of the 6th Assessment Report of the Intergovernmental Panel on Climate Change highlights the precarious nature of humanity's dependence on earth system processes and our vulnerability in these times of anthropogenic climate change. The world's political leaders gathered in Glasgow to attempt to work out a deal that will hopefully turn us away from what is increasingly looking like a global climate disaster. Moreover, as the pandemic continues to wreak havoc in so many countries, it is clear that dialogue and cooperation between scientists is now more important than ever. Over a period spanning more than three decades, geomorphologists in India, under the auspices of the Indian Institute of Geomorphologists, have demonstrated that such cooperation is vital in developing a more complete understanding of earth surface processes. In turn, it is unarguable that such understanding is essential if we are to achieve the Sustainable Development Goals. It is heartening, therefore, that the theme of the IGI meeting this year puts the issue of sustainability centre stage. I congratulate the Department of Geography at the University of Allahabad, under the dedicated leadership of Professor AR Siddiqui, in hosting the meeting and, in so doing, providing a sound foundation for fruitful discussion. On behalf of the International Geographical Union, I wish you great success in your deliberations and look forward in due course to reading the publications that will emerge from the networking and collaborations that will inevitably occur as an outcome of this important conference

Yours sincerely

M Meadows

Michael E Meadows BSc (Hons) Sussex Phd Cantab. FRGS FSSAG FRSSAF FAAS MEA
President: International Geographical Union

SORBONNE UNIVERSITÉ

Paris, November 9t[h] 2021

MESSAGE

As a former President of the IAG, I was able to witness the dynamism of the Indian geomorphology community and their extreme cordiality in all circumstances. I had also the opportunity during the 9th International Conference on Geomorphology in New Delhi in 2017 to pay homage to Professor Savindra Singh who initiated the creation of the Indian Institute of Geomorphology (IGI) in 1987. The Department of Geography of the University of Allahabad has played a leading role in the revival of our discipline and the IGI has been able to federate the community of Indian geomorphologists and allow the new generation to be increasingly present internationally. The 33rd conference of the Indian Institute of Geomorphology (IGI) entitled "Geomorphology and environmental sustainability" to be held at the University of Allahabad from December 2-4, 2021, organized by Prof. A.R. Siddiqui, Head of the department of Geography, under the patronage of Prof. Sangita Srivastava, Vice Chancellor of the University, is in keeping with this tradition of excellence. The 15 sessions of this conference are in line with the most innovative themes of our discipline and I wish all participants a fruitful exchange.
With my warmest regards to the entire community of Indian geomorphologists.

Eric Fouache
Professor at Sorbonne University
Former President of the IAG

Congratulations Message to the Organizers of the 33rd IGI Conference

Dear Professor A.R. Siddiqui, Professor Anupam Pandey, Dr. Ashwajeet Chaudhary, Dr. Vandana Shukla, and all geomorphologists in India,

Greetings! Namaste!

The Annual Conference of the Indian Institute of Geomorphologists (IGI) has now reached the 33rd Edition, which will be held online on December 2 to 4, 2021, under the organization by the Department of Geography, University of Allahabad, India. As a geomorphologist who has many friends and colleagues in India, I warmly welcome this conference, and would like to congratulate a group of people who successfully prepared this event, especially the four conveners at the University of Allahabad.

I am always impressed by the enthusiasm of Indian geomorphologists, who have been successful in organizing various important events including the Annual IGI Conferences and Young Geomorphologists Forums, and publishing numerous articles of international importance. This time I was again impressed when I looked at the well-organized conference circular and the web site in which many geomorphologists are listed, reflecting the good tradition of tight collaboration among Indian geomorphologists.

As a sort of representative of geomorphologists outside India, I send my best wishes for a very successful conference. I expect lots of interesting discussion and communications throughout the conference, under the good guidance of the skilled conveners.

Dr. Takashi Oguchi

T. Oguchi

Professor, Center for Spatial Information Science
The University of Tokyo, Japan

डॉ. मृत्युंजय महापात्र

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Dr. Mrutyunjay Mohapatra

Director General of Meteorology,
Permanent Representative of India with WMO,
Member of Executive Council, WMO

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नई दिल्ली–110003

Government of India
Ministry of Earth Sciences
India Meteorological Department
Mausam Bhawan, Lodi Road
New Delhi - 110003

Message

I am pleased to note that the Department of Geography, University of Allahabad, Prayagraj, Uttar Pradesh is organizing 33rd Conference of the Indian Institute of Geomorphologists (IGI) on the theme "Geomorphology and Environmental Sustainability" during 2-4 December, 2021.

In the present scenario of climate change, Geomorphology plays an important role especially for the Environmental Sustainability, since it touches various cycles of the ecosystem. I congratulate Department of Geography, University of Allahabad for selecting this apt topic for deliberation.

I am sure that this Conference will deliberate upon key areas of this issue and suggest measures for the benefit of the society.

(Mrutyunjay Mohapatra)

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International Association of Geomorphologists

Dated. 30.11.2021

MESSAGE

I am pleased to know that the Department of Geography, Allahabad University, will organize the thirty-third Annual Conference of the Indian Institute of Geomorphologists (IGI) and International Seminar on 'Geomorphology and Environmental Sustainability', during December 2-4. 2021.

Since the evolution of humans, different components of the earth's surface have been affected in different magnitude. As landform is one of the essential components of the environment, any type of change in the landform configuration affects the overall environment. Thus, we need to plan for a sustainable environment through landform analysis. From this point of view, the theme of the seminar 'Landform and Environmental Sustainability' is significant.

Out of 15 subthemes, one of the exciting sessions will undoubtedly be the Young Geomorphologists Competition. The conference will indeed be an International one because of the glorious presence of the President of the International Association of Geomorphologists (IAG), Prof. Mauro Soldati, to deliver the Inaugural Address and many other foreign geomorphologists.

I wish the Conference a grand success.

Prof. Sunil Kumar De
Vice-President, IAG

To
Prof. A. R. Siddiqui
Convener, 33rd IGI Conference,
Department of Geography, Allahabad University, India

Department of Geography
Delhi School of Economics
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Delhi -110 007

Prof. Suresh C. Rai
M. Sc., Ph.D.
Head
Secretary General
National Association of Geographers, India
Vice President
Asian Geographers Association

Date: 5/11/2021

MESSAGE

I am happy to know that that the Department of Geography, University of Allahabad is organizing 33rd Annual conference of the Indian Institute of Geomorphologists (IGI) on the theme "*Geomorphology and Environmental Sustainability*" during 2-4 December 2021. The organizers have chosen a very interesting and relevant topic for the conference. I hope that this conference will provide a common platform to the Geographers, researchers, planners, and decision makers to discuss the issues and to suggest some measures for development.

Wishing the faculty and students luck and success for all their future endeavours!

(Prof.S.C.Rai)

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Dr Prithvish Nag
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4-11-2021

Dear Professor Siddique,

I am delighted to know that the Department of Geography of the University of Allahabad, Prayagraj, is going to organize 33rd Conference of the Indian Institute of Geomorphologists (IGI) on Geomorphology and Environmental Sustainability in December, 2021. I do remember the contributions of Professor S.P. Chatterjee in Geomorphology when he brought out his D. Litt. thesis in a book form entitled *Le Plateau de Meghalaya* in 1936. Since then, this subject has developed by adding new dimensions in order to make it more relevant and applied. The topic of the conference indicates towards this direction. Needless to say that the role of geomorphologists has expanded not only to describe the complexities of the landform, but also to understand the processes which are linked with issues such as climate change, environment, sustainable development, policies at different levels and the like. Since the social and economic environments are associated with it, this subject becomes more pertinent.

I am sure that the geomorphologists who are likely to join on the occasion will whole heartedly contribute towards the goal of integrating this subject with other issues. The younger geomorphologists should be able to know where are the frontiers. A new era should be begun from this event with full of enthusiasm and dedication.

I am sure that this conference would prove to be memorial for all the participants.

With good wishes for its success.

Dr. Prithvish Nag

Prof. H.S.Sharma
Honorary President, CHEC- India
A Indian Chapter of Commonwealth Human Ecology Council, London
Editor, Annals of the National Association of Geographers, India (NAGI)

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Message

I am delighted to learn that the Department of Geography, University of Allahbad, Prayagraj, (UP), India is organizing 33rd conference of the Indian Institute of Geomorphologists (IGI) - an **online International conference** from 2 to 4 December, 2021. The focal theme of the conference is **Geomorphology and Environmental Sustainability,** which attracts global research communities to work on various aspects of environmental sustainability with geomorphological perspective. It has been realized that the adverse human impacts on environment are increasing dramatically and threatening the very foundation of sustainable development.

I am hopeful that the online International Conference will contribute substantially for achieving sustainable goals with reference to India.

I wish the event all success.

(Prof. H.S.Sharma)

Date: 04 November 2021

Dear Professor Siddiqui,

It gives me immense satisfaction to learn that the 33rd Conference of the Indian Institute of Geomorphologists (IGI) will be held by you and your able Team Members in the Department of Geography, University of Allahabad. The conference was perhaps earlier proposed to be held at Jodhpur, Rajasthan, but apparently the Organisers found it extremely difficult and restrictive to host it in view of the prevailing Covid-19 situation. Under the circumstance, and given the very short time left to the IGI Secretariat to hold the Conference within the calendar year, it indeed needed enough courage and a deep sense of belonging to come forward and to invite the delegates to one's University and to the Headquarters of IGI for the annual academic deliberations. This indeed is a praiseworthy step on your part. Your colleagues and students need also to be praised profusely for the courageous step. Indeed, your Department took several such bold academic steps earlier also, which will always be remembered by the IGI Members. You personally deserve Special Thanks for taking up the responsibility, especially because you yourself were seriously afflicted a few months ago by this dreaded disease, but did not let it overwhelm you by any means, either to hamper your regular task of managing the affairs of the Department, or to stop the holding of the Conference in time! The holding of the last Conference by Prof. Subhamita Chaudhuri was also a very courageous step, as she and her colleagues took the challenges personally and defeated the threats of the disease through adequate safeguards. Serious researchers of geomorphology across the country joined her in good numbers to make the 32nd Conference a great success. I am sure that the learned IGI Members and other fellow researchers in Geomorphology will come out again in good numbers to defy the threats of the disease, and make this 33rd Conference a grand success.

The theme chosen for the Conference, "Geomorphology and Environmental Sustainability", is very topical, especially as the academics and the policy makers world over are currently discussing at COP-26 of the IPCC the impacts of the emerging Climate Change issues, as well as the modalities to control them. I am hopeful that our researchers will take full advantage of this thematic platform, and will discuss their new findings and upcoming ideas for a better understanding of the problems and for remedial measures.

I look forward to yet another very successful academic event hosted by your department. Please accept my best regards.

Amal Kar.

Kolkata

(Former Principal Scientist and Head, Division of Natural Resources and Environment,
Central Arid Zone Research Institute, Jodhpur)

Abha Lakshmi Singh

NAGI, President Elect, 2021
UGC-BSR-BFF Awardee
Professor (Retd.)
DEPARTMENT OF GEOGRAPHY
ALIGARH MUSLIM UNIVERSITY
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Message

I am glad to learn that the Department of Geography, University of Allahabad, Prayagraj (Uttar Pradesh) is organizing an International online 33rd Conference of Indian Institute of Geomorphologists (IGI) from 2-4th December, 2021. The focal theme of the conference "Geomorphology and Environmental Sustainability" will attract Earth Scientists, Climatologists, Environmentalists, Policy Makers and Researchers from the world over. Fifteen sub-themes have been selected for paper presentation; original research contributions have been invited. This unique theme will definitely receive the right focus in the hands of conference participants both from within and outside the country.

I hope the deliberations and discussions at the conference will be fruitful and the participants will be greatly benefitted from their interactions. I wish the deliberations of the Conference a great success. I extend my best wishes and congratulations on this occasion to the organizers and the participants.

My best wishes for the success of the conference.

(Prof. Abha Lakshmi Singh)

Prof. Santosh Shukla (Rtd.)
- Member, Academic Council
- Dean, School of Applied Sciences
- Head, Department of General & Applied Geography
- Director, Institute of Distance Education
  Dr. H.S. Gour Central University, Sagar
- Director, Population Research Centre
  Ministry of Health and Family Welfare
  Government of India, New Delhi

29, Shanti Residency
Jabalpur Road, Neha Nagar
Makronia, Sagar- 470004 (M.P.)
Mobile : 9425495826
E-mail: sshukla.sgr@gmail.com

It gives me immense pleasure to know that Department of Geography, University of Allahabad, Prayagraj is organising **33rd Conference of the Indian Institute of Geomorphologists (IGI) an Online International Conference on Geomorphology and Environmental sustainability** from 02-04 December 2021.

Geographers have been successful in studying and analysing various dimensions environmental geomorphology, urban geomorphology, hazards and disasters and emerging issues of sustainable livelihood in last few decades by adopting their field oriented skills and expertise. Gauging the changing needs, geomorphologists sincerely have been reorienting themselves with improved methods of teaching as well as research. In recent years virtually every discipline has been enriched by adopting methodologies to study and analyse the emerging issues and problems considering their relevance to the identified specific target areas/people and **Geography is not an exception**.

I am confident that deliberations at the 33rd Conference will promote new ideas with innovative methods and techniques to study the issues related to the theme and subthemes of the conference. The academic interactions with the experienced researchers will prove immensely useful and will provide a new approach and directions to the young researchers working on geomorphology and its allied fields.

I congratulate the **Convener Prof. Siddiqui** and **members** of the **organising committee** for their initiative and efforts in organising the **33rd Conference of the Indian Institute of Geomorphologists** on the important theme.

I express my sincere best wishes for the 33rd Conference of IGI beyond expectations.

(Prof. Santosh Shukla)

Prof. A.R. Siddiqui, Head
Convener
33rdConference of the Indian Institute of Geomorphologists
Department of Geography
University of Allahabad
Prayagraj (U.P.)
India-211002

Dr. Rana Pratap Singh
(www.ranapratap.in)
Dean,Academic Affairs
Professor, Environmental Science
Former Dean, School for Enviromental Sciences
Former Head, Department of Environmental Science
Co-ordinator, Center for Industry Institution Partnership Program
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To,

Dr. A. R. Siddiqui
Professor & Head
Department of Geography
University of Allahabad
Prayagraj, Uttar Pradesh, India
Convener, 33rd IGI Conference
Secretary General,
Indian Institute of Geomorphologists

Dear Professor Siddiqui,

Thank you for your email in relation to the message for the **International Conference on Geomorphology and Environmental Sustainability** to be organized by Department of Geomorphology. The understanding of Geomorphology is a very essential component to ascertain Environmental Sustainability in era of Climate Change and Global Warming. Both biotic and abiotic components of the ecosystem are getting impacted by the Climate Change and extreme whether events for which effective adaptation and mitigation measures are essentially required. The knowledge and research advances in the field of Geomorphology shall be instrumental in mapping and monitoring of natural resources in changing agro-climatic and aqua-climatic conditions of different biomes on the earth. The various themes planned for different sessions are highly relevant to the main theme Geomorphology and Environmental Sustainability.

I convey my best wishes for great success of the mega event.

RPSingh

(Rana Pratap Singh) 12/11/21

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The Convener
Professor A.R. Siddiqui
Head, Department of Geography
University of Allahabad
Prayagraj, Uttar Pradesh

November 15, 2021

Dear Professor Siddiqui:

I am very pleased to learn that the Department of Geography, University of Allahabad which is the hallmark of excellence in higher education is hosting the 33rd Congress of the International Institute of Geomorphologists. The virtual meeting will be hosted by the University of Allahabad during December 02-04, 2021.

The focal theme of the conference is *Geomorphology and Environmental Sustainability*. This overarching topic is very pertinent where geographers can provide immense insights and understanding to the debate through their pluralistic epistemologies, scientific methodologies in studying environmental sustainability through the perceptive lens of geomorphologists. Climate change is considered to be anthropogenic and the world has reached a tipping point where if national, regional and local governments across nations do not address and reverse the trends of climate change the global climate will reach a catastrophic level. The increasing fossil fuel consumption and greenhouse gas emission has led to an accelerated process of climate change characterized by decreasing snow cover, recurrent droughts, floods, tsunami, earthquakes, hurricanes, wildfires, socio-economic vulnerability and fluctuating food supply across different parts of the world. The recent United Nations Climate Change Conference--COP 26 Summit in Glasgow has urged the global community to reduce the greenhouse gas emission by half to contain global warming to 1.5 degree Celsius above pre-industrial levels.

Thus, I wish the organizers success in bringing together young scholars, scientists and academicians in addressing such an important theme. This exchange of scholarship will help not only geographers and social scientists in cognate areas but also the students, government and the industry in understanding the contributions of geographers to regional climate change for a sustainable earth and delivering policy actions.

With best regards,

Sudhir Thakur

(Sudhir Thakur)
Professor, Department of Finance, Insurance and Real Estate (FIRE)
College of Business
California State University Sacramento
Sacramento, CA 95819-6088

MESSAGE

I am delighted to learn that the Indian Institute of Geomorphologists, a premier Institute of academicians and professionals is organizing the 33rd online International Conference on “Geomorphology and Environmental Sustainability” at the Department of Geography, the University of Allahabad, Prayagraj during December 2 - 4, 2021. The environment is a primary subject of our earth's surface and its interrelationship among organisms and daily activities. Sustainable development always encourages us to conserve and enhance our environmental resources. Geomorphologists are playing a vital role in managing and preserving the landforms of the earth's surface.

The theme “Geomorphology and Environmental Sustainability” has been quite appropriately chosen to suit the context of present environmental crises. I am sure, the deliberation in the conference and the presentation made by eminent speakers will not only generate interest but also through sufficient light on the achievements made in the Geomorphological studies for environmental sustainable development in the country.

I wish the conference all success in its endeavour.

(Prof. Devi Datt Chauniyal)
President
Indian Institute of Geomorphologists (IGI)

ANNUAL REPORT

Secretary General, IGI

The Indian Institute of Geomorphologists (IGI) aims to promote research on methodological advancement in the field of geomorphology in India. The idea of forming an association was conceived by Prof. Savindra Singh, Department of Geography, University of Allahabad during an International Conference on Geomorphology and Environment held from January 17 to 21, 1987 under his convenership in the Department of Geography, University of Allahabad wherein more than 200 delegates from European Countries and India participated and presented their research papers. After long discussion for two days regarding the name and logo of the association, its goals and objectives, mode of formation, constitution etc. were finally decided to call a general house meeting of all the delegates on January 19, 1987 to finalise the modalities. Ultimately the general house agreed that the name and logo should be Indian Institute of Geomorphologists and IGI respectively. The following objectives were formulated

1. To bring the entire earth scientist dealing with geomorphology and allied disciplines on a common platform under the banner of IGI.
2. To hold annual conferences in different places of the country.
3. To publish a research journal entitled Indian Journal of Geomorphology now it is Journal of Indian Geomorphology.
4. To coordinate research being carried out on geomorphology and allied disciplines in different universities and laboratories in the country,
5. To encourage young research scholars doing research in geomorphology by giving awards and certificates.
6. To give more emphasis on research related to human society and its welfare such as environmental geomorphology, urban geomorphology, environmental hazards and disasters and their management on different spatial and temporal scales etc.

Most of the above-mentioned goals and objectives of the IGI have been fulfilled. Till now 29th annual conferences of IGI with different focal themes have been organised at different places important being Andhra University, Waltare (First, 1988); Rajasthan University, Jaipur (twice); Poona University (twice); North Eastern Hill University Shillong (twice), North

Bengal University, Darjeeling (2000); Vishwabharti University Shantiniketan, Tamil University, Thanjavur, Annamalai University. Chidambaram: M. S. University of Baroda, Vadodara; Tirunelveli (Tamil Nadu), University of Allahabad (thrice), Kurukshestra University, Kunikshetra; Jammu University, Jammu; University of Delhi, Delhi; Banaras Hindu University, Varanasi; Tripura University, Agartala; Anna University, Chennai (2011); M. S. University, Baroda (2013), Vidyasagar University, Medinipur (2014), North Eastern Hill University (NEHU), Shillong (2015), University of Calcutta, Kolkata (thrice). In the year 2017 under the banner of IGI a mega event of Geomorphologists i.e. 9 ICG washeld in Vigyan Bhawan, New Delhi during 6 to 11 November, 2017. This was the first international conference on geomorphology held in India and the second ICG in Asia. The ICG is the official conference of the International Association of Geomorphologists (IAG) and is held once in every four years. The first conference was held in Manchester (U.K.) in 1985, the second one in Frankfurt (Germany) in 1989, third one in Hamilton (Canada) in 1993, fourth one in Bologna (Italy) in 1997, fifth one in Tokyo (Japan) in 2001, sixth one in Zaragoza (Spain) in 2005, Seventh one in Melbourne (Australia) in 2009 and the eighth one in Paris (France) in 2013. The main objectives of the conference were (i) to bring together leading and young geomorphologists to exchange and share their research findings on all aspects of geomorphology, (ii) to provide a platform for active researchers to present and discuss trends, innovations, challenges and solutions adopted in various fields of geomorphology, (iii) to advance knowledge related to earth surface processes, extreme events and natural hazards for the benefit of the society, and (iv) to foster capacity building for young researchers. Nearly 388 foreign delegates and 178 Indian delegates participated in the conference there were participation of 46 countries. 1G1 also released the Atlas of Geomorphosites in India during the inaugural function of 9th ICG conference. I must congratulate Professor Savindra Singh, President, 9th ICG; Professor Sunil Kumar De, Convener, 9th ICG and Professor V. S. Kale, Professor Sunando Bandopadhyay and entire IGI family for making the event successful. The 30th conference of IGI was held in the Department of Geography, Jamia Millia Islamia University, Delhi during 03-05 October, 2018

The family of IGI has grown rapidly with its life members exceeded to 600. It has been observed that young geomorphologists are coming very fast and they are doing quality research in the field of geomorphology. All the life members have contributed much in the growth and progress of this organization. I take this opportunity to extend a very warm welcome to all the delegates coming from various parts of the country I wish the conference a grand success.

Prof. A.R. Siddiqui

Prof. A. R. Siddiqui
Convener
33rd IGI Conference

THE INDIAN INSTITUTE OF GEOMORPHOLOGISTS (IGI)

Indian Institute of Geomorphologists (IGI) is the national platform exclusively dedicated to the research and development in the field of geomorphology in India.

The idea of forming an association was conceived by Professor Savindra Singh, former Head of the Department of Geography, University of Allahabad during International Conference on Geomorphology and Environment which was held at the University of Allahabad during 17 to 21 January, 1987. IGI was established on 19 January, 1987.

Now affiliated to the International Association of Geomorphologists, the primary objectives of the IGI are:

- to bring all Indian earth scientists dealing with geomorphology and allied disciplines on a common platform;
- to hold annual conferences in different parts of the country;
- to publish a research journal;
- to encourage young scholars in doing research in geomorphology; and
- to give emphasis on researches related to human society and its welfare viz. environmental geomorphology, urban geomorphology, environmental hazards and their management on different spatial and temporal scales.

Journal of Indian Geomorphology is the UGC-CARE listed annual publication of Indian Institute of Geomorphologists (Subject Group: Earth and Planetary Sciences).

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University of Allahabad

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In charge, Media, and Publicity
Dr. Vandana Shukla
Department of Geography, University of Allahabad,Prayagraj, Uttar Pradesh
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Prayagraj

Prayagraj, formerly Allahabad, situated at the sacred confluence of holy rivers, the ganga, the Yamuna, and invisible Saraswati, is a metropolis city in the Indian state of Uttar Pradesh. Astronomically, the city is situated at 25o 45‟ North latitude and 81o 85‟ East longitude. The most significant aspect of geophysical, geomorphological and geological location of the city is that it is situated in the intervening zone between the Gangetic plain in the north and the northern margin of peninsular India in the south. The city experiences a humid subtropical climate with an annual mean temperature of 26.1oC and monthly mean temperature of 19- 29oC. Allahabad is well-connected with other parts of the country by rail and road network. Varanasi is at a distance of 116 km and Kanpur is at a distance of 187 km from Allahabad. The
capital city, Lucknow is at a distance of 200 km from Allahabad.

University of Allahabad

Allahabad University was established on 23rd September, 1887. Its roots lie in Muir Central College named after Lt. Governor of United Provinces Sir William Muir in 1873. Popularly known as „Oxford of the East‟, Allahabad University is the fourth oldest university of India after Calcutta, Bombay and Madras University. In 1904, Allahabad University established its own teaching departments and instituted doctoral research programmes. In 1909 the present site was selected for the Library, the Senate House and the Law college. These buildings, which now house the Registrar's Office, Senate Hall and the English Department, were designed by Sir Swinton Jacob and their construction was approved in 1910. The University Senate hall was opened by then Lt. Governor Sir John Hewet in 1912. With the promulgation of the „Allahabad University Act of 1921‟ the Muir Central College merged with University.

In 1951, the University recognized certain local institutions as Associated Colleges authorized to teach undergraduate courses. Allahabad University has privilege to produce a host of distinguished politicians and statesmen including one President and two Vice- Presidents of the country, two former Prime Ministers, several State and Union Ministers, at least four Chief Justices of Supreme Court, besides a number of senior bureaucrats. Thus, the Motto of the University „Quot Rami Tot Arbores‟ (as many branches as many trees) proves true. In view of these prestigious achievements, the State Government of Uttar Pradesh accorded it formal recognition in July 1992 as a „Premier Institution‟. The demand for „Central Status‟ to the University in the centenary celebration of 1987, was fulfilled in May 2005, “The University of Allahabad Act, 2005” passed by both houses of Parliament. The President of India countersigned the bill declaring it as an „Institution of national Importance‟ on 23rd June, 2005. The University commenced functioning as a „Central University‟ on July 14, 2005 making it a red-letter day in the history of the University.

Presently the University has four faculties; Arts, Commerce, Law, and Science; three

university institutes: the Institute of Inter-Disciplinary Studies, the Institute of Professional

Studies, and the National Centre of Experimental Mineralogy and Petrology and one independent university Centre of Behavioural and Cognitive Sciences; one constituent institute: Govind Ballabh Pant Social Science Institute and eleven constituent colleges: Ewing Christian College, Chowdhary Mahadev Prasad Degree College, Allahabad Degree College, Shyama Prasad Mukherjee Govt. Degree College, Ishwar Sharan Degree College, Sandanlal Sawaldas Khanna Degree College, Arya Kanya Girls Degree College, Jagat Taran Girls Degree College, Rajarshi Tandon Girls Degree College, Hamidia Girls' Degree College and K. P. Training College.

In the light of the emerging requirement for specialised personnel in various fields, the University is managing a number of post-graduate professional courses like Institute of professional Studies (IPS), Centre of Food Technology and Centre of Computer Education. The University has established the Institute of Inter-disciplinary Studies (IIDS) in order to pursue a non-conventional paradigm for research activities. On the campus several new courses as Atmospheric, Ocean and Space, Science, Bio-Informatics, Bio-technology, Behavioural and Cognitive Science, Environmental Sciences, Food Technology, Information Technology, Intellectual Property Rights, Nano-Science and Technology, and Nutritional Sciences have been introduced since 14th July 2005 which will satisfy the need of hour and prove boon for the developing Indian Society.

The University is now exploring the new magnitude of the institutional achievement, by renovating its academic system, reinforcing and augmenting its teaching, research and residential facilities and pursuing social purposes in a coordinated manner, to keep pace with international standards in these areas and endow human resource with the capabilities to serve the nation in the special context of the challenges and imperatives of globalization.

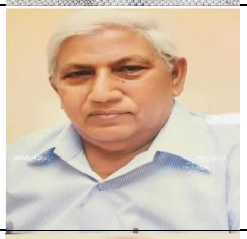
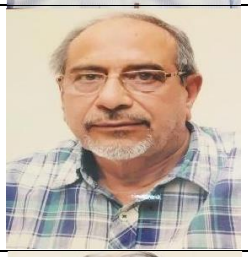
Department of Geography

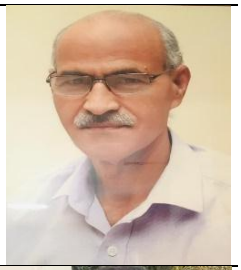
Department of Geography in Allahabad University was founded by Prof. Ram Nath Dubey. Under graduate teaching in geography began in 1937 yet a full-fledged department with PG teaching and research facility came into existence in 1946. The credit for this goes to the late Prof. R. N. Dubey, a doyen of Indian Geography, because it was his initiative that resulted into reality. Professor RN Dubey initiated the publication of 'National Geographers' in 1958. Some of the distinguished, illustrious students and prominent figures of the department of Geography, University of Allahabad are Professor M V Mathur, former Vice-Chancellor Rajasthan University, Padmashri and former Vice-President IGU, Prof. Mohammad Shafi, former Pro- Vice Chancellor AMU Aligarh, Professor RP Mishra, Professor MH Qureshi, R C Sharma, Professor Abha Lackshmi Singh etc. Many students from the department are in different fields of administration, science and technology and other services. There

are 2 geographical societies from the department which are globally recogniged. The first one of the societies is 'Allahabad Geographical Society' founded by Prof. R N Dubey. The volume of the Journal of the society 'National Geographer' was published in 1958. The second famous society is the 'Indian Institute of Geomorphologists'. The idea of forming the society and association for geomorphology students was conceived by Prof. Savindra Singh during the occasion of an international conference on „Geomorphology and Environment' which was held during January 17-21, 1987. Prof. Savindra Singh founded the 'International Institute of Geomorphology (IGI)' in year 1987. IGI is publishing a peer-reviewed journal "Journal of Indian Geomorphology" which is well recognizable journal among the geographers of the country and abroad. Prof. Savindra Singh is the founder of the society of IGI and bore the responsibility of the association as Secretary General till 2016. 2016 onwards Professor Dr A R Siddiqui has taken over the responsibility of Secretary-general of the institute and he is still holding this post of responsibility.

The Former Heads of the Department are as follows;

S. N.	Head of The Department	Year	Expertise	Pictures
1	PROF. RAM NATH DUBEY (M. A. D. Litt (Paris)	01.07.1937 – 14.11.1958	ECONOMIC GEOGRAPHY	
2	DR. MOHAMMAD NASIR KHA (M. A. D.Phil)	15.11.1958 – 22.08.1969		
3	PROF. RAM LAKHAN DWIVEDI, M.A. D.Phil	23.08.1969 – 31.07.1983	URBAN GEOGRAPHY, POLITICAL GEOGRAPHY	
4	PROF. RAM NATH TIWARI (M. A. D.Litt.)	01.08.1983 – 30.06.1991	ECONOMIC GEOGRAPHY, INDUSTRIAL GEOGRAPHY	

5	PROF. SAVINDRA SINGH (M.A. D.Phil)	01.07.1991 – 10.10.2004	GEOMORPHOLOGY	
6	PROF. RAM CHANDRA TIWARI (M.A. D.Phil)	11.10.2004 – 12.01.2005	SETTLEMENT GEOGRAPHY	
7	PROF. HARIKESH NARAYAN MISRA (M. A. D. Phil)	13.01.2005 - 14.02.2008	URBAN GEOGRAPHY	
8	PROF. KUMKUM ROY(M. A. D.Phil)	15.02.2008 – 14.02.2010	SETTLEMENMT GEOGRAPHY	
9	PROF. BHOLA NATH MISHRA(M. A. D.Phil)	15.02.2010 – 14.02.2012	URBAN GEOGRAPHY, REGIONAL PLANNING	
10	PROF. MANORAMA SINHA (M.A.m D. Phil)	14.02.2012 – 13.02.2014	POLITICAL GEOGRAPHY	
11	PROF. BRAHMANAND SINGH(M. A. D.Phil)	14.02.2014 – 13.02.2016	AGRICULTURAL GEOGRAPHY, LAND USE ANDRURAL DEVELOPMENT	

12	PROF. ALOK DUBEY(M. A. D.Phil)	14.02.2016 – 13.02.2018	ENVIRONMENT AL GEOMORPHOLOGY, REMOTESENSING & GIS	
13	PROFESSOR S. S. OJHA(M. A. D. Phil)	14.02.2018 – 14.02.2018	MICRO- CLIMATOLOGY, URBAN &FLUVIAL GEOMORPHOLOGY	
14	PROF. AZIZUR RAHMAN SIDDIQUI	14.02.2020 – Continuing	ARID ZONERESEARCH, URBAN GEOGRAPHY, REMOTE SENSING & GIS, AGRICULTURAL GEOGRAPHY	

Presently, the teaching staff involved actively in U.G., P.G. teaching and research consists of the following;

PROF. AZIZUR RAHMAN SIDDIQUI

(Head of the Department
(14.02.2020 – Continuing)

Dr. Azizur Rahman Siddiqui was born on 30th June 1970 in Fatehpur district and completed his schooling with first division, got his B.Sc. and M.Sc. degree from Aligarh Muslim University. Further, he completed his M.Phil. degree in the first division and was awarded D.Phil. on the topic „Regional Evaluation of Dissertation Hazards in Arid Lands of Western Rajasthan" in 2003 from
A. M. U. under the supervision of Prof. Salahuddin Qureshi, A.M.U. Having fourfirst bright career Dr. Siddiqu qualified
UGC-NET June 1997 and qualified Agricultural Research service –NET Oct. 1997 conducted by ICAR, New Delhi. He also completed a postgraduatediploma in Geoinformation Science and Earth Observation specialization. Geo-Hazard from the Indian Institute of Remote Sensing, Dehradun (HRSA- ISRO & ITC the Netherlands in April 2009.

Dr. Siddiqui enjoyed university fellowship for two years and was appointed as a permanent lecturer in NREC P. G. College, Khurja Bulandshahar, C. C.
S. University, Meerut on 05.11.1999 and later joined the department of geography, the University of Allahabad from 20.01.200. He was elevated as Reader in the year 2009, Associate Professor in 2012, and Professor in 2015. He has been teaching UG and PG classes since then. His specialization is in arid zone research, environmental geography, agricultural geography, urban geography, and application of remote sensing and GIS in land degradation studies.

He has supervised 12 Ph.D. students and published 38 research papers in peer-reviewed journals and attended more than 70 national and international conferences. He is also the author of three books.

He has visited France, Russia, China, Belgium, Netherlands, Switzerland, Italy, Austria, Greece, Nepal, etc. for academic purposes. Professor Siddiqui is the recipient of the excellence award in the year 2018 by the University of Allahabad. Prof. Siddiqui was also Dean Students Welfare two times. Presently he is having the responsibility of International Advisor of Foreign Students, Chairman Data Cell, Nodal officer NIRF/AISHE, etc. He is holding the post of Senior Vice President Allahabad University Teachers Association (AUTA) since 2015. Since 14 February 2020, Prof. Siddiqui has been serving as the Head of the Department of Geography. He is also holding the post of Secretary General of Indian Institute of Geomorphologists (IGI) since 2016. He had delivered several invited lectures in Indian institutes and UGC HRD

PROF. ANUPAM PANDEY

Prof. Anupam Pandey has been associated with Department of Geography, Allahabad University for last 25 years as a student, researcher and faculty member. He has been teaching at Allahabad University since last 20 years and is presently Professor in Department of Geography, Allahabad Central University, Allahabad. During the teaching tenure he was selected for M.Sc programme on Remote Sensing and Geographic Information Systems conducted jointly by Indian Space Research Organization (ISRO) and International Institute for Geo- Information Science and Earth Observation at Enschede, Netherlands. At present dedicated for exploring new avenues for application of Remote Sensing and GIS in different aspects of Geography and their Cartographic representation.

Delivered over 60 Lectures in different Orientation Programmes, Refresher Course, Induction Programmes, Summer and Winter Schools at Human Resource Development Centre (HRDC) Academic Staff College at University of Allahabad, and various other Institutions during last five years. Resource person in an International programme conducted at Indian Institute of Remote Sensing (IIRS), Dehradun by Indian Space Research Organization (ISRO). More than 50 papers presented at national and international seminars and workshops as part of guest lectures and research presentations in last five years. Authored four books (One in Co-authorship with Prof. R. P. Mishra). Member of different professional bodies relating to Geography like NAGI, IIG, IGI, DGCI and ISRS.

Dr. ASHWAJEET CHAUDHARY

B.A. (DDU Gorakhpur University),
M.A. (DSE, Delhi University),
Ph.D. (Universityof Allahabad)

Presently an Associate Professor in the Department of Geography, University of Allahabad and have teaching experience of around 16 years at both undergraduate and postgraduate levels. His research areais primarily the geographic dimensions of man-environment relationship andEnvironmental is ambit of Urban and Welfare Geomorphology. Sustainable and welfare cities, quality of city environment and cities of socially-economically marginalised people are the pivotal issues of his recent research publications. His research endeavours revealed that Indian cities have developed some common „urbanisation-related-syndromes" namely deteriorating urban infrastructure, starving basic amenities, fast depleting surface and groundwater resources, choking rivers, disappearing greenery, colossal vehicular pollution, widespread slums and squatters and the increasing „risk-vulnerability" of city dwellers having poor „risk-perception".

DR. VANDANA SHUKLA

Other Staff includes **Dr. Vandana Shukla** and she is having specialisationin Cartography.

Office Staff of the Department

1. Jitesh Kumar, Senior Office Assistant
2. Ganga prasad, Lab Attendant
3. Mehtab Alam, Lab Attendant
4. Rakesh Kumar, Parichar
5. Arjun Chauhan, Peon
6. Shivram, MTS
7. Ghissoo, Sweeper
8. Raj Bahadur, Gardener

CONTENTS

Abstract No. A1

देवप्रयाग विकासखण्ड, टिहरी गढवाल, उत्तराखण्ड का भ्वाकृतिक अध्ययन

हरिकेष[1] एवं डॉ0 मुक्ता राजे[2]

[1]रिसर्च स्कालर, [2]एसोसिएट प्रोफेसर, सहकारी पी0 जी0 कालेज मेंहरॉवां, जौनपुर

मो.: 9451455059, *E-mail: harikesh9450@gmail.com*

भौगोलिक विवेचना में भ्वाकृतिक अध्ययन एक महत्वपूर्ण आधार प्रदान करता है। पर्वतीय क्षेत्रों में तीव्र दर से बढ़ती हुई जनसंख्या भू – संसाधन को निष्चित रूप से प्रभावित करती है तथा बढ़ते भू–अवनयन तथा उसकी अनदेखी कई तरह की समस्याओं को जन्म दे रहे हैं। निर्वनीकरण, अनुचित निर्माण कार्य से मृदा अपरदन पारिस्थितिकी असन्तुलन जैसी समस्याएं उत्पन्न हाती हैं। इस शोध पत्र में अध्ययन के लिए देवप्रयाग ब्लाक, टिहरी गढ़वाल, उत्तराखण्ड का चयन किया गया है। उच्चावच, षैल संरचना, धरातलीय प्रवाह मृदा विषेशताएं तथा प्राकृतिक वनस्पतियो के आधार पर अध्ययन क्षेत्र को भू–आकार और संरचना के आधार पर भ्वाकृतिक प्रदेशों में वर्गीकृत किया गया है ।

1. उच्च भूमि प्रदेश
2. कगार प्रदेश
3. भ्रंष क्षेत्र
4. मैदानी प्रदेश

प्रस्तुत अध्ययन अवलोकन तथा क्षेत्र सर्वेक्षण पर आधारित है। द्वितीयक ऑकणों का स्त्रोत *NIDM* है। मानचित्र निर्माण *ARC GIS* एवं *BHUVAN PORTAL* द्वारा किया गया है । व्यवस्थित रूप में आंकलन करके सीमांकित भ्वाकृतिक प्रदेश ,मृदा एवं वन संरक्षण ,कृषि विकास तथा निर्माण कार्य के लिए बेहद महत्वपूर्ण हैं । ये प्रदेश समग्र क्षेत्र के सामाजिक आर्थिक विकास के नियोजन में निश्चित ही सहायक होंगे ।

प्रमुख शब्दावली – भू–अवनयन , निर्वनीकरण, प्राकृतिक असन्तुलन, मृदा अपरदन , भ्वाकृतिक प्रदेश ।

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Abstract No. A2

रायबरेली जनपद के सई नदी बेसिन का अपवाह तन्त्र तथा उसके प्रभाव

[1]प्रीती श्रीवास्तव, [2]डा0 मुक्ता राजे

[1]शोध छात्रा, [2] एसोसिएट प्रोफेसर, सहकारी पी.जी. कालेज मिहरावां, जौनपुर

मो. 8881334907 E-mail: pritisrivastava006@gmail.com

मानव संस्कृति व सभ्यता के विकास में अपवाह प्रणाली का एक महत्वपूर्म स्थान है। अध्ययन क्षेत्र का सामान्य मन्द ढाल उ0प0 से द0पू0 की ओर है। नदियाँ उच्चावच स्वरूप के ढाल का अनुसरण करती हुई समानान्तर प्रवाह का अनुसरण करती है। प्रस्तुत अध्ययन क्षेत्र उ0 प्र0 के रायबरेली जनपद का सई नदी बेसिन का क्षेत्र है। इसका अक्षांशीय विस्तार 25°57’ उत्तरी अक्षांश से 26°37’ उत्तरी अक्षांश है तथा देशान्तरीय विस्तार 80°52’ पूर्वी देशान्तर से 80°37’ पूर्वी देशान्तर है। मानचित्र निर्माण के लिए टोपोशीट सं0 63B/14, 63F/2, 63F/6, 63B/15,63F/3, 63F/7, 63F/11, 63F/4, 63F/8,63F/12,63G/5, 63G/9 का प्रयोग किया गया है। इसके साथ ही Arc GIS के द्वारा सेटेलाइट इमेजरी काप्रयोग किया गया है। प्रस्तुत अध्ययन रायबरेली जनपद के सई नदी बेसिन के

अपवाह तन्त्र के महत्व को दृष्टिपात करने के ले प्रस्तुत किया गया है। जल अपवाह प्रणाली नदी क्रम द्वारा निर्मित योजना विशेष का परिचय कराती है। जल अपवाह प्रणाली जल आपूर्ति का प्रमुख स्रोत है। सुव्यवस्थित अपवाह तन्त्र जल संसाधन को उपलब्ध कराने के साथ-साथ क्षेत्र विशेष की मृदा उर्वरता को भी प्रभावित करती है। सई नदी की अन्य सहायक नदियाँ सततवाहिनी नहीं है इन्हें 'नैया' नदियाँ कहते हैं। इसके जल सतह सामान्य़ धरातल से काफी नीचे होने के कारण इसके जल का उपयोग सिंचाई के लिए पर्याप्त मात्रा में नहीं हो पाया है, यह केवल समीपवर्ती तटीय भाग में अत्यल्प सिंचाई की पूर्ति करती है। जल अपवाह प्रणाली अनेकानेक कारकों द्वारा प्रभावित होती है तथा यह स्वंय अनेक स्थानिक , सामाजिक अभियुक्तताओं को भी प्रभावित करती है। ये कारक भ्वाकृतिक स्वरूपों की व्याख्या करने में अधिक सहायक होते हैं।

Keyword- अपवाह, उच्चावच, अनुसरण, आपूर्ति, सततवाहिनी।

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Abstract No. A3

ESTIMATION AND SUSTAINABLE DEVELOPMENT OF GROUNDWATER RESOURCES IN WESTERN HARYANA PLAINS OF NORTHERN INDIA

Vinod Kumar
Ph.D Scholar, Discipline of Geography, IGNOU

Changing land use and land cover pattern and water concerns are inextricably linked to each other in the Western Haryana Plains. Water is the lifeline for humanity and a critical resource for the future of mankind. While its availability is more or less constant, its demand is increasing due to a host of human activities. It is a basic biological need for humanity. The use of water in all sectors of life like agriculture, industries, and household makes it more precious but due to increasing population, agricultural development and industrialization leads to an increase a lot of pressure on this valuable resource. Groundwater is the most precious and largest source of freshwater that gets replenishment mainly from precipitation. The overutilization and mismanagement of this most basic resource have led to problems of its scarcity and deteriorating quality. So, it is very important to assess the groundwater development for its sustainable utilization in the Western Haryana Plains. For the assessment and development of groundwater resources methodology adopted from the methodological part suggested by Ministry of Water Resources (MOWR), Government of India. In the present study, the assessment of Ground water is made both for the kharif and rabi seasons for the period of 44 years. The ground water balance equation suggested in GWREC-97 is very useful. Hence for the suitability to assess the groundwater resources, administrative blocks could be taken as an assessment unit. It is observed that among 31 blocks 8 blocks falls under Over Exploited category, 04 in Critical category, 04 in Semi Critical category and 15 blocks falls under safe category.

Keywords: Estimation, Sustainable Development, Groundwater, Western Haryana Plain.

Abstract No. A4

LAND DEGRADATION

Dr. Anil Kumar Yadav*
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Land degradation is a recognized problem worldwide because of its potential threat to land resources which interrelates with other global environmental issues. The manifest of land degradation include deterioration of range lands, degradation of rainfed crop lands, water logging, salinization of irrigated lands, deforestation and destruction of woody vegetation growth, encroachment of mobile sand bodies and declining availability or quality of water. The Impact of land degradation is more severe and distinct in weak and fragile ecosystem due to their inherent morphological vulnerability and climatic severity. Land is understood as a terrestrial ecosystem that includes not only soil resources but also water, vegetation, climatic attributes and ecological processes (Scher and Yadav, 1996).[1]

It also refers to a temporary or permanent decline in the productive capacity of the land, or its probable potential, according to report of ICAR (Indian Council of Agriculture Research) 187.7 Million hectare i.e. 57.1 percent of the geographical area of India has been arrested by various types and degrees of land degradation.[2] The problems of land degradation are more serious in tropical regions where communities livelihoods depends on land productivity (e.g. food production and products from forest) and the land and soil resources are exposed to natural constraints land degradation is defined as either the persist at reduction of the land biological and or economic production capacity.[3] The relationship between land degradation and population trends has always been of great concern among the scientists, academician and policy makers of the country. The planning and management of land is related to food security aspect of billion mouths. In the present study an attempt has been made assess the relationship and impact of land degradation on production potential sustainability of the study area.

The present study is an attempt to examine the relationship between the fragility of the ecosystem, changing land use scenario and population dynamics with respect to food availability prospects in Banda District of Uttar Pradesh. The process of land degradation in any region clearly affect the pattern of human activities. Land degradation also affects socio economic aspect of the inhabitants. An attempt have been made to identify the critical and dominant factor in explaining about the personality of the study area.

***Keyword*:** Land degradation, Salinization, Deforestation, Livelihoods, Sustainability.

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Abstract No. A5

IMPACT ANALYSIS OF WATERSHED MANAGEMENT PROJECTS ON AGRICULTURAL DEVELOPMENT

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The watershed management is widely suggested and used technique for agriculture development in different climatic conditions. The present paper focussed on Impact analysis of watershed management projects (WMPs) on agricultural development in upper section of River Mula basin in Maharashtra (India). The study area divided into micro-watersheds using SRTM DEM data. The impact of WMPs on agricultural development analysed based in estimated selection priorities and agricultural development in micro-watersheds. The map showing selection priories prepared using morphometric techniques and map showing agricultural development prepared based on cropping pattern. The analysis shows no significant impact of WMPs on agricultural development in the selected study area.

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Abstract No. A6

कृषि पर सिंचाई संसाधनों व पर्यावरण का प्रभाव – 2001 – 2016 पाली जिले (राज.) के सन्दर्भ में अध्ययन

1. सुखदेव मेघवाल (शोधार्थी) 2. डॉ ललित सिंह झाला (शोध निदेशक)

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वर्तमान समय में कृषि क्षेत्र में आधुनिक तरीकों के प्रयोग से कृषि उत्पादन व इसके सकल क्षेत्र में अभूतपूर्व वृद्धि हुई है। मुख्य रूप से सिंचाई साधनों एवम् उन्नत बीजों व रासायनिक खादों का मुख्य योगदान है। बीसवीं शताब्दी के मध्य के बाद सिंचाई साधनों में बदलाव आने से कृषि उत्पादन में निरंतर वृद्धि हो रही है और यह आवश्यक भी है क्योंकि विश्व की विशाल जनसंख्या की उदर पूर्ति के लिए कृषि उत्पादन बढ़ाना जरूरी है। लेकिन पर्यावरण जैसी समस्याओं से इस पर प्रतिकूल प्रभाव पड़ा है।

इस शोध क्षेत्र का अध्ययन विषय राजस्थान के मध्य में अरावली के पश्चिम में गोदी में स्थित पाली जिला है, जहां 2001 से 2016 तक सिंचाई के साधनों में जो बदलाव आया है, उसका कृषि पर क्या प्रभाव पड़ा उसका अध्ययन किया गया है। इस क्षेत्र में मुख्य रुप से खरीफ की फसलें बोई जाती है, जो वर्षा आधारित होती है।

इस प्रकार अध्ययन क्षेत्र में विगत वर्षों में सिंचाई साधनों का अधिक उपयोग होने से इस क्षेत्र का आर्थिक विकास, सामाजिक, सांस्कृतिक विकास के साथ-साथ भौगोलिक क्षेत्र में परिवर्तन देखने को मिला है। जो इस क्षेत्र के उन्नति का सूचक है तथा इस क्षेत्र का भविष्य उज्ज्वल हैं। परन्तु मानवीय कारणों से कुछ पर्यावरणीय समस्याएं उत्पन्न होने से कृषि पर बुरा प्रभाव भी पड़ा।

कुंजी शब्द- सिंचाई साधन, कृषि उत्पादन, आर्थिक विकास, लोगों के जीवन स्तर में सुधार, सिंचित क्षेत्र में वृद्धि, पर्यावरणीय समस्याएं।

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Abstract No. A7

DRINKING WATER QUALITY & HEALTH ISSUES

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Water is a basic human need and a limited natural resource. It is also a precious national asset. In the recent decades, human demand and misuse of water resources have continued to grow. India has 2.4 % area of the earth, 2.45% of world's fresh water resources and 16.93e% of global population to support within its limited resources. Out of total water consumed by human being, more than 50% of it is consumed for industrial activity & only small portion is used for drinking purpose.

Drinking water in India is polluting rapidly. The pollutants usually associated with industrial effluents are organic matter, inorganic dissolved solids fertilizing materials, thermal constituents in the form of heat, suspended solids and microorganism and pathogens. Thermal pollution of industrial effluent caused deoxygenation and causes serious ecological problem. The excess level of Dissolved Solids such as chlorides, fluorides etc in drinking water can cause stomach upset, fever and impart salty taste to water. The paper discusses the Pollutants which are responsible to pollute drinking water quality and associated diseases. he paper also suggests some remedies to remove impurity in drinking water.

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Abstract No. A8

बीहड़ भूमि एक पर्यावरणीय समस्या – बुंदेलखंड के विशेष सन्दर्भ में

डा. रेखा विश्वकर्मा

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भूमि प्रकृति द्वारा पृथ्वी को दिया सीमित संसाधन है। भूतल का 71% भाग जलमग्न है एवं शेष 29% भाग ही स्थल है। यह संसाधन कृषि एवं मानव सभ्यता की जननी है। कृषि की दृष्टि से ऊपरी परत ही सर्वाधिक महत्वपूर्ण होती है। भू – क्षरण प्राकृतिक एवं मानवीय दोनों कारणों से होता है। भूमि का क्षरण सतही एवं अवनलिकाओं के रूप में होता है। अवनलिका कटाव से भूमि उबड़ खाबड़ हो जाती है, ऐसी भूमि कृषि एवं मानवीय आवास के अयोग्य हो जाती है। बुंदेलखंड की मिट्टी में संयोजन क्षमता का आभाव है। इस सम्पूर्ण पठारी प्रदेश में बड़ी नदियों की संख्या काम है। परन्तु सहायक नदियों एवं बरसाती नालों के तेज बहाव से मध्य प्रदेश के दतिया, टीकमगढ़, छतरपुर एवं पन्ना जिले एवं उत्तर प्रदेश के झाँसी, ललितपुर, महोबा, हमीरपुर, बाँदा, जालौन जिलों में मिटटी कटाव की प्रक्रिया अति तेज हो जाती है। नालीदार कटाव से समस्त क्षेत्र "मृत भूमि में परिवर्तित हो जाता है"। वनस्पति रहित भूमि पर जल वृष्टि सीधे मृदा पर होती है जिससे भूमि की ऊपरी सतह की मृदा बह जाने से भूमि असमतल हो जाती है। जिससे जल बहाव द्वारा गहरी दरारें बन जाती है, इससे बीहड़ो का उद्भव होता है।

मध्य प्रदेश में 6.83 लाख हे० भूमि बीहड़ बन चुकी है । जिसका 21% बुंदेलखंड में है, इस क्षेत्र की 1.43 लाख हे० भूमि बीहड़ में आ गयी है। यहाँ भूमि क्षरण की दर 0.12% है। सर्वाधिक गहरे बीहड़ मध्य प्रदेश के छतरपुर एवं दतिया जिलों में पाए जाते है। केन एवं धसान नदियों के मध्य बसे

छतरपुर बीहड़ संकट गंभीर रूप ले चुका है। वर्ष 1971 में यहाँ 40,000 हे० पर बीहड़ था, वर्ष 1992 में 42,000 पर इसका विस्तार हो चुका है। इस प्रकार बीहड़ क्षेत्रों में दिनों–दिन वृद्धि होती जा रही है। दतिया जिले में वर्ष 1971 में जहाँ 26,000 हे० भूमि पर बीहड़ थे। वहीं आज 30,000 हे० भूमि बीहड़ के अन्तर्गत आ चुकी है।

एक इंच मिट्टी को बनाने में प्रकृति को 100 से 500 वर्ष लग जाते है। बुंदेलखंड में भूमि को बीहड़ होने से रोकना अत्यावश्यक है। अधिकांश भूमि पर घने वृक्ष लगाकर बीहड़ बनने से रोका जा सकता है

प्रयुक्त शब्द – भू–क्षरण, बीहड, प्राकृतिक, संसाधन, अवनलिका

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Abstract No. A9

DELINEATION OF GROUNDWATER POTENTIAL ZONES IN KORDKHED WATERSHED OF LENDI RIVER USING GEOGRAPHICAL INFORMATION SYSTEM (GIS) TECHNIQUES

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In the present work, groundwater potential zones (GPZs) of Kordkhed watershed (130.8 sq km area i. e. 5.16% of the whole Lendi river) a tributary stream of Lendi river in central Maharashtra is undertaken. Geographical Information System (GIS) techniques are used for preparation of the maps and data manipulation. Geologically, whole area of the watershed is covered by Deccan Volcanic Basaltic (DVB) of late Cretaceous to early Eocene age. For GPZs study, linear, areal and relief morphometric parameters are used. The lineament and lineament density, slope, drainage density, soil, normalized vegetation index (NDVI), land use land cover and hydrogeomorphology are also studied.

In the watershed, total number of streams is 240 and length of all the streams is 215.1 km. Moderate drainage density and stream frequency indicates an area is impermeable in nature of lithology. The shape of the watershed is elongated. The relief of the area is pointing towards moderate to gentle sloping surface of the watershed. Lineament density and drainage density of the area provides indirect information about the surface impermeability. The land use land cover and NDVI study shows that the very less availability of the surface water in summer season in this area. Hydrogeomorpholically, present study is classified as alluvial plain, pediplain, pediment, moderately dissected and highly dissected plateau area. Good quantity of groundwater is available in alluvial plain, pediplain whereas moderate to poor availability is in pediment, moderately dissected and highly dissected plateau area.

Keywords: GIS, Groundwater, Morphometry, Watershed.

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Abstract No. A10

GREEN MUSEUMS AND THE CONCEPT OF SUSTAINABILITY: AN OVERVIEW

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Today, the world is facing an environmental crisis that affects all regions of the world and all levels of society. Greenhouse gas emissions are leading to a potentially catastrophic rise in global climate temperatures. Plants, animals, and ecosystems are rapidly nearing extinction.

The politically charged issue of climate change has found its way into museums. A good number of museums of the developed countries are responding to the environmental crisis in a more positive way, by incorporating sustainability into their operations and programming. In the museum field, such institutions are known as "**green museums**".

A **green museum** is a museum that incorporates concepts of sustainability into its operations, programming, and facility. Many green museums, but not all, use their collections to produce exhibitions, events, classes, and other programming to educate the public about the natural environment.

Green museums are a recent trend in museum management and are earning great interest among the professional community and literature about museum sustainability is flourishing. Within two years, green museums were twice the cover story for the professional publication of the American Association of Museums (AAM).

In India, this concept is yet to take a mind space in to museum professionals. Though, some natural history museums of India like Regional Museums of Natural History under the control of National Museum of Natural History (NMNH), New Delhi, have started incorporating the green practices in to its functioning to support the concept of sustainability. But, other museums and cultural institutions have to go long.

Present paper is based on certain observations of eminent scholars, recommendations of the conferences and professional associations on the significance of green museums and the concept of sustainability. It would be a window for the Indian museum professionals to understand, adopt and execute the green practices and sustainability in to their museums.

Key Words: Green Museum, Sustainability, Climate Change, Environmental Crisis, Ecosystem

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Abstract No. A11

HYDRO-GEOMORPHOLOGIC ASPECT AND DRAINAGE SYSTEM ISSUES - A CASE STUDY OF RANCHI CITY

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Ranchi city, located on the Ranchi Plateau, is rich in drainage features, but the haphazard growth of the city has created many problems. However, the hydro-

geomorphic issues may reach a satisfactory solution by futuristic urban planning. The area shows a dendritic pattern, which indicates less percolation and maximum run-off. Here, the drainage pattern is sub-dendritic on a gentle slope. Hydro-geomorphically, the region is classified into different zones covered by residual hills, weathered shallow plateau, weathered moderate valley, valley gullied, and plateau slightly dissected residual hills. They are the products of pedeplanation, which reduces the original mountain mass into a series of scattered knolls standing on the pediplains. But the morphometric surface of hydrology is changing in the area of the urban settlement; rivers, nallas, ponds-all are affected.

Inhabitants of Ranchi city are facing a water crisis due to the changing geomorphic features. The process of urbanisation and industrialisation from the last 30 years has caused changes in the water table due to decreased recharge and increased withdrawal. Many of the small ponds that were the primary water source in the surrounding areas are now filled for different construction purposes affecting the water table. Lots of deep- boring in the Ranchi city has also forced the water table to move down, and the Ranchi plateau consists of metamorphic rocks that are relatively impermeable and hence serve as poor aquifers. They bear groundwater only in their weathered top portion which rarely exceeds 10 meters

Urbanisation creates an environmental crisis if the growth does not follow the parameters of sustainable development. Ranchi city is facing environmental crisis - some of them are man-made and some are natural. The study focuses on some of them with their geomorphic solutions.

Key Words: Aquifer, dendritic pattern, hydro-geomorphic issues, morphometric surface, percolation, pediplain.

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Abstract No. A12

उत्तर प्रदेश के महाराजगंज जनपद के भूजल में आर्सेनिक की स्थिति एवं इससे मानव स्वास्थ्य पर पड़ने वाले प्रभाव

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प्रस्तावना : जल मानव सहित सभी जीव–जंतुओं एवं वनस्पतियों के जीवन का एक महत्वपूर्ण घटक है। जल के बिना जीवन की कल्पना ही नहीं की जा सकती। लेकिन मनुष्य के भौतिकवादी दृष्टिकोण, बढ़ता औद्योगिकरण एवं नगरीकरण, रासायनिक उर्वरकों का प्रयोग, कीटनाशकों का अनियंत्रित प्रयोग व जनसंख्या में हो रही वृद्धि तथा जनमानस की प्रदूषण के प्रति उदासीनता के कारण आज जल प्रदूषण समस्या ने विकराल रूप धारण कर लिया है।

विश्व के अनेक भागों के भूजल में आर्सेनिक पाया गया है। भूजल में आर्सेनिक की उपस्थिति मात्र ही मानव के लिए अवांछनीय है। पेयजल में आर्सेनिक की वांछित सीमा 0.05 मिलीग्राम प्रति लीटर तक अनुमन्य है। मानक से अधिक आर्सेनिक युक्त पेयजल को लंबे समय तक सेवन से व्यक्ति आर्सेनिक

किरैटोसिस नामक रोग से ग्रस्त हो जाता है। इसके साथ ही त्वचा कैंसर, मूत्राशय, फेफड़े और गुर्दे के कैंसर की आशंका बढ़ जाती है। महाराजगंज जनपद उत्तर प्रदेश राज्य के उत्तर पूर्व भाग में स्थित गोरखपुर मंडल का एक भाग है जो आर्सेनिक की समस्या से ग्रस्त है। जहां आर्सेनिक की मात्रा (0. 05 मिलीग्राम प्रति लीटर) से अधिक है जिससे जनपद में
त्वचा संबंधित बीमारियों का प्रकोप बढ़ता जा रहा है। अतः जनपद के भूजल में आर्सेनिक की स्थिति का अध्ययन आवश्यक हो गया है ताकि इनके रोकथाम के कुछ उपाय किए जा सके।

मुख्य संकेत– आर्सेनिक, जल प्रदूषण, स्वास्थ्य

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Abstract No. A13

प्राकृतिक जलधारों के संरक्षण में महिलाओं की भूमिका एवं सांस्कृतिक महत्व : रुद्रप्रयाग जिले के नारी गाँव का व्यैक्तिक अध्ययन

ROLE OF WOMEN IN CONSERVATION OF NATURAL SPRINGS & CULTURAL SIGNIFICANCE: A CASE STUDY OF NARI VILLAGE OF RUDRAPRAYAG DISTRICT, UTTARAKHAND

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संस्कृति, एक समाज के विभिन्न जाति, वर्ग, समुदाय व क्षेत्र का प्रतिरूप है। भारत के पर्वतीय क्षेत्रों में जलधारे (स्प्रिंग्स), पीने योग्य जल का एक प्राथमिक स्त्रोत है। उत्तराखण्ड के विभिन्न भागों में इन्हें स्त्रोत, नौला, धारा, पणियार, नाओके इत्यादि नामों से भी जाना जाता है। आदिकाल से ही जल व जल स्त्रोतों की सांस्कृतिक क्रियाकलापों में महत्ता रही है। नारी गाँव, उत्तराखंड राज्य के रुद्रप्रयाग जिले के अगस्त्मुनी ब्लॉक में स्थित है। यहाँ स्थित 05 जल धारे, चंडी नौला, पूखार पानी, कांडी नौला, मुलनारी नौला, तन्नौ नौला आदि विभिन्न रूपों में सांस्कृतिक क्रिया–कलापों में उपयोग किए जाते रहे हैं। इन सभी जलधारों का सांस्कृतिक परिपेक्ष्य के अतिरिक्त, सिंचाई, घरेलू उपयोग, पीने योग्य जल को उपलब्ध कराने में भी महत्वपूर्ण योगदान रहा है। 2011 की जनगणना के अनुसार, नारी गाँव की कुल जनसंख्या 578 है जिसमें से 55.9: महिलाएं पायी गयी हैं। प्रस्तुत अध्ययन के अनुसार, जलधारों के संरक्षण व संवर्धन के क्रियाकलापों उदाहरणतः जल स्त्रोतों का सौंदर्यीकरण, चाल–खाल निर्माण, साफ–सफाई इत्यादि में महिलाओं की अत्यंत महत्वपूर्ण भूमिका पाई गयी है। प्रस्तुत अध्ययन में आँकड़ों के संग्रहण हेतु क्षेत्र सर्वेक्षण, जीपीएस, अनुसूची, प्रश्नावली, साक्षात्कार, सामूहिक परिचर्चा व आँकड़ों के विश्लेषण हेतु डै म्बमस इत्यादि का प्रयोग किया गया है। जल धारों एवं अध्ययन क्षेत्र के मानचित्रिकरण हेतु ।तब ळै व ळववहसम म्ंतजी का प्रयोग किया गया है।

***Key Words*:** प्राकृतिक जलधारा, जल स्त्रोत, महिलाएं, संरक्षण, संवर्धन, संस्कृति।

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Abstract No. A14

CAPITALOCENE GEOMORPHOLOGY - SETTING THE RESEARCH AGENDA

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Over the years geomorphology has evolved to acknowledge human being as an active agent for change of physical landscapes to produce different geoforms, geodiversity and geo-heritage sites. Drastic alternation of the natural landforms in the Anthropocene cannot be authentically interpreted without an assessment of the political economies of the countries, particularly in the colonial and post-colonial periods. Transformation of land use and land cover through intensification of human activities over natural systems is manifested by long-lasting adverse impacts over various ambient environments of different scales, and this can only be rightly evaluated through their correlation with the mode of production and consumption of the societies. In this context, this paper is an attempt to set the research agenda of contemporary geomorphology to explore how capitalism has been responsible for the irreversible changes of the earth's surface leading to social exclusions of various types and magnitudes. Case studies will be cited in support of the argument.

Keywords: Built-up landscape, Geomorphic hazards, Political economic hegemony, LULC justice.

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Abstract No. A15

IMPACT OF CLIMATE CHANGE, GLOBAL WARMING AND EXTREME WEATHER EVENTS

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Climate change has breath taking impacts on natural phenomena, socioeconomic activities, public health and food infrastructure. India is one of the most affected countries by climate change. The threat is especially great in under developing and developing countries as their livelihoods are certainly dependent upon natural resources. Environmentalists suggest it is better to say climate crises than climate change due to extreme weather events. In February 2021, a ferocious flash flood occurred in Indian Himalayan valley, in May 2021 Cyclone Tauktae, the fiercest storm to hit the area of Western Ghat in several decades. Average temperature of India rose around 0.7 degree Celsius between the beginning of the 20^{th} century and 2018. These are some examples of weather severity.

Global Warming is a major factor in climate change which leads to increase of green house gases in the atmosphere which is human induced mainly due to activities such as burning fossil fuels and farming produce. Though India is now advancing more actively towards the emission intensity reduction target by using more fossil fuel, electricity generation capacity from non-fossil fuel policy. India Cooling Action Plan

and FAME India Phase 2 Scheme playing significant role in temperature reduction but more major measures required. Increase of forest cover area of 33% to create carbon sinks equivalent of 2.5 to 3 billion tones carbon dioxide is a demand of recent time.

Key Words: Green House Gases, Food Infrastructure, Fossil Fuels, Carbon Sinks.

Abstract No. A16

LANDUSE PATTERN AND AGRICULTURAL CHARACTERISTIC OF PRATAPGARH DISTRICT OF UTTAR PRADESH: A CASE STUDY

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Land is the most important significant natural resource inherited by human. The land has been utilized for different purposes in the study region. The present paper is an attempt to determine the level of agricultural development and landuse pattern in Pratapgarh district of Uttar Pradesh. This region has fertile plain topography which is best suited for the agriculture. The study area experiences immense population pressure due to rapid growth in population. Increasing cost of cultivation associated with agriculture intensification leads to land degradation. This Study is based on secondary sources of data from various agencies. Spatio temporal and statistical analysis has been carried out to construct a base for a sustainable development model.

Key Words: Agriculture Development, Land use pattern, Utilization of land, Sustainable development.

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Abstract No. A17

LANDUSE PATTERN AND SUSTAINABLE DEVELOPMENT IN THE HILLY TERRAIN: A CASE STUDY

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Land is the basic resources for the emergence and Development of all living things including, human beings. The land meets multi-facts demands of human beings that range from sustenance level to highest level of economic development. The ever increasing population on the one hand demands for more food grains and on the other many of the developmental activities like as housing, buildings, roads industries and dam etc. encroach on productive land and other sustainable Development. In appropriate landuse is one of the main reasons for soil erosion and nutrient loss in the hilly area. Keeping this fact in view an attempt will be made to know the comparative

study of landuse pattern and sustainable development in hilly Terrain of Una distric Himanchal Pradesh.

The Study area Una District typical terrain and climate conditions restrict the human activities to a great extant. The expansion of crop lands has been done by cleaning forests and at the same time crop land has also, got diverted to non- agricultural uses such as urbanization, industrialization and various other development activities. The trend of comparative changing land use results in several environment hazards like deforestation, soil erosion, landslides, congestion, and flood etc. The main objective of present paper landuse are to identify and delineate land systems and landuse; to examine relationship between fluvial morphology and landuse. As per the Methodology materials have been collected through primary & secondary field work source and through published sources like maps, literature, Census Data etc. The study area Collected data shows that there is an increase in forest (1%), Permanent pasture and Grazing land (.62%), Cultivable waste land (38.44%), Area sown more than one (19.31), Total cropped area (3.72) and Decrease land put to non Agriculture use (-.34), Net area Sown (-7.62) in the year 2011 as compared to the year 2001. Such type study will be fruitful of sustainable development of agriculture in study area.

Key words: Soil Erosion, Nutrient, Landuse Pattern, Temporal Changes and Grazing Land.

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Abstract No. A18

जनसंख्या विस्फोट (वृद्धि) जनित समस्याएं एवं पर्यावरण नियोजनः हमीरपुर जनपद (उत्तर प्रदेश) का एक प्रतीक अध्ययन

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मानव एवं पर्यावरण का अनन्य पारस्परिक संबंध है, ये एक–दूसरे के पूरक एवं परिपूरक हैं। एक के बिना दूसरे का अस्तित्व संदिग्ध है। मानव का इतिहास कम से कम 3 मिलियन वर्ष पुराना है। हमारे पूर्वज यहां शिकारी और संग्रहकर्ता की तरह रहते थे और उनकी जनसंख्या संभवतया 10 मिलियन से कम थी। कृषि विकास, औद्योगिक क्रांति की शुरुआत तथा रहन–सहन में सुधार होने और अनेक क्षेत्रों में सूखे और महामारी की घटनाएं कम होने से जनसंख्या में वृद्धि होने लगी। पिछले 200 वर्षो में हुए जनसंख्या विस्फोट में संसाधनो के प्रयोग में तथा पर्यावरण पर प्रभाव पड़ा है। हमारे भूदृश्यों में तेजी से परिवर्तन आया हैं और मनुष्य की जनसंख्या में वृद्धि के साथ–साथ यह परिवर्तन होता रहेगा। जनपद हमीरपुर उत्तर प्रदेश राज्य के दक्षिण स्थित चित्रकूट मण्डल का प्राकृतिक एवं सांस्कृतिक विविधतापूर्ण जनपद है। अतैव जनपद में जनसंख्या विस्फोट–पर्यावरण ह्रास का अध्ययन करना आवश्यक हो जाता है। जनपद में जनसंख्या वृद्धि (विस्फोट) जनित पर्यावरणीय असंतुलन की स्थिति का अध्ययन हमीरपुर जनपद के विकासखण्ड स्तर पर किया गया है।

मुख्य शब्द– जनसंख्या वृद्धि, जनसंख्या विस्फोट, कृषि विकास, औद्योगिक क्रांति, पर्यावरणीय असंतुलन।

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Abstract No. A19

ANALYSIS OF AREAL EXTENT OF CHANGE DETECTION OF NATURAL VEGETATION COVER USING GEOSPATIAL TECHNIQUES – A CASE STUDY OF NANDAKINI RIVER BASIN, CHAMOLI DISTRICT, UTTARAKHAND –INDIA

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Land use land cover (LULC) change detection based on remote sensing data is an important source of information for various decision support systems. Information derived from land use and land cover change detection is important for land conservation, sustainable development, and management of water resources. The main aim of this article is an enhanced Change Detection method for the analysis of Satellite image based on Normalized Difference Vegetation Index (NDVI). NDVI employs the Multi-Spectral Remote Sensing data technique to find Vegetation Index, land cover classification, vegetation, water bodies, open area, scrub area, with few band combinations of the remote sensed data. This purpose of this study is therefore concerned with detection and identification of the change in land use and more specifically land cover of the Nandakini River Basin, Chamoli District, Uttarakhand. To identify land cover change detection is done using remote sensing data, satellite imagery and image processing techniques. Analysis has been carried out within three dates of 2000, 2015 and 2020 using Landsat 7 ETM+ 30 m resolution and Landsat 8 OLI/TIRS 30 m resolution images. NDVI has been carried out by using ArcGIS 10.5 soft wares to identify the changes. The classification has been done using six land cover (water body, built up area ,barren land, shrub and grassland, sparse vegetation and dense vegetation). Preprocessing and classification of the images have been carried out , analyzed and accuracy assessment has been done. This study indicates that in the last 20 years period, natural vegetation areas have significantly increased by 3.99% (shrub and grassland), 4.54% (spares vegetation) and 0.73% (dense vegetation) in the basin. Therefore, proper land management practices, integrated watershed management, and active participation of the local community helps to protect undesirable LULC change in the basin.

Key words : conservation, green cover, sustainable, vegetation, landslides, land management

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Abstract No. A20

CHANGING GEO-ECOLOGICAL ENVIRONMENT OF ALLUVIAL RIPARIAN TRACT OF GANGA RIVER AT KALAKANKAR POINT

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The term 'geo-ecology' defines the interrelationship of organism with each other and with the earth environment in the particular area. Major geo-ecological changes in riparian tract of Kalakankar point region started from 1975 to 1988. The degradation of alluvial riparian tract became a prominent feature. By this meantime the degradation in Geo-ecology and geomorphology took shape in the form of rills, gullies and ravines, floods etc. During intensive field study it was noticed by the investigator that the bottom width of the gullies in the area was between 2 m and 30 m . Occurrence of Floods is the second serious hazard. The pattern of bank erosion , deep soil erosion and deforestation are serious problems of region due to hectic activities of the nature and human activities.

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Abstract No. A21

भागलपुर जिला (बिहार) में धारणीय कृषि विकास : एक भौगोलिक अध्ययन

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भारत एक कृषि प्रधान अर्थव्यवस्था वाला देश है। विश्व की सर्वोत्तम कृषि योग्य भूमि, उर्वरक मृदा, उपयुक्त जलवायिक दशाएँ एवं अथाह श्रम शक्ति होने के बावजूद हम वैश्विक स्तर पर खाद्यान्न उत्पादन में उस मुकाम को प्राप्त नही कर सके हैं जिसके हम वास्तविक हकदार हैं। विविधतापूर्ण भौगोलिक एवं जलवायिक प्रदेशों एवं सदानीरा नदियों की व्यापकता होने के बावजूद आज भागलपुर जिले में पर्याप्त कृषि विकास नहीं हो सका हैं। यह जिला नदियों की उर्वरा मिट्टी से निर्मित समतल मैदानी क्षेत्र है जहाँ कृषि विकास की अपार संभावनाएं है, किन्तु जिले में कुल प्रखंडों की संख्या 16 है, जो प्रत्येक वर्ष बाढ़ के समय इस जिले का बहुत बड़ा क्षेत्र जलप्लावित हो जाता है। जो प्रत्येक वर्ष बाढ़ जैसी समस्याओं के कारण यहाँ के खाद्य सुरक्षा पर गहरा प्रभाव पड़ता है। बाढ़ को नियंत्रित कर सिंचाई योजनाएँ शुरू की जाय तथा वैज्ञानिक ढंग से कृषि को प्रोत्साहन मिले तो निश्चय ही कृषि विकास में क्रांति लाई जा सकती हैं।

यदि हमे अपने खेतों से अपनी फसलों का अधिक से अधिक उत्पादन प्राप्त कर लगातार कई वर्षों तक उसके उत्पादकता को बनाए रखना है तो जैविक खाद के उपयोग की आदत डालनी होगी। यह जैविक खाद हमारे खेत की मिट्टी को कई प्रकार से उर्वरा शक्ति प्रदान करती हैं। इससे हमारे खेतों में पाये जाने वाले लाभदायक जीवाणुओं की संख्या में वृद्धि होती हैं। इस प्रकार की खेती के अनेक लाभ है। इन सभी विशेषताओं के कारण आज धारणीय कृषि का महत्व बढ़ रहा है, क्योंकि जैविक कृषि की तकनीक प्रचलित आधुनिक कृषि के अधिकांश कमियों को समाप्त कर सकती है। इसके साथ ही कृषि

में हो रहे नवाचरों या नवीनीकरण प्रयोग का उपयोग में संतुलन बनाने की आवश्यकता है जिससे भागलपुर जैसे सभी जिलों में कृषि का भरपूर विकास हो सके तथा साथ ही क्षेत्र की आर्थिक उन्नति का मार्ग प्रसस्त हो एवं क्षेत्रीय लोगों के जीवन की दुर्गमता कम कर धारणीय कृषि कि ओर अग्रसर हो सके।

प्रस्तुत शोध का उद्येश्य भागलपुर जिला में धारणीय कृषि विकास में अवरूद्ध करने वाले जिम्मेदार कारकों का उजागर करना, कृषकों को धारणीय कृषि के प्रति जागरूकता का आकलन कर सुझाव भी प्रस्तुत करना है। सामाजिक विज्ञान में शोध उपादेयता के दृष्टिकोण से भी प्रस्तावित विषय अत्यंत महत्वपूर्ण हैं।

मुख्यशब्दः धारणीय कृषि, कृषि विकास, कृषि तकनीकी, जल संसाधन, भूमि उपयोग, सीमांत कृषक।

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Abstract No. A22

जनपद प्रतापगढ़ के भूमि उपयोग प्रतिरूप का बदलता स्वरूप एवं उसका पर्यावरण पर प्रभाव : एक भौगोलिक अध्ययन

प्रिया सिंह*, डॉ0 आर0के0 चौरसिया**

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भूमि एक आधारभूत प्राकृतिक संसाधन है, जिस पर समस्त आर्थिक, सामाजिक एवं सांकृतिक कार्य सम्पन्न होते हैं। किसी क्षेत्र की सम्पूर्ण भूमि का विभिन्न कार्यों हेतु किया जाने वाला उपयोग, भूमि उपयोग कहलाता है। मानव की सभी व्यावहारिक उद्देश्यों के लिए भूमि की तय आपूर्ति की व्यवस्था की गई है, परन्तु वर्तमान समय में लगातार बढ़ती आबादी और अधिकाधिक आर्थिक वृद्धि की आकांक्षाओं के कारण भूमि की माँग निरन्तर बढ़ती जा रही है। बढ़ती जनसंख्या के लिए स्थान, आश्रय और उपयोगी वस्तुओं की आवश्यकता के कारण पर्यावरण पर अत्यधिक दबाव पड़ रहा है और इन सभी वस्तुओं को उपलब्ध कराने के लिए नाटकीय तरीके से भूमि उपयोग प्रतिरूप बदल रहा है। जब तक मानव अपनी जरूरतें पूरी करता रहा भूमि उपयोग के पैटर्न में बदलाव से कोई विघटनकारी प्रभाव देखने को नहीं मिला। लेकिन जैसे ही मानव सभयता ने खुद को विकसित, और विकसित करने की मुहिम शुरू की, जंगलों की अंधाधुंध कटाई शुरू हो गई, जिसका परिणाम मृदा निम्नीकरण, जैव विविधता में कमी और वायु, जल स्त्रोतों के प्रदूषण के रूप में दिखाई पड़ रहा है। प्राकृतिक संसाधनों के अत्यधिक दोहन के कारण पर्यावरण का क्षरण हो रहा है तथा यह मानव जाति और उसकी उत्तरजीविता के लिये खतरा उत्पन्न कर रहा है। जनपद प्रतापगढ़ मुख्यतः कृषि प्रधान प्रदेश है। इस जनपद के कुल प्रतिवेदित क्षेत्र के 63.32 प्रतिशत भाग में कृषि कार्य किया जाता है। जनपद की कुल जनसंख्या में (2011 की जनगणना के अनुसार) 37.4 प्रतिशत कृषक, 23.2 प्रतिशत कृषि श्रमिक तथा 6.42 प्रतिशत पारिवारिक उद्योग में लगे हुए लोग हैं। प्रस्तुत शोध पत्र का उद्देश्य अध्ययन क्षेत्र के भूमि उपयोग प्रतिरूप के परिवर्तित स्वरूप का अध्ययन एवं उसका पर्यावरण पर पड़ने वाले प्रभाव का आँकलन करना है।

संकेत शब्द : प्राकृतिक संसाधन, भूमि, आर्थिक वृद्धि, पर्यावरण ।

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Abstract No. A23

भू-आकृति विज्ञान का शहरी नियोजन पर प्रभाव : पटना जिला के संदर्भ में एक अध्ययन

राजीव कान्त आलोक

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पटना जिला के नगरीय जनसंख्या के साथ इसके नगरीय क्षेत्रफल में लगातार वृद्धि हो रही है जबकि यहाँ की भू आकृतिक बनावट विस्तृत नगरीय बसावट हेतु अनुकूल नहीं है। इसे ध्यान में रखते हुए इस पत्र के माध्यम से पटना जिला में नगर नियोजन हेतु भू-आकृति विज्ञान के अनुप्रयोग का अध्ययन किया गया हैं क्योंकि पर्याप्त नगर नियोजन के अभाव में विकसित नगर संभावित जोखिम वाले क्षेत्रों के रूप में उभर कर सामने आ सकता है, जैसा कि अविकसित और विकासशील दुनिया के शहरी क्षेत्रों के काफी हिस्से में मौजूद है। जिसमें पटना शहर भी सम्मिलित है। नगरीय पारिस्थिति पारिस्थितिकी तंत्र को व्यापक रूप से प्रभावित करता है। जिसके फलस्वरूप स्थलाकृति, वनस्पति, जलवायु, जल राशि और यहां तक कि मानवजनित गतिविधियां सभी विविध तंत्रों के माध्यम से शहरी विकास से प्रभावित होती हैं परंतु सर्वप्रथम एवं सबसे अधिक यह भूमि उपयोग स्वरूप को प्रभावित करता है। शहरी स्थल चयन, शहरी आकारिकी, औद्योगिक और अपशिष्ट निपटान स्थल चयन इन भूमि उपयोगों में से हैं। इस कारण भू-आकृति विज्ञान शहरी नियोजन का एक महत्वपूर्ण पहलू है चूंकि भू-आकृति विज्ञान भूमि की विशेषताओं में परिवर्तन के बारे में एक विज्ञान है और भू-आकृति नियोजन एक ऐसा विज्ञान है जो हमें वर्तमान भूमि उपयोग की समस्याओं के सर्वोत्तम समाधान खोजने में मदद करता है।

शब्द कुंजी – भू आकृति, नगर नियोजन, संभावित जोखिम, नगरीय पारिस्थितिकी

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Abstract No. A24

DYNAMICS OF CLIMATE CHANGE ON THE WATER BALANCE

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Water balance of a river basin or sub-watersheds are influenced by various climatic parameters such as water yield, surface runoff, evapotranspiration (ET), etc. Hence, to assess the trend in the water balance, impact of various climate parameters should be considered. This study involves the assessment of seasonal and annual ET distribution using Surface Energy Balance Algorithm for Land (SEBAL) and provides an estimation of future changes in ET and streamflow due to climate change in a part of the Narmada River basin. Climate change effects on future ET are assessed using the CMIP5 data. The major objective of the study is to evaluate changes in the water balance by studying the impact of climate using hydrological simulation in the Narmada River basin in Madhya Pradesh. This has shown that in different sub-

watersheds of the basin, there is an increased water yield and ET. The impact of climate change is observed to have a more dominant effect on the water yield than ET.

Keywords: Water Balance, Narmada River, Climate change, ET, SEBAL.

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Abstract No. A25

RELIGIOUS TOURISM AS A DRIVER OF URBANISATION IN PRAYAGRAJ CITY: A PERSPECTIVE APPROACH

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Tourism has always been and will remain a way of progress for all countries of the world, being an important driver of the use of cultural resources, traditions and local customs, connecting people, bringing real profits for the host communities, and directly contributing to GDP growth and employment and in the urbanisation of the region. *Prayagraj City is known for its resources, geography, population, social-culture structure, economy etc. Whenever there is an unexpected change in any of these parameters, the city undergoes remarkable changes.* The main goal of this paper is to study the relationship between changing Allahabad City and its religious tourism potential and present an account of these changes brought about by emerging tourism industry in the city. A comparative study was made between the city development plans, land use of development plan, tourism plan targeting Kumbh Mela preparations. The study revealed that religious tourism in Allahabad with a special focus on Kumbh Mela poses many challenges and consequently presents a list of the major challenges.

The results of the study highlight the existence of a positive relationship between the development of tourism and the increase of the quality of life, as between the level of sustainable performance and tourism intensity. The methodology is based on primary as well as secondary data, the main focus is on primary data by taking a sample of 300 respondents which is conducted by telephonic survey and Google forms.

***Keywords**: Urbanisation, Sustainable, Proliferation.*

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Abstract No. A26

बीकानेर जिलें में गैर-परम्परागत ऊर्जा स्रोतों की उपियोगिता एवं पर्यावरणीय स्थिरता में योगदान

Suman Godara

ऊर्जा आधुनिक जीवन शैली का अविभाज्य अंग बन गयी है और ऊर्जा की माँग दिनों-दिन बढ़ती जा रही है | वर्तमान में ऊर्जा का उपयोग मुख्य रूप से औद्योगिक क्षेत्र,परिवहन क्षेत्र, प्रकाश की व्यवस्था करने, घरेलू कार्यों

और कृषि कार्यों आदि में किया जाता है | चूँकि परम्परागत ऊर्जा स्रोत, जैसे- कोयला, पेट्रोलियम और प्राकृतिक गैस आदि तेजी से समाप्त हो रहें है और साथ ही इनके अंधाधुंध दोहन से पर्यावरणीय क्षति हो रही है तथा साथ ही कई चुनौतियों को भी जन्म दिया | 1970 के दशक में पर्यावरणविदों ने जीवाश्मीय ईंधन से हमारी निर्भरता को कम करने और उसके प्रतिस्थापन के रूप में नवीकरणीय ऊर्जा को बढ़ावा देना शुरु किया | 21वीं सदी की शुरुआत में दुनिया की ऊर्जा खपत का 20 प्रतिशत नवीकरणीय ऊर्जा से प्राप्त होने लगा था | इसीलिए अब यह आवश्यक हो चला है कि विश्व भर में ऊर्जा आवश्यकताओं की पूर्ति के लिए विद्यमान गैर- परम्परागत ऊर्जा स्रोतों की संभावनाओं को विकसित किया जाए |

इसके अलावा गैर-परम्परागत ऊर्जा स्रोतों का विकास इसलिए भी जरूरी है क्योंकि इनसे पर्यावरण विनाश नहीं होता और यह एक ऐसी ऊर्जा है जो प्राकृतिक स्रोतों पर निर्भर है| इसमें सौर ऊर्जा, पवन ऊर्जा, भू-तापीय ऊर्जा, जल, ज्वार और बायोमास के विभिन्न प्रकारों को शामिल किया जाता है | नवीकरणीय ऊर्जा अन्य परम्परागत विकल्पों की अपेक्षा एक बेहतर और सस्ता स्रोत है | ध्यातव्य है की जैसे- जैसे विश्व में नवीकरणीय ऊर्जा का प्रचलन बढ़ता जा रहा है, वैसे- वैसे नए और स्थायी रोजगारों का भी निर्माण होता जा रहा है | उदाहरण के लिए - जर्मनी और ब्रिटेन जैसे देशों में नवीकरणीय ऊर्जा के प्रयोग को प्रोत्साहन देने के लिए कई नई तकनीकों और रोजगारों का सर्जन हुआ है |

नवीकरणीय ऊर्जा स्रोतों को बढ़ावा दिए जाने से दुनिया के देशों में इसका बढ़-चढ़ कर प्रयोग हो रहा है, जिसके कारण वैश्विक स्तर पर ऊर्जा की कीमतों में काफी स्थिरता आई है | विकसित तथा विकासशील देशों में सौर ऊर्जा से विद्युत उत्पादन तेजी से बढ़ रहा है क्योंकि लोग पर्यावरण संरक्षण के लिए जागरूक हो रहे है | दुनियाभर में बहुत सारे ऐसे आविष्कार हुए है जो सौर ऊर्जा का इस्तेमाल करते हैं | इसी के साथ कई अध्ययनों में सामने आया है कि नवीकरणीय ऊर्जा और लोगों के स्वास्थय में सीधा संबंध होता है और जीवाश्मीय ईंधन द्वारा उत्सर्जित ग्रीन हॉउस गैस, कार्बन और सल्फर आदि मानव स्वास्थय के लिए काफी हानिकारक होते हैं |

हमारे देश में भी अक्षय ऊर्जा के प्रमुख स्रोत के रूप में सौर ऊर्जा का इस्तेमाल विभिन्न नीतियों एवं परियोजनाओं के तहत अपनी दैनिक जरूरतों के साथ- साथ अन्य क्षेत्रों में भी हो रहा है | इसी को देखते हुए भारत सरकार ने राष्ट्रीय सौर ऊर्जा मिशन की शुरुआत की जिसके तहत वर्ष 2022 तक 20 हजार मेगावाट क्षमता वाले सौर ग्रिड की स्थापना और 2 हजार मेगावाट वाली गैर-ग्रिड को विकसित करने का लक्ष्य रखा | इसी प्रकार की अन्य योजनाओं का सम्मिलित उद्देश्य है कि सौर ऊर्जा के क्षेत्र में भारत को वैश्विक स्तर पर एक आदर्श के रूप में स्थापित किया जा सके |

देश में अक्षय ऊर्जा के प्रमुख स्रोत के रूप में सौर ऊर्जा के विकास के लिए सर्वोत्तम दशाएं राजस्थान राज्य में है | राजस्थान उष्ण कटिबंध में स्थित एक मरुस्थलीय राज्य है जिसमे वर्ष भर सूर्य की किरणें चमकती है ,जिससे यह सौर ऊर्जा के क्षेत्र में अग्रणी राज्य के रूप में उभर रहा है | हाल ही में इस क्षेत्र में निजी व सरकारी कंपनियों द्वारा बड़े पैमाने पर सौर ऊर्जा के प्लांट लगाए गए है और कृषि ,पशुपालन, सरकारी व निजी भवन , घरेलू स्तर पर , स्कूल -कॉलेज ,उद्योग आदि में सौर ऊर्जा का भरपूर प्रयोग हो रहा है और ऊर्जा का एक स्थायी समाधान विकसित कर लिया जिससे इस क्षेत्र की प्रगति हो रही है | राजस्थान के पश्चिमी जिलें जैसे -जैसलमेर ,जौधपुर, बाड़मेर , बीकानेर आदि विकास की दौड़ में बहुत पीछे है, क्योंकि मरुस्थलीय दशाओं के कारण अर्थव्यवस्था के समस्त क्षेत्रों में पिछड़ापन है , जिसकी एक वजह ऊर्जा संसाधनों की कमी भी है , क्योंकि ऊर्जा विकास का मुलभुत कारक है | परम्परागत संसाधनों की सीमित मात्रा व उनका अंधाधुंध उपयोग दोनों ही स्थिति पर्यावरण को प्रभावित करती है , क्योंकि ऊर्जा की सीमित मात्रा होने से अधिक मूल्य पर ऊर्जा का वितरण समाज के कमजोर तबके को विकास की दौड़ में पीछे धकेल देती है | इसके अलावा ग्रामीण क्षेत्रों में वैकल्पिक

ऊर्जा के रूप में गोबर के उपले और लकड़ी का उपयोग ऊर्जा के रूप में बहुतायत में किया जाता है जिसके परिणामस्वरूप स्वास्थ्य की अनदेखी करनी पड़ती है|

इसी क्रम में जब बात पर्यावरण की आती है तो जीवाश्मीय ईंधन के अत्यधिक दोहन से न केवल ऊर्जा संसाधनों पर दबाव बढ़ा है , बल्कि बड़े पैमाने पर वैश्विक तापमान में वृद्धि की बदौलत जलवायु परिवर्तन की समस्या विश्व भर में एक ज्वलंत मुद्दा है | ऊर्जा बड़े पैमाने की समस्या है | इसके लिए सबसे प्रदूषित ईंधन से प्राकृतिक गैस या परमाणु ईंधन जैसे स्वच्छ ईंधनों , फिर सौर तथा पवन ऊर्जा तक जाना और अंततः ऐसे स्रोतों पर जाना जो अभी है ही नहीं |

अतः कह सकते है कि वर्तमान विश्व की मांग है कि स्वच्छ साधनों को अपनाया जाये ताकि पर्यावरणीय धारणीयता बनी रहे | पर्यावरणीय धारणीयता को बनाये रखने में स्वच्छ ऊर्जा स्रोतों की बड़ी भूमिका है , क्योंकि एक तो ये स्वच्छ व स्थायी है ,दूसरी और भारत जैसे विकासशील व उष्ण कटिबंधीय क्षेत्रों में स्थित देशों के लिए ऊर्जा का सुगम साधन है | जीवाश्मीय ईंधनों के दहन ने जलवायु परिवर्तन में कितना योगदान दिया है , ये विश्व भर में देखा जा सकता है | इससे न केवल मानवीय जाती बल्कि पेड़- पौधे एवं जीव-जंतु बड़े पैमाने पर प्रभावित है | जलवायु परिवर्तन से जीव- विविधता को सबसे अधिक खतरा है , जिससे कई ऐसी प्रजातियों का अस्तित्व ही ख़तम हो जायेगा , जो पर्यावरण स्थिरता के लिए जरूरी थी | ऐसी स्थिति से निपटने का यही तरीका है कि जीवाश्मीय ऊर्जा साधनों को स्वच्छ ऊर्जा साधनों की ओर रूपांतरित किया जाये , ताकि वर्तमान एवं भविष्य की पीढ़ियों के लिए पर्यावरणीय स्थिरता प्राप्त की जा सके |

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Abstract No. A27

IMPACT OF CLIMATE CHANGE ON GEOMORPHOLOGY: AN INDIAN PROSPECTIVE

[1]Dr. Pinki Yadav, [2]Dr Vineet Bala

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Climate change is one of the main environmental challenges facing the world today. In this paper discussed that there are many change on our geomorphology due to change in climate. India is facing several problems from the perspective of geomorphology, three important aspects of climate should be considered there are many kind of change. Climate change is associated with various adverse impacts on agriculture, water resources, forest and biodiversity, health, coastal management and increase in temperature. Decline in agricultural productivity is the main impact of climate change on India. A majority of population depends on agriculture directly or indirectly. Climate change would represent additional stress on the ecological and socioeconomic systems that are already facing tremendous pressure due to rapid industrialization, urbanization and economic development. This paper analyzes the impact of climate change on geomorphologic aspects in the Indian context. The detail analysis has been given in full paper. Which have been is based on secondary sources of data which have been collect from internet sources and books and other relevant sources. This is current and serious matter to concentrate how much impact of climate change on our geomorpholohy.

Abstract No. A28

IMPACT ANALYSIS OF WATERSHED MANAGEMENT PROJECTS ON AGRICULTURAL DEVELOPMENT

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The watershed management is widely suggested and used technique for agriculture development in different climatic conditions. The present paper focussed on Impact analysis of watershed management projects (WMPs) on agricultural development in upper section of River Mula basin in Maharashtra (India). The study area divided into micro-watersheds using SRTM DEM data. The impact of WMPs on agricultural development analysed based in estimated selection priorities and agricultural development in micro-watersheds. The map showing selection priories prepared using morphometric techniques and map showing agricultural development prepared based on cropping pattern. The analysis shows no significant impact of WMPs on agricultural development in the selected study area.

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Abstract No. A29

MORPHOMETRICAL ANALYSIS OF UPPER JIADHAL BASIN, ARUNACHAL PRADESH, INDIA

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The morohometric aspect of a drainage basin represents the simple procedures occurred in the geographical unit including the hydrologic and geomorphic processes. The Jiadhal basin is situated in the lower Siwaliks Himalayas in Arunachal Pradesh and is phenomenon drainage characteristics causing flood in drained flood plain. Its geology is mainly dominated by sandstones and fragile structural topography which respond to high sediment discharge in the basin. The region experience monsoonal climate with largest rain during june to september responding to flood in lower basin areas. The ISRO open source (C1_DEM_16B_2006-2008_v1_94E27N_g46e) is used for the study. The delineation of watershed basin was done considering the DEM, and further subdivided to catchment areas with the multispectral images downloaded from USGS portal (L71135041_04140051110_MTL). Google earth engine was used to identification of the remote places followed by field observation. The study highlighted the variation in morphometric parameters with respect to the dissimilarities in topography and climate including relief and drainage analysis.

Keywords: Morphometry , DEM , Jiadhal, relief and drainage analysis

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Abstract No. B1

IMPACT OF CLIMATE CHANGE ON AGRICULTURE IN DEVELOPING COUNTRIES

Poonam

Assistant Professor, Chaudhary ranbir singh university jind

The effect of climate alternate on agriculture will help to make clear the belief of the trouble and quantify the impact, contributing to the method of sustainable livelihoods. This takes a look at uses the Ricardian approach to explore the implications of weather trade on agriculture within the North western region of Vietnam by taking farmer adaptations under consideration. The largest regarded monetary effect of weather exchange is upon agriculture due to the dimensions and sensitivity of the sector. Warming reasons, the greatest damage to agriculture in developing countries normally due to the fact many farms inside the low latitudes already undergo climates which are too hot. This paper critiques numerous research that measures the size of the effect of warming on farms in growing countries. Even although edition will blunt some of the worst expected consequences, warming is predicted to motive massive damages to agriculture in developing countries over the subsequent century

Keywords: climate change, agriculture, developing countries

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Abstract No. B2

जलवायु परिवर्तन के विभिन्न आयामों की भौगोलिक समीक्षा

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पृथ्वी का हरेक स्वरूप परिवर्तनीय एवं गतिशील है। पृथ्वी पर जो तथ्य भूतकाल में मौजूद थे, वर्तमान काल में नहीं है। जो तथ्य वर्तमान काल में उसमें भविष्य जाते-जाते कई मौलिक परिवर्तन हो जाएगा। परिवर्तन की यह रूपरेखा मूल रूप से पृथ्वी के बाह्य आवरण पर ज्यादा प्रत्यक्ष अवस्था में दिखती है, लेकिन परिवर्तन की यह आवृत्ति पृथ्वी की आंतरिक अवस्था में भी लगातार चल रही है। पृथ्वी पर पाए जाने वाले प्रमुख भौतिक घटक जलवायु के द्वारा ही पृथ्वी पर विभिन्न भौतिक एवं संस्कृति प्रतिमान का निर्माण होता है तथा विभिन्न मानव, वनस्पति एवं जीव-जंतु संबंधित आयाम बनते रहते हैं। पृथ्वी पर के विभिन्न क्रियाकलापों के लिए जिम्मेदार जलवायु भी अपने आप में परिवर्तित भौतिक घटक है। इस परिवर्तन के पीछे प्राकृतिक तत्वों के साथ मानवीय एवं जैविक तत्व ही क्रियाशील होते हैं। जलवायु परिवर्तन के मेरा स्वरूप को तो एक मानवीय जीवन काल में देखा नहीं जा सकता, सिर्फ पुराने साक्ष्यों के आधार पर अध्ययन जरूर किया जा सकता है। जबकि परिवर्तन कि यह आवृत्ति अगर सूक्ष्मा स्तर पर रखकर देखा जाए तो जलवायु के इस परिवर्तन को जरूर अनुभव किया जा सकता है। जलवायु परिवर्तन का यही सूक्ष्म रूप जिसका कि हम अनुभव कर सकते हैं। प्रस्तुत शोध पत्र में उसके विभिन्न आयामों पर समीक्षा की गई है। यह विभिन्न आयाम इस प्रकार है। आर्थिक सामाजिक सांस्कृतिक धार्मिक कृषि संस्कृति एवं क्रियाकलाप विश्व तपन के संदर्भ में तथा जलवायु परिवर्तन के ऋण आत्मक एवं धनात्मक संदर्भ में। प्रस्तुत शोध पत्र मूलतः द्वितीयक आंकड़ों एवं तथ्यों का अध्ययन कर लिखा गया है तथा कुछ क्षेत्रीय कार्य एवं अवलोकन की सहायता से स्थानीय तथ्यों पर गौर करते हुए विश्लेषण के

प्रतिवेदन में शामिल किए गए हैं। शोध पत्र ज्यादातर जलवायु परिवर्तन एवं पर्यावरण संबंधित सम्मेलनों के घोषणा पत्र की सहायता से ही तैयार किए गए हैं। शोध पत्र में अतीत काल के जलवायु परिवर्तन के संबंधित तथ्यों को भी उरेका गया है। प्रस्तुत शोध पत्र के विश्लेषण में यह भाव देने की कोशिश की गई है कि जलवायु परिवर्तन एवं स्वाभाविक सहज प्रक्रिया है। यह परिवर्तन किसी विशिष्ट प्रजाति के लिए अगर हानिकारक होती है तो कुछ जैविक प्रजातियां विकास एवं सृजित भी होती है। सृजन विकास तथा अंत यह प्रकृति का सामान्य नियम होता है, जिसे कि स्वीकार करना हमारा प्रथम कर्तव्य है।

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Abstract No. B3

पर्यावरण संबंधित विभिन्न सम्मेलनों की भौगोलिक समीक्षा

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पृथ्वी पर पर्यावरण का अपना अलग भौतिक चक्र होता है। जो कि पृथ्वी अंतरिक्ष तथा जैविक गतिविधियों के अनुसार बदलती रहती है। यह बदलाव इतना ज्यादा सूक्ष्म एवं अंतर्राष्ट्रीय होता है कि इसे मानव अपनी आंखों से नहीं देख सकता है, उनमें यह अलग है कि पर्यावरण के बदलते रूपों एवं उसके प्रभावों को महसूस जरूर कर सकता है। पर्यावरण का यह परिवर्तन मेगा स्तर पर होता आया है। पर इधर हाल के वर्षों में मानव के भौतिकवादी सोच एवं दिनचर्या तथा उसके प्रकृति पर विजय पाने की लालसा ने पर्यावरण की सहज एवं स्वाभाविक ताना-बाना को प्रभावित कर दिया है। पर्यावरण में जीव जगत की आवश्यकता पूर्ति करने की योग्यता तो होती है पर वह मानव जैसे जीव की लालच को पूरी नहीं कर पाता है। जबकि लालची मानव भोगी मानव अपने विज्ञान और तकनीक की सहायता से पर्यावरण के सकारात्मक प्रभाव को तोड़कर नकारात्मक प्रभाव में बदल दिया है। पिछले 18 सो 50 ईस्वी के बाद इस पर्यावरण बदलाव की आवृत्ति में काफी तेजी आई है। जब वायुमंडल में o2 गैस की मात्रा अपनी उच्च सीमा की ओर जा चुका है। आए दिन पर्यावरण का नकारात्मक रूप दिखता नजर आता है। जिससे जन-धन की हानि होती है। पर्यावरण के सीना कार आत्मक पहलू को कम करने के उद्देश्य से तथा पृथ्वी पर विकास की आवृत्ति कायम रखने हेतु तथा पृथ्वी के विनाश को बचाने के उद्देश्य से उन्हें सुबह 3:00 के बाद से विश्व पटल पर पर्यावरण के संरक्षण हेतु विभिन्न सम्मेलनों के आयोजनों का सिलसिला शुरू हुआ। प्रस्तुत शोध पत्र में इन्हीं मुख्य सम्मेलनों के कार्यों एवं घोषणाओं पर मैं चर्चा करूंगी। प्रस्तुत शोध पत्र मुख्यतः द्वितीयक आंकड़ों पर आधारित होगा तथा सम्मेलन संबंधित संधि एवं साहित्य पर विश्लेषण मूल रूप से किया जाएगा। अपने सम्मेलन में उद्देश्य के प्रति कितना विश्व सजग रहा इस पर भी चर्चा करने का लक्ष्य रखा गया है। स्नातक पास के लोगों से उनका विचार प्रश्नावली के द्वारा मांगे जाएंगे जो तथ्य उभरकर सामने आ पाएंगे, उसी के आधार पर ही विश्लेषण तैयार किया जाएगा। आशा की जाती है कि प्रस्तुत शोध पत्र के माध्यम से मैं समाज में कुछ पर्यावरण के प्रति जागृति ला सकती हूं। एक पर्यावरण सेवक होने के नाते मैं इस सेमिनार में अपनी प्रस्तुति कर रही हूं।

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Abstract No. B4

पृथ्वी शिखर सम्मेलन की समकालीन समीक्षा

ज्योत्सना

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पृथ्वी के समकालीन इतिहास में पृथ्वी के संपूर्ण दृश्य रूप के विशान लीला संबंधित त्रासदी पृथ्वी पर चल रही है। समय के साथ अगर पृथ्वी को बचाने की समुचित व्यवस्था नहीं की गई तो निकट भविष्य में मानव, जीव एवं वनस्पति के वर्तमान स्वरूप पर खतरा मंडरा रहा है। इस विनाश का कारण मानव स्वयं होगा, उसका विज्ञान होगा, उसका लालच तथा प्रकृति पर हावी होने की प्रवृत्ति होगी। इसी विनाशिय आवृत्ति को रोकने के उद्देश्य से विश्व मानव ने मिलकर ब्राजील की सबसे बड़ी शटर रियो डी जेनेरो में अप्रैल 1992 में पृथ्वी शिखर सम्मेलन का आयोजन यू एन ओ के सहयोग से किया गया था। जिसमें 5 बड़े तथा कई छोटे समझौते पर विचार कर उसे भविष्य में अमल करने की प्रतिबद्धता निर्धारित की गई थी। प्रस्तुत शोध प्रबंध इसी पृथ्वी शिखर सम्मेलन की संधियों पर विचार करता है तथा इसकी समकालीन समीक्षा प्रस्तुत करता है। प्रस्तुत शोध प्रबंध मुख्य रूप से द्वितीयक आंकड़ों पर आधारित होगा लेकिन शोध तथ्य बनाने के पहले समाज के बुद्धिजीवियों के बीच प्रश्नावली के द्वारा विचार प्राप्त किए जाएंगे। शिखर संबंधित साहित्य का अध्ययन किया जाएगा तथा सभी तथ्य मिलकर शोध विश्लेषण तैयार किया जाएगा। समकालीन समय में शिखर वार्ता के शर्तों पर कितना कार्य किया गया है का विश्लेषण होगा। हमारी यह शोध पत्र पृथ्वी के संपूर्ण आयामों के प्रति जिम्मेदारी एवं जागृति का संदेश देगी। हालांकि पृथ्वी शिखर सम्मेलन की तरह अन्य सम्मेलन भी हुए हैं। लेकिन यह सम्मेलन ज्ञात इतिहास का सबसे बड़ा सम्मेलन था जो कि पृथ्वी की रक्षा, विकास, पोषण एवं सुरक्षा के विभिन्न आयामों के प्रति समर्पित था।

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Abstract No. B5

बढ़ता वैश्विक तापमान और उसका प्रभाव

वेद प्रकाश वेदी

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बढ़ते वैश्विक तापमान और तद्जनित जलवायु परिवर्तन के गंभीर परिणामों नें संकट नकारने की गुंजाइश को समाप्त कर दिया है।वर्तमान समय में हम जलवायु परिवर्तन के सबसे बुरे प्रभावों को महसूस कर रहे हैं। आईपीसीसी के ताजा वैज्ञानिक अनुमानों के अनुसार धरती की जलवायु एक ऐसे बिंदु पर पहुंच गई है जहां से इसे बदलना बहुत मुश्किल है। टिपिंग प्वाइंट के विश्लेषण से यह तथ्य सामने आ रहा है कि वैश्विक तापमान अब उस सीमा को पार करता हुआ नजर आ रहा है जहां से उसकी भरपाई करना संभव नहीं हो पाएगा। ग्रीनलैंड में बर्फ का पिघलना, अमेजन वर्षा वनों का नष्ट होना, पश्चिमी अफ्रीकी मानसून में परिवर्तन, परमाफ्रास्ट में कमी, बोरियल वनों के क्षेत्र में बदलाव, भारतीय मानसून में परिवर्तन, प्रवाल भित्तियों का नष्ट होना, अंटार्कटिका में बर्फ का पिघलना और चरम मौसमी घटनाओं में वृद्धि इत्यादि बढ़ते वैश्विक तापमान के दुष्प्रभावों के कुछ

उदाहरण हैं। प्रस्तुत प्रपत्र बढ़ते वैश्विक तापमान और उसके प्रभावों को रेखांकित करता है और इस संकट काल से उबरने के लिए कुछ सुझावों को प्रस्तुत करता है।

मूल शब्द- वैश्विक तापमान, जलवायु परिवर्तन, आई पी सी सी, टिपिंग प्वाइंट।

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Abstract No. B6

जलवायु परिवर्तन का प्रभावः चुनौतियाँ एवं समाधान

[1]डॉ0 रीना गुप्ता, [2]अनुपम प्रकाश

[1]एसोसिएट प्रोफेसर एवं विभागाध्यक्ष, महाराजा बिजली पासी राजकीय पीजी कालेज लखनऊ विश्वविद्यालय लखनऊ, उ0प्र0

[2]शोधछात्र भूगोल विभाग, लखनऊ विश्वविद्यालय, लखनऊ।

विश्व भर में जलवायु परिवर्तन का विषय सर्वविदित है। इस बात से इनकार नहीं किया जा सकता कि वर्तमान में जलवायु परिवर्तन वैश्विक समाज के समक्ष मौजूद सबसे बड़ी चुनौती है। जलवायु परिवर्तन के कारण पृथ्वी का दूषित होता पर्यावरण आज सम्पूर्ण विश्व के समक्ष एक ज्वलंत समस्या है। कोई भी राष्ट्र या व्यक्ति इसके दुष्प्रभावों से मुक्त नहीं रह सकता है। जलवायु परिवर्तन कृषि, जल संसाधन, वन और जैव विविधता, स्वास्थ्य, तटीय प्रबंधन और तापमान में वृद्धि पर कई प्रतिकूल प्रभावों से जुड़ा है। कृषि उत्पादकता में गिरावट भारतीय जलवायु परिवर्तन का एक मुख्य प्रभाव है। जलवायु परिवर्तन तेजी से औद्योगिकीकरण, शहरीकरण और आर्थिक विकास के कारण पहले से ही जबरदस्त दबाव का सामना कर रहे पारिस्थितिक और सामाजिक आर्थिक प्रणालियों पर अतिरिक्त तनाव का प्रतिनिधित्व करेगा।

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Abstract No. B7

IMPACT OF CLIMATE CHANGES: A GEOGRAPHICAL STUDY OF BIKANER DISTRICT

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Bikaner district is located in the far west of the Indian state of Rajasthan. It is situated between 27°11' to 29°03' north latitude and 71°54' to 74°12' east longitude. Bikaner district is spread across an area of 30,247.90 sq. km. The district is located on the western border of the country; hence the importance of this district increases even more. Bikaner district is a part of the arid region of Rajasthan, thus here's extreme climatic conditions. In the district high temperature and low humidity prevail for most of the months of the year. Due to climate change, many important changes in the climate are being seen in the desert areas of the country, Bikaner district is also one such desert district. The mean annual air pressure in in the study area was 98.11 mbar in the 1980s, which increased to 98.16 mbar in the 2010s. The mean annual temperature in the 1980s was 26.93° C, which decreased to 26.77° C in the 2010s. The mean annual relative humidity was 31.155% in the 1980s, rising to 35.83% in the 2010s. Average annual wind speed was 2.54 km/h in the 1980s, rising to 2.39 km/h in

the 2010s. In the 1980s, the amount of soil water present in the soil was only 0.15 g/cubic centimetres, which increased to 0.17 g/per cubic centimetre in the 2010s. In the 1980s, the daily availability of soil water was 0.81 mm per year, which increased to 0.94 mm in the 2010s. It is thus clear that there have been many changes in the climate of the study area in the last four decades. Thus, the paper examines the impact of climate changes in the study area in last four decade.

Key words: Climate Change, Temperature, Relative Humidity, Wind Speed, Surface Soil Wetness and Precipitation

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Abstract No. B8

CLIMATE CHANGE AND ITS IMPACT ON AGRICULTURE IN BUNDELKHAND REGION

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Climate change may refer to a change in average weather conditions, or in the time variation of weather within the context of long – term average conditions. Climate change is certainly without argument the most serious global environmental crisis that we face. *It is not the only environmental problem,* but it is unique in its multi-scalar characteristic, from the global to the local.

Climate change is a global issue that is disrupting the productivity of agricultural production. The long term impact of climate change could affect agriculture in many ways such as quantity and quality of crops in terms of productivity and growth rates. Climate change is likely to have a direct impact on food production across the world.

The Bundelkhand region is largely rain fed and variable precipitation trends, and drought conditions are frequent here. The continuous years of drought in Bundelkhand has severely affected agricultural productivity and weakened the livelihood systems. The Bundelkhand region, with its dependence on livestock and agriculture, is extremely vulnerable to climate change impacts such as warmer temperatures, lower precipitation and greater weather variability. These climatic uncertainties lead to more frequent spells of extended droughts, which in turn drastically affect agricultural yields.

The study area under this research paper is the Bundelkhand region, one of the poorest parts of central India. The region of Bundelkhand comprising of 13 districts of Madhya Pradesh and Uttar Pradesh. The present paper tries to find out the present status of climate change and its impact on agricultural production in Bundelkhand region.

Keywords: Climate change, Agricultural production, Bundelkhand region.

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Abstract No. B9

TREND ANALYSIS OF PATTERN OF METEOROLOGICAL VARIABLES IN DIMAPUR DISTRICT, INDIA

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Northeast India is bestowed with abundant rainfall and rich biodiversity. With the variability in climate, the region is likely to become vulnerable as the magnitude of variability depends on the location as well. With a limited number of studies undertaken in Northeast India, it becomes paramount to assess climate variability at the local level. The study examines the temporal variations in rainfall, minimum and maximum temperature and humidity during 1998- 2020 in Dimapur district of Nagaland state in India. Mann-Kendall and Sen's slope methods were employed to examine trend in the selected variables while the whisker plots were utilized to depict the monthly data distribution. The findings revealed wide variations in meteorological parameters. Above normal rainfall was observed in 2007 and 2017 while 1998, 2009, and 2020 received less than normal rainfall. A statistically significant positive trend was observed for maximum temperature during winter and pre-monsoon season. April, May and June experienced increase in maximum temperature. The minimum temperature, on the other hand, has indicated a statistically significant decreasing trend during April, May, June, July, pre-monsoon and monsoon season. The relative humidity exhibited a significant increasing trend in most of the months. Increasing trend for maximum temperature and humidity, the decreasing trend for minimum temperature, and the semi-negative trend for rainfall clearly indicate climate variability in the study area. This variability in local climate may have serious implications for the fragile and sensitive ecosystems that form the basis of livelihood for millions of mouths.

Keywords: Meteorological parameters, Climate variability, Mann-Kendall, Sen's slope, Dimapur

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Abstract No. B10

IDENTIFYING THE CAUSE OF POOR QUALITY AND AVAILABILITY OF WATER FROM MALAMPUZHA RESERVOIR EXPERIENCED AFTER THE 2018 FLOODS IN KERALA.

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Following the months of the disastrous monsoon in Kerala in 2018, severe flooding occurred all over the state, especially in the district of Palakkad. Though the flood receded in time, certain parts of the district especially near the famous Malampuzha dam faced another hurdle which was truly unprecedented. The quality of the water from the reservoir had substantially reduced after the torrential downpour in the area

making it unfit for direct consumption. Water availability was also affected. This research goes on to ask the question, "What compromised the quality and quantity of water from Malampuzha dam after the floods of 2018"? A buffer with a radius of 10 km was created around the Malampuzha dam and a primary survey was conducted on people residing around the reservoir based on reports of poor water quality and scarcity that existed around the area after the floods. A descriptive analysis of the data suggested that the root of the problem had similar traits linked to siltation in the reservoir as a result of the increased downpour on the catchment due to the heavy southwest monsoon. Further, monthly rainfall data, river flow, reservoir storage combined with a bathymetric survey data from various relevant sources were also analyzed to obtain more conclusive evidences linking water quality and quantity with siltation. The analysis shows that owing to the proneness of the region to siltation, optimal maintenance and management of the reservoir is duly necessary. The results of the research may be used to better prepare reservoirs with similar structure, topology and catchment to avoid such events from occurring in the future.

Keywords Kerala flood 2018 . Reservoir . Water quality . Water availability . Siltation

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Abstract No. B11

IMPACT OF CLIMATE CHANGE ON INDIAN MONSOON: A SPATIO- TEMPORAL STUDY

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Climate is an average atmospheric condition an area for a longer time. It controls the entire global air circulation which is responsible for rainfall pattern throughout the world. Monsoon is the major source of rainfall in India which is very erratic and uncertain in nature. India is one of the most vulnerable nations to the ravages of climate change. The recent past experience of very heavy spell along the Western Ghats shows that climate change is making the monsoon more erratic and violent. It is altering the nature of the Indian monsoon and turning it into destructive force.

An official climate change report, ***the Assessment Of Climate Change Over The Indian Region,*** prepared by the Indian scientific community and published by the ministry of earth sciences (MoES) in 2020, lays out that since 1951, the monsoon circulation has weakened, especially in regions like the Western Ghats and the Indo-Gangetic plains. Simultaneously, however, incidents of localised heavy rainfall have increased. What has also increased is the duration of dry spells between rainy days during the monsoon. Climate scientist Madhavan Rajeevan clarifies that while the monsoon is a robust system and continues to remain so, climate change has added a further layer of variability to a weather system that anyway registers a degree of natural and regional variability. Now the number of rainy days (in a season) is decreasing. And the length of the dry spells is increasing. There's not much change in

the total amount of rain. The number of rainy days may be small, but when it rains, it will rain very heavily, so that the seasonal total will be same. So there are changes in the daily rainfall activity, that is very obvious. According to the India Meteorological Department the frequency of dry spells has increased by 27% between 1981-2011, as compared to 1951-1980. The intensity of wet spells has also gone up in recent decades. Increase in moisture content due to global warming also expected to increase monsoon rainfall. Thus climate change is highly influencing the nature of Indian monsoon and causing unexpected climatic hazards.

In the present paper an attempt has been made to analyze the impact of climate change on air circulation pattern, specially the changing nature of Indian monsoon.

Key Words: Climate change, Monsoon, Variability, Erratic, Vulnerable, Global warming

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Abstract No. B12

UNDERSTANDING THE IMPACT OF TOPOGRAPHIC FEATURES ON CLIMATE VARIABLES OVER INDIAN REGION

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Southwest monsoon brings warm and humid air from tropical oceans to continents and thus causes heavy rainfall over Indian region. In mid-June, the Indian subcontinent warms up more than the Indian Ocean does, forming a strong land-ocean thermal contrast, which drives strong low-level south westerly winds. We have analysed the climate variables such as temperature, precipitation, and solar radiation to understand the climate over Indian region. As we know that, Indian region comprises of various topographical features such as Indo-Gangetic Plain (IGP) and western and eastern ghats. These topographical features affect the climate of different regions of India. For this study, we used regional climate model version 4.9.2 and compare it with high resolution CRU monthly gridded data version 4.05 as well as ERA 5 data over Indian region. We used five-year simulations from 2014 to 2018 (taken 2013 as spin-up for the model) and we concluded from the model simulations that the top of atmosphere shortwave radiation decreased during pre-monsoon season (MAM) and increased during monsoon season (JJAS) while top of atmosphere long wave radiation increased during pre-monsoon season and started to decreasing during monsoon season. Hence TOA SW radiation defined a positive correlation and TOA LW radiation defined a negative correlation with respect to precipitation over Indian region. It is noticeable that the TOA radiation is maximum over Indo-Gangetic Plain.

Key words: Climate variables, Topography, Regional climate model, Solar radiation.

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Abstract No. B13

TEMPORAL TRENDS OF RAINFALL AND TEMPERATURE OVER TWO ECOLOGICALLY SENSITIVE SUB-DIVISIONS OF WESTERN GHATS: AN OBSERVATIONAL ASSESSMENT.

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Rainfall along with temperature is the major components of the hydrological cycle, and its spatiotemporal variability is essential from both scientific and practical perspectives. There are quite a number of conflicting trends in inter-annual variability in monsoon rainfall and temperature over Western Ghats due to recent rise in temperature all over the world. Western Ghats, next to Himalayas are the major watershed for the major south Indian rivers. In this study, an attempt has been made to understand the monthly, inter-seasonal and inter-annual trends of rainfall and temperature over the two meteorological sub-divisions namely Konkan and Goa and Coastal Karnataka. Monthly rainfall data for the period of 1977 to 2016 and temperature data from 1980-2016 is used. According to the analysis, maximum rainfall occurs during the summer, whereas least rainfall occurs during winter. The parametric, Linear Regression analysis and student t-test have been used to identify the existence of trends and to know the changes in rainfall over the time period. An effort has been made to understand the relationship between ISMR (Indian Summer Monsoon Rainfall) & ENSO phenomenon and to investigate whether the rainfall over WG is influenced by ENSO phenomenon or not. Results reveal that although there is increased rainfall over Konkan and Goa, while declining over coastal Karnataka, the changes over both the sub-divisions were statistically significant. Considering rainfall in different seasons, there is a significant change during monsoon season only. The study further reveals that there is an increasing rainfall over Konkan and Goa and decreasing over coastal Karnataka. Furthermore, no statistically significant trend (positive or negative) was evident in any of the season. All temperature trends were positive. Results of this study may prove useful in the preparation of climate change mitigation and adaptation strategies in understanding the patterns of rainfall over WG.

Keywords:- Rainfall, Variability, Climate Change, Global Warming, Trend analysis, ENSO Phenomenon, ISMR.

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Abstract No. B14

IMPACT OF CLIMATE CHANGE AND GLOBAL WARMING ON AGRICULTURE IN PRAYAGRAJ DISTRICT : A GEOGRAPHICAL STUDY

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The importance of agriculture in Indian economy can be assumed by looking the share of agriculture in country's GDP which is 20.2%. But the problem is that

agriculture in India is highly vulnerable to climatic changes which threaten not only the food security of our country but employment also, because more than 50% of our workforce is still dependent on agriculture. Climatic changes caused by global warming affects agricultural productivity through changes in number of rainy days, increase of temperature, increase in the concentration of carbon dioxide and climate variability. Increase in temperature reduces crop yield and causes the growth of weed and pests. Increase or decrease in rainfall causes failure in short term but in long term yield of the crop declines. According to the research studies crops are more affected by climatic changes than other factor. For every 1^0 increase in temperature crop yield decreases by 3% to 5% according to researchers. In India there are mainly two seasons in which crops are produced: Kharif (Crops are sown in June and harvested in October) and Rabi (Crops are sown in November and harvested in May). Kharif crops are affected by rainfall variability and rabi crops are affected by temperature variability. Some crops are positively affected by climate change and some crops are negatively affected, for example with rise in temperature there is loss in the production of wheat and on the other hand legumes are benefitted from the higher percentage of CO_2, but the overall impact of climate change is expected to be negative. In this research paper, I have analyzed the changes in agriculture production caused by climatic changes and global warming using the secondary data sources.

Keywords: Climate Change, Global Warming, agriculture productivity.

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Abstract No. B15

IMPACT OF LAND USE AND CLIMATE CHANGE ON HYDROLOGY OF FORESTED AND AGRICULTURAL HEADWATER CATCHMENTS IN KUMAUN LESSER HIMALAYA

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Land use and climate change have severe effects on water availability in Kumaun Lesser Himalaya particularly in Kosi catchment with overall change in precipitation pattern including high intensity rain occurring over a short period regulating in a higher incidence and intensity of floods and reduction in groundwater recharge, reducing storage. In order to explore the influence of land use and climate change on hydrological processes, a long-term hydro-meteorological monitoring programme was launched in undisturbed pine forest and agricultural headwater catchments. The “Pair Instrumented Catchments” are the headwaters of the Kosi river- the life line of Kumaun Lesser Himalaya. The long-term data on hydro-meteorological parameters in the pine forested headwater (1987-2019) and agricultural headwater (1993-2016) were collected and also conducted many detailed studies of individual storm events in both the headwaters. The long-term data suggest that on an average, there is a decrease of about 290 mm in the annual rainfall with a decreasing trend and a significant increase in the rainfall intensity. The lean flow capacity of Kosi river

during summer has witnessed a massive over, 700% drop. Rainfall-runoff and sediment discharge from the pair catchments suggest that high intensity monsoon rainfall on a 1.83 km^2 undisturbed pine forest headwater produced a peak discharge of 91.945 l sec^{-1} including 983 mgl^1 suspended, 310 mgl^1 dissolved load and 716051 cm^3 bed load sediments. This increase several fold runoff 661.733 $lsec^1$ and sediment discharge including 2190 mgl^1 suspended, 295 mgl^1 dissolved and 865606 cm^3 bed load sediments in the 0.21 km^2 agricultural catchment. Analysis of the long-term data reveals that land use and climate change induced hydro-meteorological phenomena in the study area and around are very active. This paper highlights the consequences of land use and climate change in the region.

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Abstract No. B16

CLIMATE CHANGE AND URBAN HEALTH IN INDIAN CITIES: RISK, MITIGATION AND ADAPTATIVE STRATEGIES

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Cities globally are increasingly positioned as sites of climate action, placing new importance on India's urban transition. Cities globally are increasingly positioned as sites of climate action, placing new importance on India's urban transition. Cities globally are increasingly positioned as sites of climate action, placing new importance on India's urban transition. Today, there is growing interest in climate change's effect on human health and acknowledgment of its link to various aspect related to environment. The Intergovernmental Panel on Climate Change (IPCC) has pointed out that climate change risks to health will be distributed unevenly, with some population groups being more likely to suffer the adverse consequence than others. India is especially relevant to this discussion as it is projected to undertake the largest urban transition globally in next few decades. Urban population and especially socially and economically disadvantaged population within urban areas are likely to be vulnerable to the adverse effect of climate. People living urban areas are exposed to extreme temperature, air pollution, social stressors and they are less able to take adaptation action in India. The aim of present research is to explore and highlights major health issues in major urban cities of India and suggests mitigation strategies to combat climatic challenges in urban India. One of the biggest barriers is the lack of adequate knowledge and information at local, regional and national level. Climate change is still not taken as an emergency. Moreover, most of the attention is more on mitigation but the focus needs to be also on adaptation, especially for the vulnerable communities. Policies have to insert into each and every planning and implementation exercise an adaptation.

Key words: Climate change, mitigation, adaptation, urbanisation, sustainability

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Abstract No. B17

ASSESSMENT OF ACIDIFICATION OVER INDIAN OCEAN IN CONTEXT OF CLIMATE CHANGE DURING RECENT DECADES

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Oceans have a critical importance in regulating the climate and uptaking of CO_2 emitted by anthropogenic activities. However the rate at which the CO_2 currently being absorbed is too rapid to buffered adequately to prevent substantial changes in physical and chemical properties like acidification of ocean. Ocean acidification is a global phenomenon which if allowed continuing unabated will result in severe alteration in carbonate chemistry, which will impact upon important ecosystem and biodiversity. The objective of this article is to understand the role of climate change on acidification over Indian Ocean and the rate of absorption of CO_2 concentration. In this study, based on 1^0 x 1^0 spatial resolution data of pH and air-sea flux of CO_2 is obtained from Copernicus (EU's Earth observation programme) and 1^0 x 1^0 spatial resolution sea surface temperature (SST) data has been taken from Hadley Centre observations datasets for the period of thirty five years i.e. 1985 to 2019 over the Indian Ocean region, correlation between SST and pH, fCO_2 and pH and pH anomalies have been analyzed. The increment of 0.5^0 to 1^0 has been found in sea surface temperature (SST) and air-sea flux of CO_2 increased during the study period. The most of the region shows the decreasing trend in pH during the study period. Acidification rate increases more rapidly in Arabian Sea than Bay of **B**engal. The spatial correlation coefficient (pH value and SST) of 0.6 to 0.7 in most of the coastal region has been detected, while region away from the coast shows least correlation. The result shows the negative correlation of SST with sea surface pH value. This analysis also shows the change in rapid rate of acidification of ocean during recent three decades.

Keywords: Sea Surface Temperature (SST), Climate Change, Acidification, sea-air flux of CO_2

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Abstract No. B18

ESTIMATION OF SOIL EROSION RATE IN HIMALAYAN RIVER BASIN USING CMIP5 CLIMATE MODELS AND EARTH OBSERVATION DATASETS

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The importance of recent climate projections in estimating the soil erosion rate was studied in a Himalayan river basin. CMIP5 climate models and Recognized

Concentration Pathways (RCPs) were used to assess soil erosion rate. Based on expected rainfall from CMIP5 models, the RUSLE model was used to estimate soil erosion rate using rainfall erosivity factor (R-factor). The digital elevation model (DEM), soil and land use/land cover (LULC) data-sets were used to calculate the input parameters of RUSLE model such as LS-factor, K-factor, C-factor, and P-factor respectively. The CSIRO-Mk3-6-0 and CanESM2 climate models found to have the highest future rainfall erosivity. The highest rainfall-erosivity was estimated as 14313.1 $MJmmha^{-1}\ h^{-1}y^{-1}$ for RCP8.5 scenario of CSIRO-Mk3-6-0 model. The RCP8.5 scenario of CSIRO-Mk3-6-0 and CanESM2 had soil erosion rates of 27.5 ton/ha/year and 26.11 ton/ha/year. The northwest portion and lower middle portion of the basin was notified as region of highest soil erosion. The study highlighted that the soil erosion rate in the basin was followed the rainfall erosivity factor.

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Abstract No. B19

प्राकृतिक परिघटनायें पर्यावरणीय असंतुलन का ही दुष्परिणाम–भारत के विशेष संदर्भ में प्रबन्धन की भूमिका : एक विवेचन

डॉ0 विनीत नारायण दूबे

धरातल का तापमान तेजी से बढ़ रहा है और पृथ्वी की जलवायुविक दशाओं में नकारात्मक परिवर्तन प्रारम्भ हो चुके हैं। जलवायु परिवर्तन एक गम्भीर समस्या के रूप हमारे सामने है, जिससे निपटना मानव सभ्यता के लिए अनिवार्य होता जा रहा है, आज राष्ट्रीय तथा अन्तर्राष्ट्रीय स्तर पर यह विचार–विमर्श का प्रमुख विषय बन चुका है। सभी परिचर्चाओं का यही प्रश्न है कि किन उपायों द्वारा पृथ्वी पर हो रहे जलवायु परिवर्तनों से होने वाले दुष्प्रभावों से बचा जा सके? पृथ्वी के तापमान में लगातार हो ही वृद्धि के लिए उत्तरदायी कारकों पर भी नियंत्रण करने की बातें की जा रही हैं। जलवायु में हो रहे परिवर्तन तथा सतत तापमान वृद्धि के कारणों पर अन्तर्राष्ट्रीय स्तर पर की जाने वाली प्रमुख परिचर्चाओं तथा सम्मेलनों में, ब्राजील में आयोजित 'रियो पृथ्वी सम्मेलन–1992, जिसमें अन्तर्राष्ट्रीय पर्यावरण संधि पर सहमति बनी तथा 'यूनाइटेड नेशंस फ्रेमवर्क कंवेंशन ऑन क्लाइमेट चेंज (UNFCCC) नाम दिया गया। वातावरण में बढ़ रही ग्रीन हाउस गैसों की मात्रा पर रोकथाम करना इस संधि का प्रमुख उद्देश्य था। 'क्योटो सम्मेलन'–1997, बाली सम्मेलन–2007, कोपेन हेगन सम्मेलन–कोप, 15 तथा वर्ष दिम्बर, 2010 में मेक्सिको के शहर 'कानकुन' में हो रहे, 192 सदस्य देशों की उपस्थिति में आयोजित जलवायु परिवर्तन से सम्बन्धित सम्मेलन कोप–16, मैक्सिको–2010 प्रमुख है। इन सम्मेलन में यदि निष्पक्षता पूर्वक विकसित, विकासशील तथा पिछड़े हुए देशों के मध्य एक समझौता किया जाय तथा सभी देश उसका अनुपालन करें। हम इस भूमंडलीय समस्या का समाधान पा सकते हैं। धरती को बचाना हम सभी की अब मजबूरी बन चुकी है। ग्रीष्म ऋतु और गर्म होती जा रही है, शीतकाल का अंतराल घट रहा है, बिना मौसम वर्षा, प्राकृतिक आपदाओं का घटित होना, जैव विविधता में दिनानुदित हो रहे परिवर्तन, विभिन्न जीव तथा वनस्पति प्रजातियों का समाप्त होना, कौवे, गिद्ध, चील तथा गौरेओं का विलुप्त होना, शहरी क्षेत्रों में बढ़ रहा ध्वनि, वायु तथा जल प्रदूषण, गहराता जल संकट, बढ़ता सागरीय जल स्तर घटता भू–जल स्तर तथा ग्रीष्म काल में पेयजल की गम्भीर समस्याएँ, असाध्य रोगों का प्रसार आदि वैश्विक जलवायु परिवर्तन तथा सतत तापमान वृद्धि के ही दुष्परिणाम नहीं तो और क्या है? 'वर्ल्ड इकोनोमिक आउट लुक' जनवरी–2010 के आंकड़ों के अनुसार ग्रीन हाउस गैसों के प्रमुख उत्सर्जक देशों में क्रमशः संयुक्त राज्य अमेरिका, चीन, रूस, भारत, जापान, जर्मनी, कनाडा, ब्रिटेन (यू0के0) कोरिया आदि प्रमुख हैं। सम्पूर्ण विश्व स्तर पर कुल–28953 लाख टन, कार्बन डाइआक्साइड गैस का उत्सर्जन हो रहा है, जिसमें प्रति व्यक्ति सार्वजनिक उत्सर्जन, कनाडा द्वारा–60 तथा स0रा0अ0 द्वारा–20.6 लाख टन उत्सर्जन किया जा रहा है, भारत की

हिस्सेदारी प्रति व्यक्ति 1.2, रूस द्वारा, 12.6, जापान द्वारा 9.9 जर्मनी–9.8, ब्रिटेन–9.8, कोरिया–9.7 तथा विश्व औसत 4.5 लाख टन औसत प्रति व्यक्ति है।

प्रस्तुत शोध–पत्र में वैश्विक जलवायु में हो रहे परिवर्तन के कारणों, प्रभावों तथा नियंत्रणकारी उपायों का अध्ययन भारत के विशेष संदर्भ में किया गया है। वर्ष 1800 ई0 से अब तक जहाँ पृथ्वी का तापमान, 0.74^0 से0 की वृद्धि हुई वहीं, 2100 ई0 तक 1.8^0–4^0 से0 वृद्धि का अनुमान है। ध्रुवों पर 200 प्रतिशत वृद्धि दर्ज की गयी है। बीसवीं शताब्दी में समुद्र तल में जहाँ 10–20 सेमी0 जल तल वृद्धि हुई है, वही 2100 ई0 तक 18–59 सेमी0 वृद्धि का अनुमान है। जलवायु परिवर्तन से होने वाले प्रमुख नियंत्रणकारी उपायों में कार्बन उत्सर्जन में नियंत्रण, जल संरक्षण, वाहनों का उचित प्रयोग, विभिन्न वस्तुओं का रिसाइकिल प्रयोग, बायो ईधन प्रयोग, वायु सौर, ज्वारीय तथा भू–तापीय उर्जा के प्रयोग का विस्तार, ग्रीन हाउस गैसों का सीमित प्रयोग आदि किये जा सकते हैं। भारतीय संदर्भ में भी समुद्र जल स्तर में वृद्धि से महाराष्ट्र, तमिलनाडू आन्ध्र प्रदेश, केरल, उड़ीसा तथा पश्चिमी बंगाल राज्यों के तटवर्ती क्षेत्रों के जलमग्न होने का अनुमान व्यक्त किया गया है। जब तक प्रत्येक व्यक्ति स्वयं की नैतिक जिम्मेदारी मानकर पर्यावरण की रक्षा तथा पृथ्वी को बचाने का संकल्प नहीं लेगा तक हम पृथ्वी की रक्षा नहीं कर सकेंगे। विश्व स्तरीय वायुमंडल में पायी जाने वाली 1 प्रतिशत गैसों में प्रमुख रूप से कार्बन उत्सर्जक गैसों में क्रमशः कार्बनडाईआक्साइड, कार्बन मोनोआक्साइड, सल्फर डाईआक्साइर्ड, नाइट्रोजन ओजोन, मीथेन, क्लोरोफोरोकार्बन तथा अन्य डाइड्रोकार्बन्स का अतिआवश्यक होने पर अल्प मात्रा में प्रयोग किया जाना चाहिए। अन्य क्षेत्रों में उपयोग के लिए विकल्पों की तलाश की जानी चाहिए, तभी हम पृथ्वी को संरक्षित कर सकेंगे तथा पृथ्वी के सुरक्षित रहने के बाद ही हमारी सुरक्षा हो सकती है, अन्यथा दुष्परिणाम तो सामने आने प्रारम्भ ही हो चुके हैं।

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Abstract No. B20

TRENDS AND VARIABILITY OF EXTREME WEATHER EVENTS IN KUMAON LESSER HIMALAYA: A CASE ILLUSTRATION OF RAMGAD WATERSHED

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The paper analyzed the variability of the precipitation pattern and interpreted the frequency and intensity of the high intensity rainfall and drought over the Ramgad Watershed, Kumaon Lesser Himalaya, India over the past three decades. The study used the ground observed climatic data of Automated Weather Station [AWS] of India Meteorological Department situated in the watershed. The study observed an increasing trend in the annual average rainfall as well number of rainy days with few exceptions between 1989 and 2018. The study investigated that the amount of rainfall as well the number of rainy days has increased in monsoon season, whereas both the rainfall and rainy days declined substantially in winter months increasing temporally variability in the precipitation pattern. Further, the watershed recorded a progressively increasing trend in the events of high intensity rainfall during monsoon months with a considerably large proportion of high intensity rainfall events falling in the category of severe rainfall events. Whereas, the frequency of the incidences of high intensity rainfall has shown a declining trend during winter season in the watershed. However, the number as well as the intensity of drought have been observed increasing in winter season if compared to monsoon months when the incidences as well as the intensity of drought have shown a declining trend. The study concluded that climate change

induced extreme events of high intensity rainfall and drought have emerged the major environmental threats undermining the sustainability of socio-ecological system and thus increasing vulnerability of large proportion of population to water, food, health and livelihood insecurity in the rain-fed and densely populated Lesser Himalayan mountains.

Key Words: Climate Extreme, Extreme Weather Events, High-Intensity Rainfall, Drought

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Abstract No. B21

CLIMATOLOGY OF THE ARABIAN SEA AND ITS UPPER OCEAN DYNAMICS USING REGIONAL OCEAN MODEL

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This study attempted to demonstrate the skill of the regional ocean model system (ROMS) in simulating the hydrographic property of the Arabian Sea (AS). Additionally, the impact of horizontal resolution is investigated. In this regard, ROMS is integrated over AS covering [30˚E-80˚E; 5˚N-30N˚] using horizontal resolutions ¼˚(~25km) for ten years. The comparison of model results with available observation and reanalysis indicates reasonable resemblances in reproducing the spatiotemporal distribution of surface and subsurface hydrographic property i.e. sea surface temperature (SST), sea surface salinity (SSS), sea surface currents. This study shows that the variability is governed by annual and seasonal high-resolution setup which shows better performance for both season. The seasonal variability of Indian summer monsoon (ISM) is dominated by westward north equatorial current and southward moving currents, which are confined to the boundary currents, where basin circulation is generally observed.

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Abstract No. B22

जलवायु परिवर्तन, वैश्विक ऊष्मन और चरम मौसम की घटनाओं का प्रभाव : अयोध्या (फैजाबाद) जनपद का एक वैयक्तिक अध्ययन

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धर्म नगरी अयोध्या (फैजाबाद) एक सांस्कृतिक, धार्मिक तथा ऐतिहासिक नगर है। प्रशासनिक दृष्टिकोण से इसे मण्डल का दर्जा प्राप्त है। यह प्रभु श्रीराम की जन्मस्थली तथा प्राचीन काल में कोशल राज्य की राजधानी थी। इसकी स्थापना बंगाल के नवाब अलीवर्दी खान ने की थी। वर्तमान में अयोध्या एक प्राचीन एवं धार्मिक नगर के रूप में स्थित है, जो लोगों के आकर्षण का सदैव केन्द्र बना

रहा, जिसका परिणाम है कि यहाँ नगरीकरण एवं मानव बसाव अनियमित ढंग से देखने को मिलता है। स्वतन्त्रता पश्चात नियोजन काल के दौरान इस नगर में नगरीकरण, औद्योगीकरण और यातायात सुविधाओं का विकास तीव्र गति से हुआ। नगर को जहाँ शिक्षा, स्वास्थ्य, रोजगार, यातायात, पेयजल और विद्युत आपूर्ति आदि जैसी बुनियादी सुविधाओं का केन्द्र माना जाता है, वहीं नगर के अनियोजित विकास से लोगों को नगर की विभिन्न समस्याओं का सामना करना पड़ता है। वर्तमान समय में तीव्र औद्योगीकरण तथा खनिज ईधनों के दहन के परिणामस्वरूप वायुमण्डल में विभिन्न हानिकारक गैसों का उत्सर्जन हो रहा है, जिस कारण स्थानीय तथा राष्ट्रीय स्तर पर ही नहीं बल्कि अन्तर्राष्ट्रीय स्तर पर वैश्विक ऊष्मन तथा विभिन्न मौसमी घटनाओं जैसे–बाढ, सूखा, अम्ल वर्षा और चक्रवात आदि में वृद्धि हो रही है, जिसका परिणाम है कि अयोध्या नगर अपनी अस्मिता खो रहा है तथा नगर के तापमान में लगातार वृद्धि हो रही है।

अतः यहाँ शोधकर्ता अध्ययन क्षेत्र में अनियोजित नगरीकरण एवं तत्सम्बन्धी नकारात्मक प्रभावों को सीमित करने हेतु नगरों के नियोजन और औद्योगिक नीतियों में परिवर्तन व परिमार्जन के साथ पर्यावरण अवनयन की घटनाओं के दुष्प्रभावों को सीमित करने का प्रयास किया है।

मुख्य शब्द– सांस्कृतिक, प्रशासनिक, नगरीकरण, औद्योगीकरण, वायुमण्डल, वैश्विक ऊष्मन, अम्ल वर्षा, चक्रवात, औद्योगिक नीतियों।

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Abstract No. B23

IMPACT OF CLIMATE CHANGE-ADOPTION AND MITIGATION

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Climate change refers to the change in many climatic factors brought by nature as well as human activities, around the globe. Changes in climate have more adverse effects than benefits on people and environment. Such as deaths are increasing as a result of heat waves, floods, droughts, tornadoes, extreme weather conditions and more and more forest fire and deforestation.

The anthropogenic factors mainly human economic activities give rise to average global atmospheric temperature. The man induced changes are rapid and capable of changing global weather and climatic patterns at much faster rate. The greenhouse gases which are released to the atmosphere by burning fossil fuels for different purposes are responsible to great extent for climate change. Electric power stations using mainly coal and mineral oil, numerous factories, transport sector e.g. railways, trucks, buses, cars, two wheelers, agricultural implements and aircrafts all over the world burn immense quantity of diesel and petroleum every year, spew carbon dioxide together with other undesirable gases in the atmosphere.

The climate change, therefore appear certain to happen. As a result people and natural resources are sound to be affected by the impact which may accelerate in coming decades certainly as such, there is a need to confront this situation to overcome the effects of climate change by taking actions globally to reduce the greenhouse-gas emissions drastically, though these gases will remain in the atmosphere for several decades due to their long life. If the natural and human systems could adapt to these impacts, the severity and cost of climate change impacts inducing variability and extremes would reduce for many more decades in time. Remedial actions are required

to mitigate or permanently eliminate the greenhouse gas combustion to decrease the amount of carbon dioxide in atmosphere.

Key words: Climate change, Adaptation, Mitigation, Greenhouse gasses, anthropogenic, hazards, emission.

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Abstract No. B24

COMPARATIVE ANALYSIS AND SELECTION OF APPROPRIATE DISTRIBUTION FOR FLOOD FREQUENCY ANALYSIS: A STUDY OF ANNUAL MAXIMUM FLOWS OF KANGSABATI RIVER, INDIA

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Annual maximum flows are an important part of the river flow regime and statistical analysis of the parameter demands considerable attention. This paper has discussed the maximum flows of six gauge sites of the Kangsabati river basin by using Flood Frequency Analysis (FFA) approach. Four probability distribution namely Lognormal (LN), Gumbel (EV1), Generalized Extreme Value (GEV), and Log Pearson Type 3(LP3) have been applied. Annual maximum discharge data from 1990 to 2019 at Simulia, Purihansa, Phulberia, Kharidwar, Tusuma, and from 1988 to 2016 at Mohanpur were collected from the office of the K.D. Sub-division of Central Water Commission (CWC, India), Medinipur. Logarithmic method of Rating Curve Extension were applied to fill the missing data records. Two goodness-of-fit tests namely Kolmogorov-Smirnov (KS), and Anderson-Darling (AD) were applied to the used distributions at 5% significance level. Based on goodness-of-fit tests, LP3 is ranked as the best fitted distributions for maximum number of sites and GEV is the second best distribution. Flow magnitude of 2, 5, 10, 25, 50, and 100-years return periods were thus estimated on the basis LP3 distribution. Both the observed and estimated peak flow magnitude were recorded highest at the downstream gauge site Mohanpur among the six gauge sites.

Keywords: Annual maximum flow, Flood frequency analysis, Missing record fill-up, Rating Curve Extension, LP3, GEV, Goodness-of-fit tests, Return periods, Peak flow moderation, Kangsabati River

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Abstract No. B25

ANTHROPOGENIC INTERFERENCE AND BIOPHYSICAL ALTERATION IN THE STATE OF UTTARAKHAND

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The widespread urbanization due to various anthropogenic activities like construction of roads, buildings, bridges; recreational activities (hotel, resorts, amusement parks)

have resulted in clearing of large stretches of forests across the globe. This large scale clearing of forests have altered biophysical composition considerably which in lieu leading to climatic changes at all three levels macro, meso, and micro. The most vulnerable situation is being faced by the States located in the region of the Himalayas of India. One such State is Uttarakhand which have experienced fast pace of urbanization on one hand and deforestation on the other hand. The objective of present study is to analyze the change detection in impervious surface and green cover for the period 1990-2020. The study also analyzes the level of human interference in the destruction of pristine ecological surroundings and disturbing ecological balance in the study area. The methodology consists of digital data viz. Landsat - 4, 5 (TM) for 1990, 2000, 2010 and Landsat - 8 (OLI) for 2020. The findings of the study show that built-up (impervious surface) have increased over the period and have triggered several climatic changes and disasters (landslides) in the study area.

Key words: Urbanization, Impervious Surface, Deforestation, Climate change

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Abstract No. B26

THE SEASONAL VARIABILITY OF OXYGEN CONCENTRATION IN THE BAY OF BENGAL

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The Bay of Bengal has a major role in the dynamics of the Indian Ocean which needed so many investigations to reveal the important factors influencing human life. Oxygen and temperature are the important factors which govern the ecosystem of the ocean and thus the biological productivity of the ocean. In the present study, we evaluated the possible roles of sea surface temperature and oxygen variation to the seasonal variability in Bay of Bengal using the observational data of SST from the European Centre for Medium-Range Weather Forecasts (ECMWF) along with the Copernicus oxygen dataset. We observed the oxygen anomaly and seasonal mean SST and oxygen variability, the seasonal correlation between SST and oxygen from 2010 to 2018 in the domain 80ºE-100ºE, 10ºN-22ºN which depends on region to region and in average a negative correlation is obtained.

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Abstract No. B27

जलवायु परिवर्तन, वैश्विक उष्मन और चरम मौसम की घटनाओं का प्रभावः कन्नौज जनपद का एक वैयक्तिक अध्ययन

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विश्व विख्यात सुगन्ध नगर कन्नौज भारत के प्राचीनतम नगरों में से एक है। भारत की कला, शिक्षा, धर्म, साहित्य, विज्ञान तथा संस्कृति के उन्नयन में कन्नौज का योगदान अभूतपूर्व है। यही कारण है कि

प्राचीन साहित्य के कन्नौज को 'तीर्थ' की संज्ञा प्रदान की गई है। प्राचीन काल में यह 'अश्वतीर्थ' के नाम से विख्यात था क्योंकि यहाँ पर गंगा के किनारे सुहोत्र व अष्टक जैसे प्रतापी सम्राटों ने अनेक 'अश्वमेघ यज्ञ' किये थे। इस प्राचीन नगर कन्नौज को आज जनपद का दर्जा प्राप्त है। इस नगर का विकास क्रमिक रूप से विभिन्न चरणों– प्राचीन काल (सातवीं शताब्दी से पूर्व), मध्यकाल (सातवीं शताव्दी से 1760 ई0 तक) तथा आधुनिक काल जिसे दो भागों– पूर्व आधुनिक काल (1760–1947 ई0 तक) तथा स्वतंत्रता प्राप्ति के पश्चात् (1947 ई0–अब तक) में सम्पन्न हुआ है। स्वतंत्रता पश्चात् नियोजन काल में ग्रामीण व नगरीय दोनों क्षेत्रों में तेजी से विकास देखा गया। किन्तु कन्नौज प्राचीन नगर होने के कारण यहाँ नगरीकरण अनियोजित ढंग से हुंआ है, जिसके विविध प्रभाव देखने को मिलते हैं। जहाँ एक नगर को नागरिक सुविधाओं जैसे– शिक्षा, स्वास्थ्य, यातायात, पेयजल, रोजगार, विद्युत आपूर्ति, सुरक्षा आदि जैसी बुनियादी सुविधाओं का केन्द्र माना जाता है वही नगर के अनियोजित विकास से नागरिकों को विभिन्न कठिनाइयों का सामना करना पड़ता है। वर्तमान समय में बढ़ते औद्योगिक गतिविधियों तथा विभिन्न ईधनों के दहन के परिणामस्वरूप बड़े पैमाने पर CO_2 का स्थनान्तरण वायुमण्डल में हो रहा है जिस कारण स्थानिक, प्रादेशिक या देशीय स्तर पर ही नहीं बल्कि विश्व स्तर पर वैश्विक उष्मन तथा विभिन्न मौसमी घटनाओं जैसे– अम्ल वर्षा, धुम्र कोहरा, सूखा आदि घटित हो रही हैं। इत्र नगर के नाम से विख्यात कन्नौज नगर में बढ़ते वाहनों की संख्या और औद्योगिक इकाइयों के कारण विभिन्न पर्यावरणीय समस्याएं जन्म ले रही है जिसका परिणाम है कि नगर कन्नौज अपना मूल स्वरूप खोता जा रहा है। नगर का तापमान निरन्तर बढ़ रहा है साथ ही शीतकाल में धुम्र कोहरा यातायात को बाधित कर रहा है। अतः यहाँ शोधकर्ता अध्ययन क्षेत्र में बढ़ते नगरीकरण के प्रतिकूल प्रभावों को सीमित करने हेतु नगरों के नियोजन तथा औद्योगिक नीतियों को महत्व दिया जाना आवश्यक समझा है, जिससे न सिर्फ कन्नौज नगर बल्कि अन्य नगर भी नियोजन की इन नीतियों को अपनाने में पीछे नहीं रहेंगे।

मुख्य शब्द– उन्नयन, तीर्थ, अश्वतीर्थ, नियोजन, अनियोजित विकास, वैश्विक उष्मन, अम्ल वर्षा, धुम्र कोहरा, नगरीकरण, प्रतिकूल प्रभावों, औद्योगिक नीतियों।

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Abstract No. B28

EVALUATION OF CREDIBILITY OF CAMS AND MERRA-2 REANALYSIS AEROSOL OPTICAL DEPTH PRODUCTS THROUGH INTERCOMPARISON WITH AERONET.

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The Earth system is variable in nature, and sampling of geophysical datasets is inadequate or needs to be verified. The comparative estimate of datasets derived from ground instrumentations and computational models may focus on precise weather monitoring. Therefore, validation of two reanalysis aerosol optical depth (AOD) data with AERONET AOD data has been presented in this study to examine the better performance. Specifically, the evaluation of the reliability of two long-term atmospheric composition reanalysis datasets- the Copernicus Atmosphere Monitoring Service Reanalysis (CAMSRA) and Modern-Era Retrospective Analysis for Research and Applications, version 2 (MERRA-2) has been done at three location in the Indo-Gangetic Basin (IGB) over the period of 5 years (2014-2018). The statistical analysis suggests a robust agreement of CAMSRA and MERRA-2 with the three AERONET

stations. Both of the reanalysis data set suggest an overestimation and underestimation, respectively with AERONET AOD dataset over the different time scales, by the mean of coefficient of determination (R2), mean absolute error (MAE), root mean bias (RMB) and root means square error (RMSE). The intercomparisons of these two reanalysis datasets demonstrate some appealing similarities and differences over the seasonal and annual scale with each another. Overall, comparisons among all the products indicate that CAMSRA seems to be more satisfying and promising. The disagreement of the total AOD affects the AOD retrieval for each size classification and causes errors in estimations of size-fractioned AOD. Moreover, due to different pollution levels, distribution patterns, and meteorological conditions, there are distinct seasonal characteristics in the performance of AOD products for different regions.

Keywords: Aerosol optical depth (AOD), Copernicus Atmospheric Monitoring Service Reanalysis (CAMSRA), Indo-Gangetic Basin (IGB)

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Abstract No. B29

ON THE EXTREME EVENTS IN INDIAN SUMMER MONSOON RAINFALL

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We have investigated the Indian Summer Monsoon using the model output of Regional Climate Model version 4.6 (RegCM4.6) and India meteorological dataset. The RegCM4.6 is run from 1st January 1982 until 31st December 2006 at 25 km horizontal resolution with the biosphere-atmosphere transfer scheme (BATS) and Emanuel CP scheme for convection over land and ocean areas. Model region covers a broad region of 49° E to 110.64° E and 12.5° S to 46.5° N 25 km horizontal resolution. The model time step was taken to be 60 seconds in order to maintain stability. The trends in tropospheric temperature extremes reveal the changes in thermal structure convective equilibrium of the atmosphere. The analysis of TT extremes indicates about the likelihood of significant warming in lower troposphere than the middle and upper atmosphere. The importance of Tibetan Plateau has been realized from this Study. It is seen that the seasonal warming of TP maintains upper tropospheric temperature gradient during summers, which is necessary for the maintenance and progression of monsoon flow over India at seasonal and sub-seasonal scales. We found that the accurate representation of high frequency mode *viz* the quasi-biweekly mode can be extremely helpful for predicting the monsoon fluctuations over India. The high frequency mode has almost no association with the northward propagating Boreal Summer Intra-Seasonal Oscillation (BSISO), it is strongly linked to sub-seasonal variability of TP. Its representation is numerical models is still a challenge for the scientific community. The discrepancies in higher and low frequency mode arise due to various factors including the model resolution, topographic details, lack of ocean coupling, etc. The study of coupled air-sea

dynamics using regional models can potentially reveal unexplored aspects of monsoon variability at high frequency mode.

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Abstract No. B30

IMPACT OF SEA SURFACE TEMPERATURE ON CHLOROPHYLL DURING PRE-MONSOON, MONSOON AND POST MONSOON

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In this study, we tried to analyze the effect of sea surface temperature, salinity on Chlorophyll, and their individual variability during the Pre-monsoon, Monsoon, and Post-monsoon. In this study area, Chlorophyll-a concentration changed with the aspects of the monsoon which in turn changed the growth of Phytoplankton. The chlorophyll concentrations were higher during June-July-August-September than other seasons. This process can encourage phytoplankton growth and increase the concentration of Chlorophyll-a. In the period 2003-2007 for which the study was performed, we observed that temperature and salinity changes with respect to the monsoon and its Pre-monsoon and Post conditions, which affected the chlorophyll-productivity in the Bay of Bengal. Thus due to the increase in the temperature day by day the flora and fauna conditions will be changing in the future.

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Abstract No. B31

FLOOD HAZARD ZONATION MAPPING BY USING GIS AND APH MODEL IN ALIPURDUAR DISTRICT, WEST BENGAL

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Floods are the most unpredictable natural disaster and also frequently occurred that affect severely to property, infrastructure, natural resources and many casualties are also associated with it in both developed and developing countries. Poor are more vulnerable to flood. Alipurduar District is located in piedmont plain of Duars region which has unique physiographic and orographic setting controlled by the eastern Himalayas. Numerous small to medium streams which are originated from high altitude of Himalayan region meet at the foothills and form large, wandering or braided rivers like the Kaljani, Raidak-I, Raidak-II. Godadhar, and Sankosh all of which eventually debouch into the mighty Brahmaputra River. The district has been experiencing severe flood every year. Flood hazard potential mapping is required for management and mitigation of flood. The present research was aimed to assess the efficiency of analytical hierarchical (AHP) process to identify potential flood hazard

zones by comparing with the results of a hydraulic model. Initially, four parameters via distance to river, land use, elevation and land slope were used. Data set are DEM (SRTM), LANDSATE, Geomorphology, Geology and Rainfall etc.

Key words- Flood Hazard, Zonation, Duars Region, AHP,

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Abstract No. C01

A GEOGRAPHICAL STUDY OF THE EFFECT OF GLOBAL WARMING AND EXTREME WEATHER EVENT ON DISTRICT GONDA

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District Gonda is a plain area located in the central Ganges plain of Uttar Pradesh. Here both events like global warming and extreme weather events are reflected. Global warming is the phenomenon of increase in the normal temperature of the area. The effect of global warming is reflected on various aspects of agriculture, climate, vegetation and human life in the district. An extreme weather event is a phenomenon that is related to change in normal weather events that have a direct impact on human life. As an extreme weather event, before the monsoon, sometimes local cyclones arise in the district, which are called 'Stormy Jhoka' in the local language. Sometimes frost and hailstorm are also seen in the winter. Cold wave in winter and heat wave in summer negatively affects human life. Due to global warming, the problem of floods and sometimes drought also arises in the district Gonda. Which affects the agriculture of the district. Due to the impact of agriculture, human life of the district gets affected.

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Abstract No. C02

सड़क मार्गो के निमार्ण से भौतिक वातावरण पर प्रभावः अल्मोड़ा जनपद के विशेष सन्दर्भ में

भूपेन्द्र कुमार एवं ज्योति जोशी

भूगोल विभाग, कुमाऊँ विश्वविद्यालय, एस0 एस0 जे0 परिसर, अल्मोड़ा, उत्तराखण्ड–263601,

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वर्तमान समय में सड़क मार्गों के निर्माण से भौतिक वातावरण पर नकारात्मक प्रभाव पड़ रहा है। धरातलीय ढाल अपना मूल स्वरूप खोते जा रहे हैं, प्राकृतिक वनस्पति नष्ट हो रही है, प्रवाहित होने वाली नदियों के मार्ग अवरूद्ध हो रहे हैं, भू जल स्तर प्रभावित हो रहा है तथा प्राकृतिक जल स्रोत नष्ट हो रहे हैं। इन सभी परिवर्तनों के परिणामस्वरूप जल प्रदूषण, वायु प्रदूषण, मृदा प्रदूषण जैसी गम्भीर समस्याऐं उत्पन्न हो रही हैं। यह सभी समस्याएँ अध्ययन क्षेत्र में निवास करने वाले प्राकृतिक जीवों के आवास व मानवीय आवासों पर भी नकारात्मक प्रभाव दिखाई देने लगा है। कृषि योग्य भूमि का एक बड़ा भाग इससे प्रभावित हुआ है।वर्तमान समय में भू स्खलन जैसी प्राकृतिक आपदा से सम्पूर्ण जनपद प्रभावित हुआ है। अतः कहा जा सकता है कि सड़क निर्माण प्रक्रिया से, अल्मोड़ा जनपद का भौतिक वातावरण नकारात्मक रूप से प्रभावित हुआ है। इस समस्या के निदान के लिए दूरगामी सोच तथा पर्यावरण प्रबन्धन के मानकों का पूर्णतः पालन सुनिश्चित किया जाना अति आवश्यक है।

संकेत शब्दः सड़क निर्माण, प्राकृतिक वातावरण, भू स्खलन, प्राकृतिक आवास, अल्मोड़ा, उत्तराखण्ड।

Abstract No. C03

DELINEATION OF WATER DIVIDE ZONE IN LOWER FLOODPLAIN REGION OF MAHANANDA RIVER BASIN, WEST BENGAL: A METHODOLOGICAL APPROACH

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Geomorphology deals with the identification, interpretation and representation of the landforms based on morphology and geomorphic process. Interfluve is a tract of land between two rivers. A water divide zone is any elevated area of terrain that separates drainage basins into two parts. Floodplains are land areas adjacent to rivers that are characterized by repeated inundation and composed of unconsolidated sedimentary deposits. Levelling field survey has been used in this study. Across the interfluve, 2 km interval cross profiles are plotted. Based on the levelling field survey delineated the water divide region and inundation level of the area. After the full bank discharge, the increase of 0.5 metre water level and 1 metre increase water level impact has been measured. Based on the data flood inundation zone map has been prepared. In a lower floodplain region roads and human settlements are the barrier of water movement. The main objectives of the present study are to analyse the methods related to delineation of water divide in the floodplain and analyse the flood impact of the study area. This paper will give the knowledge to the planners, local dweller and researcher about the impact of flood in the lower floodplain of the study area.

Keywords: Delineation of water divide, Interfluve, Levelling field survey, flood inundation zone map, floodplain

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Abstract No. C04

A GIS BASED COMPARATIVE STUDY OF ANALYTICAL HIERARCHY PROCESS AND FREQUENCY RATIO METHODS FOR LANDSLIDE SUSCEPTIBILITY MAPPING ALONG HIGHWAY ROAD SECTION IN J&K, INDIA

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This paper attempts to comprehensively study the landslide susceptibility mapping using analytic hierarchy process (AHP) and frequency ratio (FR) methods along highway 1D from Bandipora to Gurez, J&K, India. This research work deals with the landslide susceptibility mapping using AHP & FR Methods in GIS environment. The

landslide influencing geo-environmental factors which include slope angle, land use/land cover, distance to faults, precipitation, soil, slope aspect, lithology, altitude, distance tostreams, and distance to road were considered. The landslide inventory map comprising of 279 landslide events was created based on past records of the Border Roads Organisation (BRO) of Srinagar, Bandipora and Gurez, as well as landsat 7ETM + images, Google earth images, and secondary sources. Google maps were used due to their high resolution and available GCP's which enabled in identifying the landslide events precisely and in addition to that extensive field survey was also conducted. The analysis of the relationships between the landslide related factors and the landslide events were then computed in GIS environment. A weighted pair wise comparison matrix was generated using AHP and FR methods. The geo-environmental factors and their derived weights through AHP and FR were then overlaid using the index overlay module in ArcGIS 10.2 supplemented by MS Excel and Matlab R2008a. This area has the most tortuous and rugged zones with high incidence and impact of landslides simultaneously. Thus there is an urgent need to mitigate the landslide susceptibility particularly to avert the disruption from Srinagar to Leh road which causes vastinconvenience, economic and human losses.

Keywords:-Landslide Susceptibility; GIS; Index Overlay Model; AHP; FR; ArcGIS; Matlab

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Abstract No. C05

GEOMORPHOLOGICAL HAZARDS IN AMBIKAPUR REGION, CHHATTISHGARH

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The region is situated between 22° 32' 30" N to 23° 57' 25" N latitudes and 82° 2' 10" E to 83° 42' 15" E longitudes and covers a territorial span of 13851.58 km^2. The natural boundary of Rehar and Kanhar watershed marks the eastern boundary of the region, while the northern limit is demarcated by the water divide of Iria and Baran river, whereas the watersheds of Mand and Rehar rivers work as the southern boundary of the region. The south western boundary is delineated by Hasdo and its tributaries, whereas the water divides of Gopad and Rehar rivers act as the North-Western boundary of the region.

Floods, landslides and soil erosion are the major geomorphological hazards of the present study region. The region is characterized by sub-humid worm, sub-tropical monsoon climate having mean annual rainfall ranging between 900 mm to 1000 mm of which more than 82% is received during three wet monsoon months of July, August and September. In this way the erosional and transformational work take place maximum in wet months or monsoon season. The region becomes hot during summer season and it experiences strong cold weather in winter season. These conditions are responsible for the physical weathering of sandstones and shales. After 15 June sudden outbreak of monsoon takes place in the region. The rainfall of wet month

increases the rate of chemical weathering. The loose material of hill slopes come down towards piedmont areas and cause landslides. Helpless rivers of winter and summer season become very powerful to the view of erosion and transportation. Rehar, Moran, Mahan, Mond, Hasdo and Iria are perennial rivers. The perimeter zone of the region is in the form of highlands. The turbulent stream during monsoon periods becomes active to the view of erosion. When these rivers and their tributaries descend from the highlands, pour huge amount of water in piedmont areas and excess waters goes to main stream that causes floods in the middle parts of study region. Although floods are not long lasting, their effect is very deep for the settlers near hill slopes and valley sides of different river. Tribals always clear the vegetative cover of their surroundings, so the thin layer of soil is eroded and transported by turbulent streams. These also develop numerous gullies in valley sides slopes and region becomes ravine infested.

Keywords; River, Turbulent, Flood, Landslides, Soil Erosion.

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Abstract No. C06

SPATIAL PATTERN OF LANDSLIDES ALONG THE MANDI-MANALI NATIONAL HIGHWAY STRETCH, HIMACHAL PRADESH, INDIA

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Landslide is one of the major hazards, widely spread in India which cause extensive damage to human lives, infrastructures and environment. It is estimated that 50 percent of the landslides occur along the road side. Himachal Pradesh has a road network of 33000 Kilometers and 80 percent of these roads are vulnerable to landslides. NH-3 is one of the major National Highway in the state which connect important tourist destination like Kullu and Manali. The ongoing construction as well as road widening activates make this highway more vulnerable to landslides. The present study demonstrate the results of GIS based thematic maps. The secondary data from Bhukos portal of Geological Survey of India has been used to prepare landslide inventory. The landslide inventory includes 302 landslides with their attribute data in the study area. The satellite imageries of LANDSAT 8 and SRTM DEM were used to derive baseline information of various parameters like slope, aspect, relative relief, drainage density, geology, and geomorphology. Landslide is the most costly and damaging natural hazards in the mountainous region. Therefore to reduce the risk of disaster it is important to analyze different causative factors to suggest the mitigation and preparedness policy at regional and micro level.

Keywords: Landslide, Hazard, Vulnerable, Disaster, Risk.

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Abstract No. C07

GEOMORPHOLOGICAL INVESTIGATION OF PARAGLACIAL ZONE IN DHAULI GANGA VALLEY: IMPLICATION OF 07TH FEB'21 RISHI GANGA FLOOD, UTTARAKHAND

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Paraglacial zones are indirectly conditioned by glaciers and glacial processes. They sequester paraglacial sediments left behind by receding glaciers. Often these sediments are mobilized by extreme precipitation events causing destructive sediment-laden floods. The present study analyses the 07th February 2021 Raunthi Gad (stream) flood in the upper Ganga catchment. The aim is to understand the geomorphic and climatic factors responsible for the event; understand the pattern of sediment mobilization, and estimation of the paraglacial sediment stored in the catchment. Towards this, depositional landforms like moraines, alluvial fans, terraces, talus/scree cones were mapped using Landsat 8 and Google Earth imagery. The pre- and post-disaster sediment volume was estimated by taking time-series data of 01st and 10th Feb 2021. The study infers that the flood was initiated by dislodging the ice pack on a pre-existing rock fissure. The fresh snowfall followed by an abrupt temperature rise possibly led to melting of the snow and thus lubricated the fissure, triggering the collapse. The paraglacial sediment from the landforms and englacial water were incorporated by the rock-ice fall as it moved downstream. Also, the sediment-laden water was possibly impounded temporarily in the constricted valley topography downstream besides the hydropower barrages of Reni and Tapowan. We estimated that out of 10.6×10^8 m^3 volume of paraglacial sediment stored in Dhauli Ganga catchment, ~7% was mobilized during the 07th Feb single-day event. The long-term (1989- 2017) climate data suggests, warmer winter and spring seasons in the catchment. Similar debris flow floods and avalanches were reported subsequently in the NW Himalaya, which may be an artifact of the rising temperature observed.

Keywords: Paraglacial zone, Paraglacial sediments, Dhauli Ganga catchment, Debris flow.

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Abstract No. C08

भू–आ तिक अपदाएँ : भारत के संदर्भ में एक भौगोलिक अध्ययन

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भारत की भू–आकृतिक संरचना को देखे तो यहाँ पर्वत, पठार एवं मैदान तीनों संरचना मौजूद है। इसके उत्तर में महान हिमालय पर्वत हैं जिसकी उत्पत्ति यूरेशियन प्लेट एवं इण्डो–ऑस्ट्रेलियन प्लेट के

आपस में टकराने से हुई है जो क्रमशः अंगारालैण्ड एवं गोण्डवाना लैण्ड का भाग है। आज से लगभग एक करोड़ वर्ष पूर्व यूरेशियन प्लेट एवं इण्डो–ऑस्ट्रेलियन प्लेट के टकराने से हिमालय पर्वत का निर्माण हुआ है। यहाँ पर इण्डो–ऑस्ट्रेलियन प्लेट यूरेशियन प्लेट के नीचे घुस रही है। इन दोनों प्लेटों का आपस में टकराने से इन प्रदेश में भूकम्प, भूस्खलन, सुनामी इत्यादि आपदाएँ आती है जिसका भारत पर प्रभाव प्रत्यक्ष रूप से पड़ता है।

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Abstract No. C09

INVESTIGATION OF GEOMORPHIC LANDFORMS IN RELATION TO HAZARDS OF NUBRA AND SHYOK VALLEY

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The geomorphological setting of Nubra and Shyok valley comprises of glacial, glacio-fluvial and lacustrine deposits and the evolution of these landforms provides an important aspect in understanding the Quaternary scenario and the associated hazards of the area. These deposits include alluvial fans, braided river, slumping sites, horns, aretes, tillites and many more. With time, some sites became vulnerable and prone to natural hazards. The google earth imagery of previous years and the present field study demonstrates diversity in the landform features depicting the evolution the area is witnessing. The most common natural hazards are avalanches, landslides and sediment accumulation due to glacial melt leading to washing out of settlements. The mitigation steps can be taken at these specific sites to prevent the foreseen damage. The common and most feasible method to investigate the area is through geomorphological mapping. The geomorphic mapping gives detailed demonstration of the landforms, depositional, erosional features and the site prone to harmful events. The detailed mapping of features like alluvial fans, drainage pattern, slumping sites, moraines are helpful in risk assessment and management programs. The changes observed over years are due to the climatology of the region which is affected by increased tourism and changing weather conditions like annual precipitation and mean air temperature. This is a clear demonstration of climate change which this area is facing and will lead to more hazards if not taken care of.

Keywords: Quaternary, Avalanches, Geomorphological Mapping, Hazards.

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Abstract No. C10

MITIGATION OF FLOOD: A CASE STUDY OF GHATAL BLOCK, IN GANGETIC DELTA

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A flood is an overflow of water that submerges land that is usually dry. They area most common and widespread natural severe weather event. Flood is an attribute of

physical environment of hydrological cycle of a drainage basin (Singh S., 2009). Global warming is causing an increase in extreme weather all around the world, extreme weather increases the chance of flooding in coastal and riverine areas in tropical region (IPCC, 2014).

Ghatal block, of Paschim Medinipur (district) of West Bengal is very vulnerable to flood owing to its typical basin shaped topography, complex drainage system, critical physiographic location and climatic situation. The region becomes flooded 3-4 times in a year. Due to its basin shaped topography water remains stagnant for a long duration of time. Moreover, owing to its complex drainage system the river struggles to carry the surplus runoff water which results in heavy flooding. The paper focuses on devastating effects of flood on agriculture, settlements, transport and communication etc. in Ghatal region. By the help of maps and satellite images, graphs we can properly traverse the paper and the effects of flood on natural and human resource in Ghatal block to help local people to sustain by reducing the risk and mitigate wreak havoc caused by flood.

Key Words: Geomorphological hazard, Flood, Sustainability, Remote Sensing and GIS.

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Abstract No. C11

RISK ASSESSMENTS OF HYDRO-POWER PROJECTS: STUDIES ABOUT ONE FAILED AND ONE EXISTING DAM PROJECTS ALONG THE NAGAVALI RIVER, ODISHA-ANDHRA PRADESH

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The Nagavali, one small independent river is after originating from a hill (1300m) of Kalahandi District flowing through a longitudinal valley between Eastern and Western ridges in Orissa and Andhra Pradesh and finally falls in Bay of Bengal. In the year 2003, Government had announced several hydro-powers projects along the Nagavali River basin. Two such projects had started at Hathipahar region in Rayagada, Orissa and at the Thotapalli village in Vizianagaram District, Andhra Pradesh in 2005. The Hathipahar region was situated over a piedmont slope of the eastern ridge (formed of Khandelite-granite) and the Thotapalli site is located over rolling plain. On July 2006, due to torrential rainfall and flash flood, the under constructed dam at Hathipahar had collapsed and the valley had experienced wide changes in terms of channel shifting (about 550 meters), headword erosion, valley incision and soil loss.

But that time, Thotapalli site was not get much affected and thus the construction got completed in 2010. Eventually there was another flood in 2011 which caused huge erosion and enlargement of the reservoir from 2.1 sq. km. to 9.16 sq. km. Not only that the upstream course of the river merged with reservoir and the width of the river

increases from 172m to 1.6km. Again, this event caused destruction of roads, rail lines, households and agricultural lands.

For the present study SCS-CN model has been used and validated with real time discharge data, land use-land cover change, spatio-temporal variations in channel width-depth and sedimentological variation have been analysis to assess the risk at Hathipahar and Thotapalli hyro-power sites. Google Earth and SRTM DEM have been used for detecting changes. Intensive field survey has been carried out in order to prepare a micro level elevation model and to understand lithological formation of the area.

Keywords: Piedmont slope, flash flood; hydro-power project; SCS-CN model; risk assessment

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Abstract No. C12

LANDSLIDE SUSCEPTIBILITY ANALYSIS: A CASE STUDY OF MUNNAR PANCHAYAT AND SURROUNDINGS, IDUKKI DISTRICT, KERALA

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Landslides are one of the most recurrent natural phenomena that are of overwhelming significance in the Western Ghats. Ecologically and environmentally sensitive, this region, surrounded by vast jungles, has been experiencing landslides recently. This has disturbed the transport and communication routes severely. Even today the risk of yet another landslide remains in very high terrains being under severe transmutation by human interference. Excess urban penetration has led to triggering of landslide along with causing colossal damage to property and loss of life. Immense risk looms large all along the Western Ghats with cumulating conditions that build the potentiality to landslides. The study of landslides has drawn worldwide attention mainly due to the aggravating socio-economic consequences as well as the increasing pressure of tea plantation and urbanization on the mountain environment.

In order to reduce the damage and manage vulnerable areas, there is imperative need to formulate comprehensive Landslide Vulnerability and Susceptibility Zonation maps for different areas of the Western Ghats region emphasizing the urbanized and burgeoning pockets. The concept of landslide susceptibility and landslide susceptibility assessment have been introduced in the past couple of decades and various methodologies have been developed for evaluating the devastating power of landslides and its associated processes. The ultimate aim is to evolve a method suitable for specific areas through which appropriate management measures can be

taken to reduce the risk from potential landslides. Any approach towards LSV and LSI would require identification of the conditions leading to slope failure, their systematic mapping and evaluation of their relative contributions by amalgamation of all factors in the ultimatum.

The aim of this paper is to assess the various landslide vulnerability factors in Munnar Panchayat Wards and surrounding area on raster-based GIS platform and generate landslide vulnerability and susceptibility maps. To achieve the objective, a detailed inventory of maps based on all parameters assessed has been generated of the study area from the satellite imageries, primary survey data and secondary data. The accuracy of results is being validated by constant field observations and prediction accuracies.

Keywords: Landslide vulnerability, susceptibility, transmutation, parameters, GIS, factors, mapping

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Abstract No. C13

AN ANALYSIS OF LANDSLIDE SUSCEPTIBILITY *:* A CASE STUDY OF KALEJ KHOLA BASIN, WEST SIKKIM

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Land Slide is a natural phenomenon as well as it is a quasi-natural hazard ,and its significance in the eastern Himalayas and its surrounding Kalej Khola Basin Which is a small mountainous state in the eastern Himalayas covers an area of 7069 sq. km., extending approximately 114 km from north to south and 64 km east to west. It is also a hilly state consisting of tangled series of interlocking mountain chains rising range above range from the south to the foot of high peaks which marks the snow line in the north.

In Kalej Khola besin There are many factors responsible for land slide vulnerability in this area like the land use pattern, transportation system , vegetation density , soil properties slope aspect of Kalaj Khola basin make it vulnerable for land slides. Settlement type of this area is mostly scatter but have some little urbanized areas. The concept of landslide susceptibility and landslide susceptibility assessment have been introduced in the past couple of decades and various methodologies have been developed for evaluating the devastating power of landslides and its associated processes. The ultimate aim is to evolve a method suitable for specific areas through which appropriate management measures can be taken to reduce the risk from potential landslides.

The aim of this paper is to assess the various landslide vulnerability factors in Kajel Khola Basin and surrounding area on raster-based GIS platform and generate

landslide vulnerability and susceptibility maps. To achieve the objective, a detailed inventory of maps based on all parameters assessed has been generated of the study area from the satellite imageries, secondary data. The accuracy of results is being validated by constant observation and prediction accuracies.

Keywords: Landslide vulnerability, susceptibility, parameters, GIS, factors, mapping

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Abstract No. C14

COASTAL VULNERABILITY AND MANAGING STRATEGIES: A CASE STUDY ON PARTS OF COASTAL DISTRICTS OF SOUTH ANDAMAN ISLAND, INDIA

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Coastal hazards and related vulnerability is a global issue and indeed India is not an exception**.** Vulnerability of coastal zone depends upon the risk arising from the various natural hazards like cyclonic storms, tsunami, etc. and the characteristics of the exposed area. Assessing this vulnerability becomes an emerging challenge for the coastal districts of South Andaman especially for the Port Blair as the area was massively destructed due to the earthquake and tsunami waves in December 2004. The present study exclusively addresses the coastal vulnerability of South Andaman Islands to tsunami hazard and also applied the environmental zoning concept as a functional management tool. Two different measures have been computed for assessing the vulnerability, one is the "coastal insularity" and the other is "coarse vulnerability" for four subdivisions of Port Blair: Urban Port Blair, Rural part of Port Blair, Havelock Island and Neil Island respectively. Coastal insularity is a measure of the openness of the coast, whereas demographic profile includes the number of population which is exposed to the coastline. The physical attributes and demographic profile of the coastal districts were extensively surveyed and documented during the fieldworks carried out in different areas of the studied Island. Necessary mapping tasks for the estimation of final vulnerability index for all the coastal districts were performed combining the insularity index data and population density data. Results indicate that the Port Blair town shows highest vulnerability index thus high risk of tsunami hazard, while rural part of Port Blair shows the lowest index value. Finally, seven environmental zones have been demarcated on the basis of their functional values to restore the environmental balance as well as to promote sustainable management for the entire Island community.

Key Words: Hazards, Vulnerability, coastal insularity, coarse vulnerability, Andaman

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Abstract No. C15

ROLE OF GEOMORPHIC MAPPING FOR HAZARD ASSESSMENT: A CASE STUDY OF SISSU WATERSHED

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Geomorphological mapping of any region is an inventory depicting the landscape of that region with its landforms and processes. These landforms are the oldest possible tools to study and analyse the features, forms and processes of the earth surface just by the visual interpretation. Geomorphic maps for any region act as preliminary tools for deciding the course of action for the management of land. But most important advantage of such mapping is geological and geomorphological hazard risk management. One single map can help us understand the processes that are responsible for giving the earth its present shape and tell as to, how did these landforms gradually evolved out in its present shape. Geomorphic maps also act as a base for the other arenas with applied aspect such as landscape ecology, forestry, soil sciences etc. A clear, precise and accurate geomorphic map provide information's, where a landform is, why is it there, what it is made up of and how it has changed, gives us an upper edge to manage human interactions with the earth's surface. Landforms are most important factor to study and analyse to look deeper into knowing hazard probability of any area because landforms influence the cycle of natural event occurring therein apart from influencing human life. Once the landforms in any region is mapped properly through geomorphic mapping, it can give us insight on geologic history, structure and lithology of any region. Geomorphic mapping is a tool through which the analysis and solution of problems concerning land and environment planning and management can be done. Any region will be prone to more floods if it has a topography or slope that can increase the movement of the water downstream. In addition, it has unconsolidated lithology things can further go worse. There are several techniques involved for the identification of the accurate landforms and processes involved and then mapping it. These techniques are relief shading, gradient, profile curvature. Using these techniques, a detailed geomorphic map has been prepared for the Sissu watershed, along with coding and categorization of each unit.

Sissu watershed, in general, is a barren eroded region with rocky outcrop surface. Sissu watershed has plenty of small and large glaciers which are valley as well as hanging type glaciers. There are a quite a large number of cirque glaciers as well. The entire region has dense network of small melt water streams coming out from these glaciers. All these melt water steams join the Sissu main stream. Sissu is also a glacier fed river. The region shows the extent for glacial advancement in the past in the form of lateral and terminal moraines. The cyclic advance and retreat of glaciers is seen by the alignment of series of lateral moraines and terminal moraines. It is because of this alternate advance and retreat of glacier that led to the formation a big pro-glacial lake at the mouth of the source glacier and dammed by its end moraine complexes.

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Abstract No. D01

GEOMORPHIC PROCESSES AND LANDFORMS IN THE INDUS VALLEY BETWEEN HEMIYA TO KHALSI, LEH DISTRICT, LADAKH, INDIA

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The study also deals to understand anthropogenic influence on the processes and landforms of the study area. Extensive Field survey supported with satellite data has been taken to analyze, identify, and map the study area for better identifications of landforms. From the filed observations, spatiotemporal study of satellite data, Google earth images it is very well understood that the processes operating in the study area intensified due anthropogenic influence. Alluvial fans, river terraces, river bank deposits, alluvial plain, hill slopes have been highly altered and lost their natural entity.

Keywords: Anthropogenic, Field survey, Landforms, Alluvial Fans, Hill slopes, River bank deposits

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Abstract No. D02

ASSESSMENT OF COURSE DYNAMICS AND IMPACT ON LAND USE PATTERN IN MIDDLE GANGA PLAIN

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Course dynamics is a key feature of all the rivers. It has become a major concern for floodplain dwellers as well as policymakers interested in floodplain planning and management. Using 46 years of remote sensing datasets, We have investigated the spatial and temporal change of the Ganga River course in a portion of Uttar Pradesh, India (from 1972 to 2018). For this analysis, various features were extracted manually, and supervised classification was performed for Land Use/Land Cover (LULC) analysis. This research shows that a significant portion of land along both banks of the Ganga River has changed from 1972 to 2018. The right bank near Padao experienced a 3594 m shift, while the left bank near Ramna observed a 2384 m shift. This research pinpoints four main areas where course modification is a significant factor (i) MS1 (near Sirsa), (ii) MS2 (near Inargaon, Semradh, and Khamaria), (iii) MS3 (near Mirzapur to Kachhawan), and (iv) MS4 (near to Ramnagar). In all of the

movement areas, there has been a noticeable rise in the built-up area, as well as a decline in vegetation cover and marshy land in the floodplain. MS4 was the worst affected site, with a sharp increase in fallow-land from 3.04% to 35.9% and a drastic decrease in Marshyland from 16.88% to 0.07%. Manual mapping of different geomorphic features and automatic classification of land use/land cover had shown that course dynamics and developments in geomorphic units have a greater effect on Land Use and Land Cover Categories.

Keywords: Course dynamics; Ganga River; LULC; Geomorphic units

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Abstract No. D03

DEPOSITIONAL ATTRIBUTES AND CHANNEL PLANFORM ANALYSIS OF THE JALDHAKHA RIVER IN MATHABHANGA I & II BLOCKS OF KOCH BEHAR DISTRICT, WEST BENGAL

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The planform morphology of the Jaldhaka River is quite dynamic because of different ambient fluvial mechanisms (viz. bankline shifting and meandering, bar deposition and channel convergence/divergence during varying flow stages). An examination of such morphological changes is pertinent to ascertain the overall river behaviour and its sensitivity to discharge fluctuations, precipitation events and landscape change. This study examines the successive planform configuration from 1990 to 2020 along a portion of the river and its variation across a number of cross-section lines. Furthermore, it quantifies changes in *charland* distribution and pattern from 2011 to 2020 and estimates erosion/deposition extents on long-standing vegetated/cultivated *charland* surfaces. The respective banklines for 1990 and 2000 were digitized from Landsat-5 TM images, first using the Normalized Difference Water Index to differentiate between water and non-water surfaces while the banklines of 2010 and 2020 were digitized from Google Earth. For estimating bankline erosional/accretional extents, 47 section lines were drawn at ~1 km spacing throughout the study reach. Charlands were digitized for 2011, 2014, 2017 and 2020 and their geometric attributes (longest length, maximum width, perimeter and area) were ascertained. Results reveal that the Jaldhaka River has shifted along both its banks in different locations and that it follows an irregular shifting pattern. Channel narrowing occurs at crossing structures (e.g. the Mansai Bridge) while widening in its upstream and downstream sections. *Charlands* numbers have decreased from 2011 to 2020, but their total area has increased, indicating bigger bar deposits. Thus, the overall sediment accumulation has risen. Individual *charland* shape (circularity) and length-width ratio are altered by sediment fill/loss over time. Bank attached *charlands* (vegetated and developing into long-standing deposits) are crucial for riverside dwellers who use these for cultivation. Measures to reduce their areal loss are thus crucial and this study identifies those most prone to erosion.

Keywords: Bankline shifting, *charland*, Jaldhaka River, floodplains, bar deposits, Dooars

Abstract No. D04

FLOODPLAIN ZONES AND FEATURES IDENTIFICATION IN MIDDLE GANGA PLAIN USING LANDSAT 8 (OLI & TIRS) AND ASTER (GDEM) DATA BY OVERLAY ANALYSIS

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This paper attempt to identification and demarcation of floodplain zones and features in Middle Ganga Plain using Landsat 8 (OLI & TIRS) and ASTER (GDEM) data by Overlay analysis. A floodplain has usually composed primarily of lateral accretion deposits with an overlay of fine vertical accretion flood deposits. Mapping of geomorphic features through a ground survey using quantitative methods involves a significant amount of time, money, and effort. On the other hand, modern remote sensing techniques have a new dimension to geomorphology, making it more precise, cost-effective, and less time-consuming. The major objectives of the study have as to identifying the major geomorphic feature in study area and to delineation the different floodplain zones of middle Ganga plain. The present study has been based on primary and secondary data. Primary data collected through field observation and selective field check for cross verification and feature identification. On the basis of overlay analysis the result has that six zones namely Active Channel, New Flood Plain Zone I, New Floodplain Zone II, Old Floodplain Zone I ,Old Flood Plain Zone II, Depressed Low Land and several other geomorphic features like Sand Bar, Paleochannel, Meander Scare, Oxbow Lake and Lineament has been delineated and identified.

Key word: - Floodplain, Landsat, Paleochannel, Sand Bar

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Abstract No. D05

MORPHOMETRIC ANALYSIS OF MANIYARI BASIN (BILASPUR DISTRICT, CHHATTISGARH)

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The term morphometry is used in several disciplines to mean the measurement and analysis of land form characteristics, In geomorphology, it is applied to numerical examination of land form , which may be referred to as geo-morphometry . A basin can be defined as a hydrological unit varying in extent/from which run off resulting from precipitation flow past a single point into large stream river.

Morphometry could be defined as the measurement and mathematical analysis of the configuration of the earth surface and of the shape and dimension of its land forms.

The area, altitude, volume, slope, profile and texture are the main aspects examined in the study of morphometry. The technique is used for the varied characteristics of drainage basins which include erosion surface, nature of erosion, formation of slopes etc.

The study area Maniyari River Basin extends about 2885, sq kms it span over the part of Bilaspur District of Chhattisgarh. The topography of the basin is undulating. Northern Part is hilly dissected plateau region and sourthern part of plains with alluvium. Physically Maniyari Basin Part of Pendra Lormi Plateau.

Maniyari river is tributary of Mahanadi river. The total length is 133 kms. which flows towards north east to south west. Maniyari river is a seventh order River basin including fifteenth sub Basin.

The objectives of study area in following ways –

1. To describe and discuss quantitatively the linear, areal and relief characteristics of Maniyari Basin.
2. To study the relationship among the quantitatively morphometric properties of Maniyari basin. It tries to examine how these properties are associated with each others.
3. To investigate by varies technique to geomorphic stage of development.

Data Base and Methodology :-

The present study is mainly based on primary data generated through the SOI toposheet. (1: 50,000 scale). In present study Base map showing drainage details have been prepared from the toposheet. The morphometric analysis advocated by Horton (1945) introduced qualitative as well as quantitative analysis of land forms. Strahller in 1952 modified the Hortonian scheme and emphasized the quantitative interpretation of land forms. In this paper uses the quantitative geomorphic methods the only means of the drainage basin, stream order, stream number, stream length, drainage density, stream frequency, Bifurcation Ratio, etc. have been studied. These properties further will be correlated with hydrologic and sedimentation yield data.

Geomorphologically, the study area Maniyari basin is a part of Pendra Lormi Plateau which are vary dissected land by tributaries of Maniyari basin. The drainage density, drainage texture and drainage frequency indices indicate the mature state of Maniyari Basin, But lower part of basin is plains which is gentle slopes. The Bifurcation Ration occurrence between 2.7 to 3.4 indicates well development of drainage network. Quantitative description of the Basin geometry (morphometric analysis) requires measurement of linear features, gradient of channel network and contributing ground slopes of the drainage Basin.

Keywords:- Morphometry, Fluvial, Drainage Network , Geomorphology, Tributaries, Bifurcation.

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Abstract No. D06

GEOMORPHOLOGICAL INTERPRETATION OF GEOMETRY OF LONG-PROFILE: A CASE-STUDY OF CHAMTA RIVER

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Geometries of long-profile are a consequence of form-process relationship under fluvial environment. In this paper, parts of the longitudinal profile of the Chamta river of Darjeeling Himalaya are used as the basis for the geomorphological assessment. RL survey has been conducted in the lower portion (14774 m to 16420 m downstream distance from source of channel) of Chamta river to prepare the long profile, whereas the representative long profile of the inaccessible (falls under the protected forest of Mahananda Wild Life Sanctuary) upper Chamta (3000 m in downstream distance from source of Chamta) is drawn on the basis of SRTM DEM (2006), extracted from USGS. Mathematical models (Linear, exponential, logarithmic and power function model) have been introduced to set the best-fit model over that. Each mathematical function has its own geomorphological significance or interpretation on the basis of stream-energy and channel competency. Best fit of a mathematical function depends on the degree of concavity of the long-profile. Exponential and Power function regression models are best fitted for the representative upper and lower Chamta longitudinal profile respectively. The best-fitted (with highest magnitude of R^2= 0.6882) exponential function represents the stage pre-graded stage in the studied reach of upper Chamta, whereas the best-fitted (with highest magnitude of R^2= 0.8315) power regression model in the representative long-profile of the lower Chamta bears the imprint of further concavity of river profile after reaching the grade.

Key words: Exponential function, power regression model, Grade

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Abstract No. D07

LAND USE ANALYSIS AND POLLUTION ASSESSMENT ALONG THE GANGA VALLEY FROM RAMPURGHAT TO CHUNAR

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The study analyzes the land use and pollution along with assessment of the Ganga Valley from Rampurghat to Chunar, which lies on the right bank of the river Ganga (Ganges). Municipal and industrial effluents affect the sediment and water of the river. The river is a chief source of water supply, power generation, river sediment transport and growth of the urban industrial zone. Though, the river obtains huge amount of untreated wastewater which imbalances the nutrient focus at many points along the stretch. There are also more possibilities for the development resource in the river valley. Therefore, keeping in the view this, study of rivers and valleys in geography has become very necessary.

Keywords: Land use, Ganga Valley, Pollution, Rampurghat, Chunar

Abstract No. D08

IS TAPI RIVER OF WESTERN INDIA EFFICIENTLY CONVEYING LARGE MAGNITUDE FLOODS?

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An attempt has been made in this paper to find out efficiency of the Tapi River through at-a-station hydraulic geometry. Data regarding hydraulic variables associated with Annual Maximum Series (AMS) are available for five sites on the Tapi River. The data have been used to derive at-a-station hydraulic geometry equations. The hydraulic geometry exponents (b, f, and m) have been plotted on Rhodes' ternary diagram. The results illustrate that the rate of change in mean depth (f) and mean velocity (m) with discharges are greater than the rate of change in width (b). The total variance values for two sites are close to the theoretical value (0.33). The results of hydraulic geometry analysis further suggest that the behavior of the alluvial Tapi River is not truly alluvial but quasi-bedrock. The channel geometry of the Tapi River plays a significant role in efficient conveyance of monsoon floods through the changes in the hydraulic variables with increasing discharge.

Keywords: Flood hydrology, flood geomorphology, channel geometry, monsoon floods, Tapi River, ternary diagram

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Abstract No. D09

PLAIN-FED RIVERS OF VARYING BED AND BANK MATERIAL COMPOSITION IN TERMS OF DOWNSTREAM HYDRAULIK GEOMETRY IN THE LOWER NAGAR BASIN

Pranay Paul

The present work investigates the nature of two plain-fed rivers of varying bed and bank material composition in terms of downstream hydraulic geometry in the lower Nagar basin. The master stream, Nagar is a sand dominant river and its tributary Kulik is composed of mainly silt and clay. The downstream hydraulic geometry was measured along 11 cross-sections on Nagar river and 10 cross-sections on the Kulik for both the pre-monsoon and monsoon flows including the *fr* number, hydraulic radius calculation. The seasonal comparison of hydraulic geometry exponents between those rivers has been made in order to observe the change in exponent variables. Results indicated that there is a significant transition of those rivers from season to season. The bank-full discharge makes the most of the changes in the Himalayan rivers, but the magnitude varies with rivers. The width [*b*] exponent increases by almost two times from pre-monsoon to the monsoonal flow in the Nagar river. In sharp contrast, velocity [*m*] exponent increases by four times during the monsoon in comparison to the pre-monsoon in Kulik river. Seasonally, the range of

width, depth and velocity exponents (b, *f* & *m*) in silt-clay dominated channels varied up to 0.05, 0.35 and 0.40 respectively. The same exponents in sand dominated channels have a range of 0.57, 0.37 and 0.20 respectively. It is argued that the composition of the bed and bank materials plays key role in terms of changing the hydraulic geometry exponents. The sandy composition of banks helps to guide the flow laterally and widen the channel shape downstream and in contrast, cohesive silt and mud content banks help to confine the flow within its determined channel boundary. The results would be helpful for proper planning and management to tackle the devastating impact of flood in the studied floodplain region.

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Abstract No. D10

IS TAPI RIVER OF WESTERN INDIA EFFICIENTLY CONVEYING LARGE MAGNITUDE FLOODS?

Puneet Yadav[4]

Morphometric Analysis of Simrawal River Basin from Northern Foreland of Peninsular India Using Geospatial Techniques.

This study attempts to study the morphometric characteristics of Simrawal basin by using Geographical information system (GIS). Drainage basin is an area drained by the stream and its tributaries. The morphometric analysis of river basin helps to explore the interrelationship between hydraulic parameters and geomorphologic characteristics. This study has been conducted in the Simrawal basin of Northern Peninsular India. It can help in better management of various resources such as soil, water, land, etc. of the basin. This study can be applied for soil and water management in similar type of drainage basins.

Keywords: Morphometric Analysis; Simrawal Basin, GIS

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Abstract No. D11

सिंहभूम जिला की धरातलीय बनावट एवं विशेषताओं की भौगोलिक समीक्षा

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पृथ्वी के जन्म एवं निर्माण की कहानी की शुरुआत आज से 500 करोड़ वर्ष पहले हुई थी। पृथ्वी के संपूर्ण क्षेत्रों का निर्माण एक समय ना होकर अलग-अलग भूगर्भिक काल में हुआ था। जैसे पठारी भागों का निर्माण सबसे पहले हुआ। पहाड़ी भागों का निर्माण बाद में हुआ तथा मैदानी भागों का निर्माण सबसे नवीन है। यही मूलतः तीन भू-संरचनाएं पृथ्वी पर मौलिक रूप में पाई जाती है। प्रस्तुत शोध क्षेत्र झारखंड राज्य भारत देश का एक प्रमुख संसाधन प्रदेश है, जोकि धारवाड़ युगीन संरचना का प्रतिनिधित्व करती है। यह संरचना पृथ्वी के जन्म के प्रारंभिक अवस्थाओं को सूचित करता है। प्रस्तुत शोध पत्र इसी संसाधन एवं संरचना की विभिन्न विशेषताओं

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के वर्णन हेतु समर्पित होगा। प्रस्तुत शोध पत्र मूलतः द्वितीयक आंकड़ों एवं विश्लेषणों को पढ़ कर तैयार किया गया है। जिसमें भूतल पत्रक का भी सहायता लिया गया है तथा यथा स्थान G.I.S, प्रणाली द्वारा बनाए गए मानचित्र में आवश्यकतानुसार लगाए गए हैं। यह अध्ययन क्षेत्र हमारी शोध प्रबंध में शामिल है, इसीलिए शोध प्रबंध बनाने के पहले मैं इस क्षेत्र का शोध भ्रमण भी की हूं। यह शोध भ्रमण के अवलोकन का भी अनुभव हम प्रस्तुत शोध विश्लेषण में शामिल करूंगी तथा अंत में शोध निष्कर्ष भी लिखूंगी। आशा की जाती है, कि हमारा यह शोध पत्र सिंहभूम दोनों जिला के प्रति कुछ नवीन जानकारी एवं जागृति देने में सक्षम होगा। प्रस्तुत शोध पत्र तैयार करने के पहले भारत एवं विदेश के बड़े विद्वानों के ग्रंथों का अध्ययन किया गया है।

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Abstract No. D12

ASSESSMENT OF ANTHROPOGENIC ACTIVITIES AND ALTERATION IN STREAM POWER: A STUDY ON THE DAMODAR RIVER, INDIA

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Anthropogenic activities are one of the significant external controlling factors that affect the fluvial processes significantly. The stream power is the primary contributing agent that controls the erosion and deposition of a channel bed. It is influenced by the artificial construction and the natural configuration of the river. The Damodar River originates from Peninsular India and flows through the plateau, plateau fringe and plain region. It is altered by several human activities such as dam and barrage constructions, sand mining, industries and coal mining etc. The upper and middle sections (~180 km) of the river have been taken for the study as stream power variation is significant in these sections. The flow velocity is used to estimate stream power. It is generated from eleven sites in the upper and middle sections of the river. The Integrated Anthropogenic Index (IAI) has been developed to identify the natural and anthropogenic dominant reaches. The IAI contains various types of indices such as artificial water surface ratio (AWSR), road along river ratio (RARR), road density (RD), artificial river ratio (ARR), artificial coal mining ratio (ACMR), and bridge along river ratio (BARR). The stream power distribution of the artificially controlled section is characterised by increased stream power with some exceptionally knick due to bedrock reaches and dam and barrage constructions. The multimodal stream power distribution of the river reflects several energy alterations due to the dominance of human activities. This reflects in the development of various types of bars which are inversely related to stream power. Innumerable human activities produce slope irregularities resulting in stream power, thereby erosional and degradational processes of the river.

Keywords: Anthropogenic activities; Stream power; Slope; Integrated Anthropogenic Index; Bar area; Anthropogenic and Natural reaches

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Abstract No. D13

MORPHOMETRIC ANALYSIS OF NEERU WATERSHED OF KASHMIR HIMALAYA, USING GEOSPATIAL TECHNIQUES

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Morphometry is the measurement and mathematical evaluation of the Earth's surface morphology, as well as the shape and size of its landforms. It is essential to understand the geohydrological characteristics of a watershed in relation to topographical features and flow patterns. It also aids in estimating the incidence of infiltration and discharge, as well as other associated hydrological characteristics of a watershed, i.e., erosion and sediment transport, which has a significant impact on conserving natural resources. The present work has been carried out to investigate the morphometric analysis (linear, areal, and relief aspect) of the Neeru watershed, a left-bank tributary of the Chenab River, located in the district Doda of Jammu and Kashmir. To fulfil this, SOI topographical sheets and Sentinel-2B satellite images (10 m spatial resolution) were used to extract the drainage network and delineate the watershed boundary. Additionally, with the help of geo-spatial technology, CARTOSET DEM (30 m spatial resolution) was utilized to assess the parameters like slope, aspect, and relief of the study area. The watershed covers an area of 415.19 sq. km and has a watershed length, width, and perimeter of 65 km, 22.4 km, and 106.03 km, respectively. It has been designated as a 5th order watershed, with lower order streams predominating and a drainage density of 0.81 km/sq.km, indicating that the watershed is highly permeable, resulting in increased subterranean water storage capacity. The bifurcation ratio ranges from 2 to 4.74, with a mean bifurcation ratio of 3.67, which shows a strong structural control on drainage development. The elongation ratio (Re) of the study area is 0.67, indicating an elongated shape with high relief, steep slope, high sediment load discharge, and susceptible soil erosion.

Keywords: - Neeru watershed, Bhaderwah Valley, Morphometric analysis, River Chenab

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Abstract No. D14

FLUVIAL PROCESSES AND LANDFORMS OF SASUR KHADERI RIVER: A CASE STUDY OF ALLAHABD DISTRICT

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The hydrological cycle is an everlasting process on earth. In this process, rainfall is the basic input coming into the surface. Flowing surface water is the result of total precipitation minus evapotranspiration and infiltration into the ground. The water flowing as a stream performs three kinds of geologic work as erosion, transportation and deposition. Hence, the running water is considered as one of the geological agents on earth. The word "fluvial" in Latin refers to " river". The world fluvial is used to denote the running water as stream or river.

Flow of water has a force. It has a velocity. It also has the power to generate power. There are many natural and dynamic processes happening along a river. Sometimes, there may be severe floods along the river courses which can destroy everything along the flow path. Natural hazards are also caused by these streams. Flowing water has the ability to dissolve many soluble mineral substances available on its way. Rivers and running water are considered to be dynamic geomorphic agents. Fluvial processes entail the erosion, transportation, and deposition of earth materials on the surface. Fluvial processes and fluvial landforms dominate the land surface all over the world. Understanding of the fluvial geomorphic processes is an essential aspect in physical geography.

Keywords: Hydrological cycle, Rainfall,fluvial processes

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Abstract No. D15

COAL-MINING INDUCED GEOMORPHOLOGICAL HAZARD: A CASE STUDY IN DUDDHI TEHSIL OF SONBHADRA DISTRICT

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Mining refers to the extraction of geological materials of the earth surface. Coal mining has always been a backbone of economy as it provides base for industrial setup. Coal mines in the study area are part of Singrauli coal series. This series bears bituminous type of coal formation.The coal from these mines is supplied to numerous thermal power plants located in the nearbyareas. The major coal mines in these areas are Kakri, Bina, Kharia and Krishnshila. These are open cast mines. This area physiographically lies in Chhota Nagpur Plateau and has thickforest cover. It is a tribal dominated area. Pahariya, baiga, gond,chero etc are some major tribes of this region. These tribes derive their livelihood from the forest product. The unplanned growth of coal mines has brought a significant change in land use pattern and utilisation and it posses a threat to its surrounding environment since environmental pollution resulting from coal mining and related activities has created a grave situation for the locals residing here. Coal mining in this area has changed the landscape of this area as high mounds of coal-mining generated wastes is visible from a distance. There is no proper forestation on this mountains of coal-waste making it vulnerable to erosion and land-sliding in rainy season. Coal-peats gives a different look the whole landscape which are not filled up after mining is done and it gets flooded in the rainy season. Hazardous coal mining and consequent industrialisation have led to issues of livelihood, displacement, rehabilitation and environmental sustainability. This work deals with assessing the impact of coal mining on land use pattern and utilization and resultant hazardous situation arising out of mining activities. It takes into consideration socio-economic ramification of changed land use pattern and utilisation. The work's centrality revolves around landscape change, life, livelihood, residence, occupational structure and way oflife and how mining activities have impacted them. The work is based on both primary and secondary data source. GIS and remote sensing techniques been used for land use change detection. Questionnaire, schedules

and surveys have been prepared to asses impact of these mining activities on the socio-economic conditions of the tribal population living in these areas.The result shows that there has been a significant change in life, livelihood, residence and environmental quality.

Keywords: Mining, Coal, Tribes, Hazard, Environment

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Abstract No. E01

कौशाम्बी जिले में भूमि उपयोग परिवर्तन का पर्यावरण पर प्रभाव

निशी इफ्तिखार, डॉ अर्चना त्रिपाठी

शोध छात्रा, एसोसिएट प्रोफेसर, सी० एम० पी० कॉलेज प्रयागराज।
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वर्तमान समय मे मानव ने आधुनिक तकनीक के विकास, प्रोधोगिकी, रासायनिक खादों के उत्पादन तथा उपभोग में वृद्धि, सिंचाई के साधनों एवं सुविधाओं में वृद्धि तथा विस्तार, अधिक उत्पादन वाले बीजो के विकास आदि के माध्यम से कृषि में पर्याप्त विस्तार एवं विकास किया है। जहाँ एक ओर यह हमारी आवश्कताओं की पूर्ति में सहायक है, वही दूसरी ओर इसके कारण पर्यावरण असंतुलन की स्थिति भी उत्पन्न हो रही है। वन की कटाई, अत्यधिक उर्वरकों का प्रयोग, उन्नत बीजे, सिंचाई आदि इसमें सहयोग दे रही है। वन विभिन्न परिस्थितिकीय तंत्र को सेवाएं प्रदान करता है। वे जैव विविधता का समर्थन करता हैं। वन्यजीवों के लिए महत्वपूर्ण आवास प्रदान करते हैं, वातावरण से कार्बन डाइऑक्साइड के प्रतिशत में कमी आदि में महत्वपूर्ण भूमिका निभाते हैं। जब वनों को कृषि या विकास कार्यों के लिए काटा जाता है तो पारिस्थितिक तंत्र का ह्रास होने लगता हैं। फसल उत्पादन और सिंचाई तंत्र नष्ट होने लगता हैं। वनों की कटाई से मिट्टी का कटाव, लवणीकरण, मरुस्थलीकरण और मिट्टी का क्षरण होता है। इस शोध पत्र का उद्देश्य कौशाम्बी जिले में भूमि उपयोग परिवर्तन का पर्यावरण पर प्रभाव का अध्ययन करना है, इसके लिए द्वितीयक आंकड़ो, ग्राफ़, गुणात्मक एवं संख्यात्मक विधितंत्र का प्रयोग किया जाएगा।

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Abstract No. E02

IMPACT OF GEOMORPHIC PROCESS ON THE HUMAN AND NATIONAL ECOSYSTEM IN SOUTH CHHOTA NAGPUR

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Located in the southern part of Jharkhand, South-Chhotanagpur is comprised of the districts of Ranchi, Gumla, Lohardaga, East Singhbhum, and West Singhbhum. Its area is about 20891 square kilometres that are covered by a plateau. This region extends from 84° E to 87° E longitudnally, and from 21°58'10" N to 23° N

latitudinally. On its northwestern side are forests full of trees, while on its south-eastern side are minerals which are important economically.

The granite rocks that cover about two-thirds of this plateau are located in the north-western part of the district of Gumla. Dharwar rocks are also found in West Singbhum. Cretaceous archean lava can be found primarily in north-western Singhbhum. Also in west Singhbhum, there is an intrusive Basi igneous unit.

South Chhotanagpur can be divided into three parts physically - plateaus of the Patt region, Ranchi plateau, the lower part of Chhotanagpur plateau, and Chaibasa plain. Most of the area is a plateau covered by lava eruptions, so ultimately this region has a lot of mineral resources, which are essential to industries.

Due to this plateau area having waterfalls and rapids like the North Koel, South Koel, Sankh and swarnrekha rivers, it makes sense for it to become a tourist attraction, which can then be used for sustainable development in the area.

Keywords: Natural resources, relief features, sustainable development.

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Abstract No. E03

मानव का भूआकारिकी पर प्रभाव

चन्द्रप्रभा

वी. एस. एस. डी. कालेज कानपुर, फोन नं. – 9453111198

प्रौद्योगिकी एवं विज्ञान की तीब्र प्रगति ने धरातल की सतह पर अनेक प्रकार के भूस्वरुपों को उत्पन्न किया है। मानवीय कियाकलापों में उन्नत प्रौद्योगिकी एवं विज्ञान के प्रयोग ने मानव की धरातल की सतह पर परिवर्तन करने की क्षमता को बढ़ा दिया है। मानव द्वारा धरातल पर परिवर्तन करने की क्षमता प्राकृतिक भूआकृतिक प्रक्रमों की तुलना में कही तीब्र है। भूआकारिकी एवं भूउपयोग परस्पर सम्बन्धित है जिस पर मानव की सम्पूर्ण आर्थिक एवं सांस्कृतिक कियाएं संचालित होती हैं जो धरातल पर विविध परिवर्तन को दर्शाती हैं। भूआकृतिक प्रक्रमों– जलीय प्रक्रम, वायु प्रक्रम, सागरीय परिवर्तन, हिमानी प्रक्रम धरातल पर भूआकृतिक स्वरुपों को उत्पन्न करने के लिए उत्तरदायी होते हैं। मानव अपने आर्थिक कियाकलापों से इन सभी भूआकृतिक प्रक्रमों की गति को तीब्रता प्रदान करता है। मानवीय हस्तक्षेप से , आर्थिक कियाकलापों से भूआकृतिक प्रक्रमों की गति तीब्र हो जाती है फलस्वरुप भूस्वरुपों का निर्माण होता है इसे मानवजनित भूआकारिकी का नाम दिया जाता है। मानवीय आर्थिक गतिविधियां कभी प्रत्यक्ष कभी अप्रत्यक रुप में जाने अनजाने प्राकृतिक प्रक्रमों एवं धरातलीय स्थलाकृतियों में परिवर्तन करता है। औद्योगिकीकरण एवं नगरीकरण ने वनों को काटने की प्रक्रिया को तीब्र किया है परिणामस्वरुप मृदा अपरदन के प्रक्रमों की दर की तीब्रता में वृद्धि हुई है। खनन हेतु प्रयोग किये गये विस्फोटको के कारण भ्रंशन, एवं भूस्खलन की तीब्रता में भी वृद्धि हुई है। मानवीय विकास कार्यों से वन विनाश, औद्योगीकीकरण , एवं नगरीकरण के फलस्वरुप तापमान में वृद्धि हुई है जिसके कारण ग्लेशियर एवं हिमनदों का पिघलने की की गति तीब्र हुई है। नदियों पर जलभण्डारों एवं बांधों के निर्माण कर नदियों के जल को रोकने एवं छोड़ने से, उसकी दिशा परिवर्तित करना जल अपरदन की प्रक्रिया की गति को तीब्र कर देता है। मानवीय आर्थिक गतिविधियां एवं विकास की होड़ ने भूआकारिकी के विकास के प्राकृतिक प्रक्रमों के साथ छेड़छाड़ की है। मानव की ये गतिविधियां कभी कभी अति तीब्र आकस्मिक परिर्वतन को प्रदर्शित करती हैं।

मुख्य बिन्दु :– भूआकृतिक प्रक्रम, आर्थिक एवं सास्कृतिक गतिविधियां, मानव जनित भूआकारिकी, वनीकरण, नगरीकरण

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Abstract No. E04

GEOSPATIAL ANALYSIS OF LAND DEGRADATION IN TRANS-YAMUNA UPLAND REGION

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Land degradation is a process by which the physical or chemical quality of a land would be reduced, which is difficult to rejuvenate in same degree within that time scale in which that land was build. In the present study, the land degradation is analyzed in the ArcGIS environment by standardization and rescaling of various parameters belongs to terrain, geo-climatic, surface runoff, vegetative cover and land use land cover. The success and prediction of land degradation model is validated by automatic linear modelling of regression by standard model method; which explains relationship between fields, total N = 54 observation has been considered, in which low value of information criterion (-147.040) suggest 82.3 % accuracy of model prediction of land degradation in Satna river basin, which indicate a higher prediction capability of the model.

Keywords: Land degradation; Trans-Yamuna Upland Region; Surface-runoff; geo-climatic Conditions

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Abstract No. E05

OPPORTUNITY AND UTILITY OF FOOD PROCESSING INDUSTRIES OF IN SORAON TEHSIL OF PRAYAGRAJ DISTRICT, UTTAR PRADESH

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This study aims to throw light on the opportunities of food processing industry in Soraon Tehsil of Prayagraj District. Due to rich agricultural production and high population density, high connectivity to the Prayagraj city, Soraon Tehsil has great opportunity of food processing industries. Soraon tehsil is the largest producers of vegetable (like; potato) and food grain (like; paddy and wheat) in the Prayagraj district. Hence it will be the high earning product for the local people.

As we know that food-processing industry means value addition in products originating from agriculture, forestry and fisheries. Across the world, food-processing is considered to be a sunrise sector because of its large potential for growth and socio economic impact. It not only leads to income and employment generation but also helps in reduction of wastage, value addition, and foreign exchange earnings and enhancing manufacturing competitiveness.

Because of all these opportunities the utility of food processing industry in Soraon tehsil is very low. For sustainable development and maximum welfare of local people

of the tehsil, the people, industrialists and government should be aware and should increase investment in the sector. So that the opportunity to be converted in utility.

Keyword: Economic growth, Food Processing, Opportunities, Soraon Tehsil.

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Abstract No. E06

जनपद शाहजहाँपुर (उ0प्र0) में औद्योगिक विकास का प्राकृतिक पर्यावरण पर प्रभाव : एक भौगोलिक अध्ययन

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सर्वविदित है, कि औद्योगिक विकास से ही क्षेत्रीय विकास को गति मिलती है। इसके विकास से ही क्षेत्र विशेष में रोजगार के अवसर प्राप्त होते हैं, फलस्वरूप क्षेत्र के निवासियों के जीवन स्तर में परिवर्तन देखने को मिलता है, लेकिन इसके साथ ही साथ औद्योगिक विकास का प्रभाव प्राकृतिक वातावरण पर नकारात्मक रूप में देखने को मिलता है। अध्ययन क्षेत्र में औद्योगिक इकाइयों से निकलने वाले धुआँ और गैसों से प्राकृतिक पर्यावरण असन्तुलित होता है, जिससे समस्त जैविक तंत्र प्रभावित होता है। वर्ष 1950 से निरन्तर तेजी के साथ औद्योगिकरण हो रहा है। जिसके कारण भूमि तथा ऊर्जा संसाधनों का निरन्तर दोहन और वन संसाधन की अनियन्त्रित कटाई के फलस्वरूप प्राकृतिक असंतुलन के कारण मानव व वन्य जीव जन्तु अपने जीवन का अस्तित्व बनाये रखने के लिए विभिन्न प्रकार के पर्यावरणीय प्रभावों का सामना कर रहे हैं। अध्ययन क्षेत्र में अनेक वन्य जीव मिलते हैं जिनमें हिंसक एवं अहिंसक जीव जैसे–तेन्दुआ, जंगली सुवर, जंगली कुत्ते, लकड़बग्घे, बिच्छू, ऊदबिलाव एवं अन्य जंगली जानवर जनपद के उत्तरी छोर पर अधिक मिलते है। रिलायंस तापीय ऊर्जा केन्द्र (रोजा) एवं इसमें कार्यरत मजदूरों के आवासीय परिसर जहाँ है वहां पर भी अनेक जंगली जानवर मिलते है। प्रकृति से छेडछाड़ का नतीजा हम लोगों को पर्यावरण के नाकारात्मक प्रभाव के रूप में देखने को मिल रहा है। अतः क्षेत्र में इनकी संख्या में भारी कमी का आँकलन किया जाता है और इन सब का सम्मिलित प्रभाव प्राकृतिक पर्यावरण पर स्पष्ट रूप से देखा जा सकता है।

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Abstract No. E07

IMPACT OF RIVER GANGA ON THE ENVIRONMENT OF PRAYAGRAJ CITY

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Rivers are important agent of geomorphic change and they bring significant change in the physical and human environment. River Ganga and its fluvial dynamics play important role in shaping the environment on its bankside. Prayagraj City is located on the bank of river Ganga which surrounds the city from the north and the east before making confluence with Yamuna. Since Prayagraj is an important city of

cultural and economic importance the human processes too have a great degree of impact on the fluvial morphology of the River.

The present work tries to find out the relationship between human and physical processes that influence river dynamics and what are the resultant change in surrounding environment. It also brings out the temporal change in river course and do study the study region from impact-analysis view point.

The tools and techniques requires satellite images and using GIS, maps are drawn of change occurred over time.

The study finds a significant human and physical changes in the landscape of Prayagraj City along river Ganga. The river over the time not only changed its fluvial morphology but affected the landscape. Since the City is a growing metropolis and of great cultural and economic importance it has impacted to a significant degree the physical landscape especially in and along the course of river Ganga.

Key words: Ganga, Fluvial Morphology, Environment, Impact-Analysis.

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Abstract No. E08

PRIORITIZATION OF SUB WATERSHED FOR SOIL EROSION BASED ON MORPHOMETRIC AND LULC PARAMETERS USING TOPSIS IN THE SHILABATI WATERSHED, WEST BENGAL

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Morphometric characteristics together with human interference, have a massive impact on soil erosion. This study attempts the Soil erosion prioritization of the sub-basin of the Shilabati watershed in the Purulia region of West Bengal using morphometric and LULC parameters. Initially, the Shilabati watershed and its Twenty-six, 3rd order sub-basins were delineated using SRTM DEM. The ENTROPY method was applied to assign the weights of the parameters which have been further processed with the Multi-Criteria Decision Making (MCDM) model namely TOPSIS, to estimate the performance value (PI) indicating the potentiality to soil erosion. The result showed that sub-basin SB25, SB04, SB14, and SB26 have a high-performance value (0.65-0.58) that indicates a very high soil erosion potentials which includes the Garhbeta badland region. Conversely, sub-basin SB019, SB20, SB15, SB16, SB22, and SB24 portrayed less soil erosion potentiality with ample vegetation and less anthropogenic intervention. The study findings will assist towards formulation of in-depth assessment of soil loss to maintain a sustainable sediment budget of the immensely erosive Shilabati watershed.

Keywords- Morphometric parameters, LULC, RS and GIS, TOPSIS, ENTROPY.

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Abstract No. E09

ASSESSMENT OF INTERRELATION BETWEEN THE FLUVIO-MORPHIC LANDFORMS AND AGRICULTURAL INPUTS ON KALIYAGANJ C.D. BLOCK OF UTTAR DINAJPUR DISTRICT, WEST BENGAL

Different fluvio-morphic landforms like marshy land, wetland etc are the potential zone for different types of crop cultivation. The study area comes under the sub-tropical monsoon climatic region in West Bengal and covering a total rural area of 301.93 km^2 (30192.91 hectares). The study area belongs to the huge lowland alluvial plain of the Ganga-Brahmaputra delta region and has high potential for the cultivation of paddy and jute. Aman paddy, boro paddy, jute, mustard, wheat, lentil and maize are cultivated in the study area. Six intermediate and one factor of production inputs has been used to produce the outputs, such as a seed, fertilizer (chemical and organic), crop protection products (herbicides, pesticides, insecticides etc.), irrigation, tillage and labor. To access the dominant of inputs varies among crops and the hierarchical arrangement of inputs is calculated by principal component analysis (PCA). The result suggests a clear role of the fluvio-morphic landforms on the use of different inputs and land utilization.

Keywords: Wetland, Marshy land, Agricultural inputs and PCA

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Abstract No. E10

SOCIAL STUDY OF "KUMBH" IN PRAYAGRAJ, UTTAR PRADESH, INDIA

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In Prayagraj, hearing the word "Kumbh", creates the picturesque vision of Triveni sangam in people's mind. At the sacred confluence of rivers, huge multitudes filled with sense of devotion move like waves in the ocean. 'Shahi Snaan' of Akharas, chanting of vedic mantras and elucidations of religious hymns in the Pandaals, proclamations of knowledge, Tatvamimansa by rishis, spiritual music, mesmerizing sounds of instruments, holy dip in the sangam with utmost devotion fills the heart of devotees with immense pleasure. Also, prayers are offered at many divine temples exhibiting the greatness of Prayagraj Kumbh.

The Kumbh Mela at Prayag takes place for approximately 55 days, spread over thousands of hectares around the sangam area, and becomes the greatest of ephemeral city in the world. Regularity of this celebration continuing since ancient times is unique in itself. Ever increasing pressure of populace and expanding cities tend to engulf the rivers and events like Kumbh, graces the rivers with the profound status of creators of the world. There is a deeply enrooted feeling of devotion and faith flowing in the veins of every Indian since eternity.

The Prayg Kumbh Mela is different as compared to Kumbh at other places due to various reasons. Firstly, the tradition of Kalpvas is practised only in Prayag. Secondly, the Sangam is considered as the centre of the earth in few scriptures. Thirdly, for creating the universe Lord Brahma performed the Yajna here. Fourthly, Prayagraj is called the shrine of pilgrimages, but the most important reason is that the significance of performing rituals and tapas at Prayagraj is of richest among all pilgrimages and provides one with the greatest virtue.

Key Words; Prayag, Kumbh, Sangam, Mela, Pilgrims, Temples.

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Abstract No. E11

PREVIEW ON THE INTERACTION BETWEEN TRANSPORTATION INFRASTRUCTURE AND GEOMORPHOLOGY

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Transport network infrastructure interacts with the earth surface because they often share common spaces (e.g., river valleys), such that transport is an anthropogenic pressure that can affect geomorphological processes and outcomes. Still, the control of transportation infrastructures (TIs) on geomorphological forms and processes have not been systematically studied or documented since having a profound effect worldwide. The present preview provides a multidimensional overview based on the available literature and data on the effect of TIs in changing hydro-geomorphology to sustain a peaceful harmony between the transport network and its surrounding landscapes. The study underlines the effect of major TIs like trails, roads, railways, tunnels, causeways, waterways, and airports on the alteration of different geomorphological processes like the movement of earth material, geomorphic connectivity, slope instability, sediment production, gully initiation, and surface runoff. For instance, the global level proximity analysis shows about 40 per cent of landslides happen within the 500 m of any major roads only. Due to the fast development of TI, the mountain regions are more prone to slope instability because of the alteration of surface hydrology by increasing runoff, road and ditch guided concentrated flow, rills and gully formation by reducing drainage area to cross the critical threshold limit. The plain regions are facing the problem of fluvial (dis)connectivity because of the close proximity between river and transport networks and undersized causeways. For sustainable TIs development, the factor of climate change should be incorporated along with the practice of bio-engineering for roadside slope management, deculverting, 100-years flood return for causeway construction, mapping of river corridors, road water harvesting for less effect on geomorphology.

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Abstract No. E12

EXPOSURE OF ARSENIC IN GROUND WATER OF GANGA PLAIN IN BIHAR: AN EMERGING HEALTH CRISIS

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Natural Arsenic contamination is an acute public health crisis which affects nearly 60 million people in South Asia and southeast Asia Alone. Arsenic is a metalloid found in Earth's crust though in very less amount. It is commonly concentrated in sulphide - bearing minerals. It's presence in ground water Sources is attributed to number of natural and Anthropogenic Causes. It percolates as it has property of solubilizing through which it reaches groundwater. Other sources be Alluvial deposits and volcanic sources. As it has become a health hazard worldwide, majority of arsenic hotspot can be found in Taiwan, Chile, Mexico, China, Bangladesh, India and Argentina.

In India it is mainly found in Ganga - Meghna – Brahmaputra doab (GMB). Earlier the problem was seen in Bengal but in recent years Bihar has become vulnerable to arsenic contamination. In Bihar majority of people are dependent on ground water for meeting drinking requirements as well as for irrigation purpose. Bihar is an Eastern State of India which lies in flood plains of Ganga(a.k gosh and others).

The first major hotspot found in Bihar was Simaria village in Bhojpur district. The study was conduct in 4 districts of Bihar i.e., Patna, Bhojpur Vaishali, Bhagalpur. The methodology involved arsenic detection in ground water by use of field Test kit for detection and obtaining GPS Coordinates of Arsenic hotspot. water from 2800 government hand pump will be tested. Blood samples from district hospitals will be collected.

World Health Organisation's provisional guideline value for arsenic in drinking water - 0.01 mg/l (10 µg/l). According to ministry of water Resources Government of India 1600 habitations from 67 blocks affected due to Arsenic poisoning. According to Golobocan 2018 18-0 million new Cancer cares was reported. “Our study has confirmed the presence of arsenic in food chain in Bihar through irrigation water. Three common eatables — rice, wheat and potato — have elevated levels of arsenic that increases the disease burden in exposed persons” (g.ashok). At least 77 per cent of households had an arsenic concentration in drinking water below the WHO guideline value of 10 µg / L.

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Abstract No. E13

IMPACT OF TRANSPORT ON AGRICULTURAL DEVELOPMENT IN ALLAHABAD DISTRICT

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Transport is regarded as a crucial factor in improving agricultural development .it enhance quality of life of the people, creates market for agricultural produce,

facilitates of seed sales centre, fertiliser sales centre an cold storage centres. This paper looks crucial role transportation plays in agricultural development of Allahabad district. The data of all indicators have been analysed by as assigning ranking levels and divided into five groups pressure an stressed of these indicator variables. Data of each variable were processed add mapped . In order to arrive at composite figure of agriculture development. Vulnerability ranking were cumulated. lowest ranking was assigned to worst condition, a high score rank has been assigned to best condition. This study revealed that an improved transportation will encourage farmers to work harder in the rural areas of Allahabad district for increased production, add value to their products, empower the farmers as well as having positive impact on their productivity, income, employment and reduce poverty level in the rural areas since it will be easier to move inputs and workers to farm as well as products to markets and agro industry .

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Abstract No. E14

ENVIRONMENTAL CONSEQUENCES OF INTENSIVE SOYBEAN PRODUCTION IN DUNGARPUR DISTRICT OF RAJASTHAN

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The intensification of agricultural land-use and changes in farming methods in conjunction with new industrial technologies has made it possible to increase food production. However, this has resulted in continuous environmental degradation, particularly of soil, vegetation and water resources. Ample use of chemical pesticides soil organic matter levels is declining (N, P, and K) and land becomes unproductive. This study is an attempt to analyse the consequences of intensive soybean production on soil and water in the study. It seems that continuous production of soybean and using high pesticides in the fields has disturbed the whole ecology of the area. There are so many instances have to be seen that comes after yielding soybeans. Database used for the study was fields survey and report collection from the agriculture department of the District. Study find out that the water level and quality have decreased contamination by nitrate and phosphate. Intensive use of pesticides degraded the soil quality it becomes poisonous which threaten the area's food security in the future.

Key Words: *Environment, Degradation, Intensive, Consequences, Pesticides, Quality*

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Abstract No. E15

बाड़मेर जिले के बालोतरा उपखण्ड की आधारभूत सुविधाओं का विकास : भौगोलिक एवं पर्यावरणीय अध्ययन

श्रीपाल एवं डॉ. ललित सिंह झाला

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बाड़मेर जिले के बालोतरा उपखण्ड में आधारभूत सुविधाओं के विकास में तेजी से परिवर्तन हो रहा है। इस प्रदेश के आधारभूत सुविधाओं के कारण नगरीकरण की प्रक्रिया में बढावा हो रहा है। इस आधारभूत सुविधाओं के कारण मानव प्रवृति में आर्थिक, सामाजिक एवं सांस्कृतिक आयामों में परिवर्तन की गुणवता का अध्ययन किया जा रहा है। मानव प्रवृति आर्थिक एवं सामाजिक कारकों में आधारभूत सुविधाओं का पड़ने वाले प्रभाव काफी उभरकर सामने आ रहे है। इस उपखण्ड के क्षेत्र में पचपदरा तहसील में लग रही रिफाइनरी के कारण भू–क्षेत्र में काफी भूदृश्य एवं उच्चावच में परिवर्तन नजर आ रहा है। इस क्षेत्र में रहने वाले लोगो के जीवन, रोजगार एवं रहन सहन की प्रवृति बदल रही है। इस क्षत्रे के लोगो द्वारा व्यावसायिक उद्यम एवं अपने कार्य संचालन का पर्यावरण पर पड़ने वाले प्रभाव एवं आने वाले समय में चुनौतियों को स्वीकार किया है। आधारभूत सुविधाओं का मानव की जीवन प्रकृति पर गहरा प्रभाव पड़ता है। इस क्षेत्र की भौगोलिक अध्ययन करने के साथ–साथ पर्यावरणीय महत्वता का अवलाके न करना जरूरी है। अतः इस जीवन में आने वालो समय में संसाधनों की पहचान कर लोगों के जीवन में आधारभूत सुविधाएँ की उपलब्धता के कारण संपोष्ण के आकर्षण का केन्द्र बनती है।

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Abstract No. F01

SOIL DEVELOPMENT ON ALLUVIAL FANS IN THE SPITI VALLEY, HIMACHAL PRADESH, INDIA

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Spiti valley, a cold desert area, possesses all necessary conditions for optimal development of alluvial fans and contains plenty of them. Soil is a precious resource in cold deserts and develops only at certain favourable sites. Alluvial fans (along with river terraces) are the most suitable sites for soil development in such regions. However, the presence and development of soil on alluvial fans are not uniform and is influenced by numerous factors that vary spatially and temporally. Thus in this work, we have made an attempt to explore the soil development on alluvial fans of the Spiti valley cold desert. For this purpose, detailed fieldwork was conducted on five alluvial fans situated at different altitudinal locations along the Spiti river. On each fan, vertical sections and surficial characteristics were examined at proximal, middle, and distal parts. The vertical sections reveal negligible soil development and thus indicate rather a rapid deposition and a shorter quiescent period between depositional events to cause pedogenesis during the vertical aggradational phase. However, the presence of vesicular and calcretes horizons, desert pavements, and rock varnish at some inactive and elevated sites suggest a relatively long period of inactivity at such locations which caused the formation of these features. It further suggests that these features came into

existence after the abandonment of such a site. Further, the difference in the maturity of these feature reveals more soil development on relatively older and higher sites. Thus, such studies may help in better understanding of the evolution of these features and landscapes in similar environmental settings.

Key words: Soil development, cold desert, Spiti valley, vesicular horizon, varnish, abandonment, landscape evolution

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Abstract No. F02

शुष्क क्षेत्र में स्थायी फसल उत्पादन के लिए जल प्रबंधन – एक भौगोलिक अध्ययन

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भारत भौगोलिक विविधताओं से युक्त एवं कृषि प्रधान देश है। इसके उत्तर पश्चिमी शुष्क क्षेत्र में मिट्टी एवं जल दोनों के संदर्भ में जैविक दबाव अधिक है और जल संसाधन की स्थिति विकट है, तथा यहॉ पर फसल विकास की अवधि लम्बी है। इस तरह की परिस्थितियों के तहत स्थायी फसल उत्पादन को समझना एक कठिन कार्य है इस शोध पत्र में प्रयास किया गया है कि स्थायी फसल प्राप्त करने के लिए जल संसाधनों का प्रबंधन कैसे किया जाये। भू–जल संचय के माध्यम से खेतों में सिंचाई हेतु जल प्रबंधन की आवश्कता है जिसमें खेती के लिए जल–संग्रहण प्रणाली के रूप में खड़ीन इस क्षेत्र में अद्वितीय है फसल पानी और पोषक तत्वों का प्रबंधन तथा मानसिक रणनीतियों के साथ–साथ स्थानीय जरूरतों के लिए वैकल्पिक भूमि उपयोग प्रणाली पर विस्तार से चर्चा की गई है। जल संसाधन में गिरावट लाने वाले कारकों के प्रभाव को कम करने के ठोस उपाय करने की चर्चा की गई है तथा नमी संरक्षण जैसे मुद्दो पर भविष्य के लिए अनुसंधान की जरूरतों, मृदा संरक्षण, पोषक तत्व प्रबंधन, फसल प्रणाली, जल प्रबंधन की विधियॉ और वैकल्पिक भूमि उपयोग जैसे सुझाव दिये गये है।

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Abstract No. G01

UNFOLDING THE GLACIER DYNAMICS IN THE CHHOMBO CHHU WATERSHED OF TISTA BASIN, THE SIKKIM HIMALAYA, INDIA: IMPACTS OF LOCAL TOPOGRAPHIC FORCING AND CLIMATE VARIABILITY

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Glaciers of the Tista basin represent an important water source for mountain communities and a large population downstream. The article presents observable changes in the Chhombo Chhu Watershed (CCW) glacier area of the Tista basin, the Sikkim Himalaya. The CCW contains 74 glaciers (>0.02 km^2) with a mean glacier

size of 0.61 km^2. Temporal inventory and changes in glacier parameters were monitored and derived from the declassified Hexagon Keyhole-9 (KH-9) (1975), Landsat 5 Thematic Mapper (TM) (1989), Landsat 7 Enhanced Thematic Mapper Plus (ETM+) (2000), Landsat 5 TM (2010), and Sentinel-2A (2018) images. The total glacier area in 1975 was 62.6 ± 0.7 km^2; and by 2018, the area had decreased to 44.8 ± 1.5 km^2, an area loss of 17.9 ± 1.7 km^2 (0.42 ± 0.04 km^2 a^{-1}). Clean glaciers exhibited more area loss of 11.8 ± 1.2 km^2 (0.27 ± 0.03 km^2 a^{-1}) than partially debris-covered and maximally debris-covered glaciers. The area loss is 5.0 ± 0.4 km^2 (0.12 ± 0.01 km^2 a^{-1}) for partially covered glaciers and 1.0 ± 0.1 km^2 (−0.02 ± 0.002 km^2 a^{-1}) for maximally covered glaciers. The glacier area loss in the CCW of the Sikkim Himalaya is 0.62 ± 0.5 km^2 a^{-1} during 2000–2010, and it is 0.77 ± 0.6 km^2 a^{-1} during 2010–2018. Field investigations of selected glaciers and climatic records also support the glacier recession in the CCW due to a significant increase in temperature (0.25°C a^{-1}) and more or less static precipitation since 1995. Thus, this paper unfolds our current knowledge of glaciers, climate–glacier interaction and topographic forcing in the Chhombo Chhu Watershed of Sikkim Himalaya.

Keywords. Glacier changes; Clean glaciers; Glacier classification; Elevation effects; Climate change; Sikkim.

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Abstract No. G02

SPATIO-TEMPORAL CHANGE IN A HIMALAYAN WATERSHED USING REMOTE SENSING AND GIS

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The snow cover of fragile and youngest mountain chain having the highest water tower of the earth, viz., the Himalaya is depleting steadily due to global warming. There is need to study the pattern of spatio-temporal changes in different watersheds of the Himalaya. The present paper provides pattern of spatio-temporal change of a Himalayan watershed, viz., the Gori Ganga watershed which is a tributary watershed system of the mighty Kali River which makes boundary India and Nepal. For this study Landsat-5 Thematic Mapper (TM) of 1990, 1999 and Landsat-8 (OLI and TIRS) of 2016 were used. Study reveals that in 1990 about 30.97% (678.87 km^2), in 1999 about 25.77% (564.92 km^2) area of the Gori Ganga watershed was under snow cover while in 2016 the snow cover was found only 15.08% (330.44 km^2). These data suggest that on an average during the last 26 years (1990-2016) about 348.43 km^2 snow cover has been converted into non-snow cover area at the rate of 13.40 km^2/year. If this rate of depletion of snow cover continues, the study advocates that there shall be no snow cover area in the Gori Ganga watershed by the end of 2040, therefore, there is an urgent need for mitigation of depletion of snow cover area for the survival of Himalayan glacial-fed rivers.

Key Words: Snow Cover Depletion, Himalaya, Gori Ganga Watershed, GIS and Remote Sensing, Himalaya.

Abstract No. G03

TERRAIN CHARACTERISTICS AND LAND RESOURCES IN LEH VALLEY WITH SPECIAL REFERENCE TO AMPHITHEATER VALLEYS AND DRY FANS

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The present paper is concerned with terrain characteristics and land resources in Leh valley with special reference to amphitheater valleys and dry fans . Terrain is defined by the New English Dictionary as a 'tract of country considered with regard to its natural features and configuration'. Terrain characteristics of an area have great role in varied land resources development under the influence of different environmental conditions. Terrain characteristics play a significant role in planning and management of resources at local and national levels. Topography and the natural features of the area have also prominent impacts on the types and occurrences of hazards and disasters in the valley. Hence, present study has focused on varied landform-land use aspects of the cold dessert Ladakh area. Scientists have always showed great interest to this high altitude dry polygenetic landscapes characterised with glacial, periglacial, glacio-fluvial, aeolian, lacustrine and tectonic processes. The authors have studied the Stakmo river, tributary of the Indus river with the help of field experiences as well as secondary data. Undoubtedly , glaciers fed nalas, mineral enriched riverine sediments, flat surfaces with comparatively gentle gradient over fans and vallys, natural vegetation are the prime natural resources to develop agricultural lands, settlement areas, roads, tourism industry in the Leh valley. Different quantitative techniques have been used to establish that amphitheater valleys and dryfans are only landforms over which the settlement areas have been expanded.

Key words: Terrain characteristics, land resources, Stakmo nalla, Leh valley

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Abstract No. G04

BASELINE REPORT OF GLACIERS AND GLACIAL LAKES OF DARMA VALLEY, UTTARAKHAND

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A baseline glacial study is conducted with the help of remote sensing data of Darma valley situated in Uttarakhand. A total of 21 small to large glaciers present in the

valley are mapped using sentinel-2, 2020 and Landsat-2, 1976 data. It is observed that almost all glaciers have very small accumulation zone. The average shrinkage rate the glaciers is estimated as an average of 0.164 Km^2 in 44 years. In all Glaciers the lowest and highest altitude of the snout is found at 3493m and 4734.71m AMSL respectively. Almost all glaciers are retreating but one glacier apparently appears to be advanced up to 41.3m. However, this advancement has to be verified further in the field. Major glacial lakes are also delineated from the satellite imagery. In the year 1994 around 9 (Nine) major glacial lakes were present with a total area of 33.228 Ha. However, in 2020 the area of the same reported lakes was increased to 42.045 Ha.

Keywords: Remote Sensing, Glacier, Snout, Glacial Shrinkage, Glacial Lake etc

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Abstract No. G05

GEOMORPHOLOGICAL MAPPING OF THE UPPER GORI GANGA RIVER BASIN, CENTRAL HIMALAYA

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Geomorphological Mapping provides an insight to understand the relationship between process and forms. The main aim of geomorphological mapping is to understand the distribution and development of landforms. In the present study an attempt has been made to understand the processes of landforms development and associated paleo environmental conditions. Mapping is carried out using Google earth, field observations and literature of the previous workers. On the basis of landforms, the study area has been divided into 3 geomorphological units i.e., Glacial, glacio-fluvial, fluvial. The main landforms present in the glaciated area are cirques, arete, horn, 'U' shaped valley, moraines, supra glacial lakes etc. Landforms in the deglaciated zone are the deformed ridges of lateral and frontal moraines, and outwash plain. Terraces and alluvial fans/debris cones appears to be formed by the rework of glaciogenic deposits. It is observed that the glacial depositional landforms are stretched to 7 km on both banks of Gori Ganga River till the confluence of Gori and Gonkha Gad near the Milam village from the snout of Milam Glacier. The presence of these depositional glacial landforms up to Milam village, indicate the extent of the glacier in the past from present snout. The detailed characteristics of these landforms are helpful to understand the glacier dynamics in the past.

Keywords- Geomorphological Mapping**,** Landform, Glacial, Glacio-fluvial, Fluvial, Paleo-Environment

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Abstract No. G06

GEOMORPHOLOGICAL VICISSITUDES IN GLACIERS AND GLACIATED VALLEY DUE TO EXTREME EVENTS: A CASE STUDY OF DEBRIS FLOW IN JULY 2017 AT TERMINUS ZONE OF THE GANGOTRI GLACIER, GARHWAL HIMALAYA, INDIA

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The present study investigates the debris flow of July 2017 that occurred at the terminal moraine of the Meru Glacier, Bhagirathi basin, Garhwal Himalaya. This event has changed the geomorphology of the Gangotri Glacier's snout and downstream of the Bhagirathi River due to the displacementof massive debris. The triggering factors of debris flow in the glaciated terrains are very complex. The analysis of rainfall data shows that the area received heavy rainfall during theevent, triggering a massive debris flow. The major debris flow and flash floods in the high mountain regions are principally linked to the extreme rainfall episodes. The heavy rainfall induced this debris flow event, causing an abrupt increase in runoff/discharge to the moraine-dammed lake (Meru glacier) that further led to a breach of the lake. The debris flow has prominently changed the geomorphology of the Gangotri Glacier terminus zone as well as the channel geometry of the river, evident from the analysis of pre-and post-event Sentinel-2A images. The glacier has vacated an area of around 26,770.65 $m^2$of ice during the post-debris flow event.

Moreover, a drastic change has been observedin the snout position (Gomukh), the frontal retreat of ~110 m. The retreat of the glacier snout along the central flow line was around 62 m. Drastic changes in the course of the Bhagirathi River were about60 (Near Snout) to 170 (1 km Downstream) m. Overall the Bhagirathi channel shifted from west to east direction.

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Abstract No. G07

POTENTIAL IMPACTS OF CLIMATE CHANGE ON GLACIERS & INCREMENT OF GLACIERS LAKE OUTBURSTS

Shubham Soni

Abstract: Various Studies suggest that Himalayan Glaciers are shrinking due to combined effect of intensified Exogenic and Endogenic Processes. It has a serious impact on downstream population as well as infrastructure. Many Glaciers melt rapidly and gave birth to a large number of new glacial lakes. Incidents such as Avalanches, Glacial Rebound, Earthquack, Cloud Burst & Landslide may be Caused for Glacial Lake Outbursts (GlOFs), & Flash Flood which have an potential to wiping out localized area. Now various technique has discovered for Risk Reduction such as – Controlled breaching, Pumping and siphoning out water and making a

tunnel through moraines barriers or ice dam. Also there is an increasing use of instrument such as Doplar Radar and Dropsondes that can provide an clear cut idea about an weather in an horizontal and vertically manner respectively.

National Disaster Management Authority has recommended use of synthetic Aparture Radar imaginary to automatically detect changes in water bodies, new lake formation especially during the monsoon month which are really helpful to address Glacial Lake Outbursts (GLOFs). Still we are facing various challenges in front of us. There is an scope to develop widely accepted procedure for planning and regulation of area, Climatic prediction model, & Monitoring system for Glacial Lakes.

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Abstract No. G08

SPATIAL ANALYSIS OF CIRQUES IN NW HIMALAYA: APPLICATION IN PALEO-ENVIRONMENT RECONSTRUCTION

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Glacial cirques are bowl-shaped depressions with steep headwall and nearly flat base carved by glaciers. Since cirques indicate initiation of glaciation in the mountains, their morphology, distribution, altitude, aspect can serve as valuable paleo-climate indicators particularly in the remote and inaccessible locations where often other proxies may be absent. In the present study an attempt is made to categorize and understand the evolution of both the relict and modern cirques in NW Himalaya (Karakorum, Ladakh, and Zanskar) along the precipitation gradients of Indian Summer Monsoon (ISM) and the mid-latitude westerlies. The relict and modern cirques were mapped in the Karakorum, Ladakh, and Zanskar ranges using Google Earth Imagery, Landsat 8 (30m), Sentinel-2A (10m) and ALOS Palsar Digital Elevation Model (12.5m). Various parameters such as peak elevation, minimum elevation, relief, area, circularity, mean slope, mean aspect and hypsometric maxima (indicate cirque floor elevation) were derived to understand the influence of precipitation gradient, wind pattern, lithology, structure, and aspect in evolution of cirques and thus, glaciation. The preliminary results show that cirques are dominantly deepened and clustered in the western sector of the ranges suggesting that the evolution of cirques is strongly influenced by moisture supplied by the mid-latitude Westerlies. On the contrary, the cirque floor elevation (indicative of the Equilibrium Line of Altitude-ELA) decreases to the north along the precipitation gradient of the ISM following the global ELA vs latitude pattern. The modal aspect of the paleo-cirques in the Zanskar and Ladakh ranges is aligned along with prevailing paleo-wind direction during the LGM (NE direction) as observed in northern hemisphere cirques, where are in Karakorum, its towards NW. The study indicates dominance of glacial erosion in the NW Himalaya (glacial buzzsaw).

Key words: Cirque, NW Himalaya, ELA, Glacial buzzsaw

Abstract No. H01

GEOMORPHOLOGICAL CONTROLS OF GEMSTONE EXPLORATION: A CASE STUDY OF EMERALDS OF GURABANDA AREA, DISTRICT- EAST SINGHBHUM, JHARKHAND.

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Emerald (Panna) is a precious green color gemstone and a variety of mineral beryl ($Be_3Al_2(SiO_3)_6$) having hardness 7.5-8 on Mohs scale. It is one of the rarest gemstones of greater value after diamond and ruby. The study area Gurabanda (22°21'51''N: 86°32'22''E) is a part of Singhbhum shear zone (SSZ) falling within the toposheet No.73J/11 where emerald occurrences are hosted by mica-schist and pegmatites. The Paleoproterozoic Dhanjori Group of rocks are the major lithology of the area. The Shear zone furnishes an ideal condition for emerald crystal growth. The present work was carried out to understand the geomorphology controlling the gemstone exploration of the area through literature survey, topographical study and Surface based field investigation. Our study revealed that the Gurabanda area exhibits hilly terrains, cultivated lands and various drainage pattern where the gemstone occurrences are confined to the hill slopes. Exploration is greatly guided by the geomorphological controls. This paper presents an overview of geomorphological features of the area controlling the gemstone exploration.

Keywords: Emerald (Panna), Gurabanda, Geomorphology, Exploration.

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Abstract No. H02

COMPARISON BETWEEN TWO RIVERS AND RIVERS' BASIN IN THE LIGHT OF THE EVIDENCE OF TECTONIC ACTIVITY: CHEL AND NEORA

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The present study is concentrated to show the relationship between structural control and drainage characteristics for establishing active tectonic influence on drainage network in the piedmont zone of the Sikkimese-Bhutanese Himalaya, between Chel to Neora rivers. The whole area is divided into two parts following the tributaries and main river- one is Chel river basin and another is Neora river Basin. Two dissected fan surfaces are there- Gorubathan-Rangamati fan surface and Matiali-Chalsa fan surface. Satellite images and DEM data are processed with the help of different softwares. Lineaments, scarps have been identified from the nature of the flow path of rivers. Topographic cross sections and long profiles are generated from DEM.

Digitization of rivers from sat images, watersheds and thalwegs generated from DEM, delineating the drainage patterns to see the relation with relief. Morphometric study has been done by observing mountain front sinuosity(S_{mf}), valley floor width to height ratio(Vf), asymmetry factor of river basin (AF), concavity and slope of river channel, hypsometric curve, sinuosity index (SI), stream length gradient index (SL) index which differ significantly in different parts of the study area. The values of Morphometric indices of Chel basin are S_{mf}>4<5, AF>21<22, Concavity> 0.011<0.012; which indicates this basin is tectonically inactive, asymmetric and the river is supposed to be in senile state. Where in other hand the values are- S_{mf}<2, AF<11, Concavity<0.05 of Neora river basin, which denotes it is slightly tectonically active with a marked break of slope in long profile of Neora river, this river basin is near symmetric and possibly eroded in nature. SI and SL index also give significant result, relevant to the outcomes of previous morphometric indices. In many parts of the study area, stream courses are directed and influenced by lineaments. Any change in tectonics of this region may influence on the development of drainage network.

Keywords: Morphometric indices, Mountain front sinuosity, Valley floor width to height ratio, Asymmetry factor, Concavity, Hypsometric integral, Sinuosity index, SL index, Steepness index.

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Abstract No. H03

TECTONIC GEOMORPHOLOGY, HAZARDS AND DISASTERS IN AND AROUND BAROMURA HILL, TRIPURA

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Tectonically North-Eastern India containing Tripura remained very dynamic through Tertiary-Quaternary period. The evolution of hilly landform in this area is associated to the movement of Indian plate. Researchers (McKenzie and Sclater, 1971; Curray and Moore, 1974; Sclater and Fisher 1974) recognized that the intensity and pattern of plate-to-plate interaction between the Indian Tibetan (Eurasian) and Burma Plates persisted very dynamic through the geological past, which plays significant role in geophysical changes of the North-Eastern part of Indian subcontinent and the Bengal Basin. Strong influence of tectonic changes caused intense change of geomorphology in the present study area. Pliocene and Quaternary period is marked by geo-tectonic changes in this area (Dutta, 1974). Tectonic activities are supposed to have continued even in recent times (Nandi, 1977) and have exerted impact in landform evolution in the study area. The study area is marked by typical folded structures an extensive range of variations in structural features has been detected in Baromura hill from north to south. Presently geomorphology within study area is characterized by a wide range of variation controlled by tectonic setup of this area. Tripura, as part of north-east India also falls within Zone -V in seismic hazard map of India, updated in 2000 by the Bureau of Indian Standards (BIS). Accordingly, geo-physical set-up of the

study area requires proper explanation and study at regional to micro level in order to cultivate a viable hazard and disaster management strategy.

Keywords: North East India, Hilly terrain, Tripura, Tectonics, Geo-Physical Changes, Geomorphology, Hazard, Disaster

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Abstract No. H04

ROLE OF TECTONICS, CLIMATE, AND LITHOLOGY ON THE TOPOGRAPHIC EVOLUTION OF NORTHEAST INDIA

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The present compilation is focused on the role of different perturbations on the evolution of complex northeastern Himalayas and associated regions. Tectonics, climate, and lithology play a crucial role altogether to give a shape of moderate to low relief topography that is present in the Sikkim, Assam, and Meghalaya region. While several rivers (e.g. Teesta, Torsha, right bank tributaries of Brahmaputra) are influenced by tectonics and climate and show numerous drainage disequilibrium by forming conspicuous knickpoints at several locations; the rivers which are originating from the Shillong plateau are mostly controlled by lithology and local structures. This compilation provides an overall glimpse of the geomorphic setting and the complex topographic response under the influence of various forces during the different geological time frames.

Keywords: Landscape evolution; Tectonics; Lithology control; Sikkim; Brahmaputra; Shillong

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Abstract No. H05

KOYNA-WARNA SHALLOW SEISMIC REGION IN INDIA: IS THERE ANY GEOMORPHIC EVIDENCE OF ACTIVE TECTONICS?

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The Koyna-Warna region in western Deccan province shows very frequent shallow seismicity of smaller magnitude since the construction of the Koyna reservoir during the 1960s. The present study investigates if there is any possible geomorphic evidence of active tectonics in this region with the help of digital topographic analyses. A total of 60 sub-catchments in this area have been examined for drainage and topographic anomalies. The anomalous SL index and ksn values indicated drainage disequilibrium through numerous transient knickpoints on the longitudinal profiles. The integrated geomorphic analyses of asymmetry, hypsometric integral, SL index, valley width height ratio, and elongation ratio revealed two distinct high possible tectonic regions-

(i) between Koyna Rift and Patan fault zone, and (ii) upstream of left-hand tributaries of Koyna.

Keywords: Tectonic geomorphology, Seismicity, SL index, ksn, Koyna

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Abstract No. I01

THE NEARSHORE WATER QUALITY ASSESSMENT USING AVIRIS AND SENTINEL 1 A SAR DATA: A CASE STUDY IN JAKI MIRYA, KONKAN COAST OF MAHARASHTRA, INDIA

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The nearshore water space with the shore fringe landscapes of Ratnagiri coast in Maharashtra represents an important ecological zone that is influenced by high anthropogenic pressures from coastal development. Coastal water bodies and estuaries of the study area receive and operate the mixing process of land discharges and long shore current discharges loaded with nutrients and pollutants. The shallow water ecosystems of the region are damaged due to the concentration of oil spills and dissolved organic matter. In addition, artificial structures on the beaches also affected the interaction processes between ecosystem functions of nearshore marine waters and estuarine waters, thus destroying the ecologically valuable habitats of beaches, shore platforms, beach ridges, embayments, and rocky headlands.

The present study describes the seasonal variation of oil spills, dissolved organic matters, and other water quality parameters of the near shore environment of Jaigarh Bay, Kalbadivi Bay, Mirya Bay, and Ratnagiri Bay using AVIRIS and Sentinel 1A SAR data in Remote Sensing approach also by field sampling data with water analyzer equipment. By the study, it is represented that oil spills are concentrated in the nearshore waters close to the shorelines during monsoon, drifted towards the shallow off shores during pre-monsoon in a band of the marine water body, and broken into patches all along near shores during post-monsoon months. However, the values of CDOM show 3.18 mg/l in post-monsoon, 2.75 mg/l in pre-monsoon, and 2.71 mg/l in monsoon months in the near shore marine waters.

The beach habitats of the detached spit nearby Bhatye Bridge of Jakimirya and Ratnadurga shore attached beach are damaged by deposition of pollutants from nearshore marine waters and estuarine waters. Such a study can provide databases for the environmental management of the coastal zones and to make the sustainable framework for the restoration of valuable coastal habitats.

Keywords: CDOM, Oil spills, Coastal habitats, Shallow water ecosystems, Environmental Management

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Abstract No. I02

MONITORING CLIMATE RESILIENT EMBANKMENTS IN RESPONSE TO SEA LEVEL RISE EFFECTS ALONG THE TIDAL ESTUARIES OF THE SOUTHWESTERN SUNDARBAN USING GEOMORPHOLOGICAL AND BIO-ENGINEERING METHODS

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The eastern and western banks of the Saptamukhi tidal estuary are prone to flood risks in the southwestern Sundarban due to the variation in channel size at different reach distances, increased tidal prisms, the ephemeral rise of sea waters during cyclone landfalls, and low lying topography of the reclaimed tracts in the channel fringe islands. The occasional outbreak of cyclones, shoreline recession rates, and dynamic sediment transport paths have modified the geomorphological and biological processes of the estuary banks which are rendering the coast exposes to waves and currents attacks and also rendering the coast prone to overtopping and overflowing effects of tidal surges on the protective earthen embankments. The estuary or the arm of the sea at its current situation does not accommodate the increased tidal prisms and might be vulnerable to the predicted sea-level rise rates in the local coastal system that will register the occurrences of frequent embankment failures in the near future. As a consequence of the weakened embankments of the estuary fringe area, the western and eastern tracts suffered from saltwater inundations, rapid forest degradations, changing estuary fringe morphology, and shoreline dynamics after the events of cyclone landfalls during the previous decades.

The study reveals that the island fringe tract in the tidal estuary in response to the sea-level rise effect needs to manage the climate-resilient embankments as per the engineering guideline and by monitoring hydro-geomorphological and biological processes with introducing the ecological buffers of mangroves on the river side and country side of embankments. The present research is carried out in the region with the application of geospatial techniques, extensive survey through rigorous field works and monitoring the growth, ecology and mortality rate of managed mangroves under favourable and unfavourable conditions of tidal flats to improve the capacity of physical, ecological and morphological buffers of the southwestern Sundarban against the flood risk.

Keywords: Tidal Prisms, Ephemeral rise of sea waters, Climate Resilient Embankments, Hydro-geomorphological, Ecological Buffers

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Abstract No. I03

COASTAL EROSION ALONG ODISHA COAST

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Coastal erosion is a natural response to water and wind process at the shore ,but erosion is only a problem when human development is at risk.There is a common perception, that coastal erosion increased by climate change ,sea level rise and different human activities in the coastal areas. Human activities have strongly influenced the equilibrium of the coastal zone. The main human disturbances inducing coastal erosion are extraction of sand and gravel from river and beaches ,building dams that reduce fluvial sedimentary inputs ,building of jetties and breakwaters associated with ports and coastal recreational activities interfering with the longshore current sediment transport ,destruction of littoral dunes and vegetation to build roads and hotels.In this paper an attempt has been made to study the highly vulnerable coastal erosion of Odisha coast between Paradeep and Dhamara ports in Kendrapara district.The shore line has retreated resulting extensive coastal erosion and some villages were completely wiped out.The change of the shore line is studied by using satellite images of landast ,sentinel ,google earth ,resoursat and survey of India toposheet for the last 40 years.Not only the shore line changed but also spit formed at the river mouth completely wiped out .The erosion is mostly due to the impact of tidal surge during cyclonic storm as the cyclonic storms are increasing intensity in the recent past..

Ket words:- coastal erosion ,shore line change ,storm surge ,tidal surge ,vulnerable.

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Abstract No. I04

ANALYSIS OF THE COASTLINE CHANGES IN THE TAT ISLAND, INDIAN SUNDARBAN

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The study aims to analyze the shape and position of the shore changed with shoreline recession and aggradation in the Tat area of G-Plot Island, Indian Sundarban. Sea level rise, tidal fluctuations, storm surges, and other natural calamities, which are vulnerable in the deltaic tracts of Sundarban results in a high rate of erosion in the southern part of G-Plot since last 41 years from 1980 to 2021 as seen from the multi-temporal Landsat images of 3(MSS), 5(TM) and 8(OLI) which were collected to study the coastline change and predict the future coastline positions. A digital shoreline analysis system (DSAS) has been used to analyze the shoreline changes by endpoint rate (EPR) and Shoreline change envelope (SCE) after demarcating the transects along the baseline. The rate of erosion/accretion has been calculated by

using the DSAS tool in ArcGIS software along with its area. The slope and elevation of the region as the controlling factors of erosion have also been calculated by collecting the data from SRTM-30 resolution. From the analysis of these data, we can observe that the coastal erosion rate is high in regions like Gobardhanpur and Sitarampur. These places were severely affected during Aila, 2009 for which coastal management has been developed to construct embankments along the shore to check the loss of land, ecosystem, and economy in the last decadal period. The maximum rate of erosion is seen in the period of 2000-2011 with 4.433 sq. km of land loss.The vulnerable zones are demarcated in the study area which can help several other management techniques need to be adopted by the Govt based on certain geological, morphological, climatological, and economic conditions to induce a sustainable development program to protect the Sundarbans and to ameliorate the lives of the residents living in this fragile ecosystem.

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Abstract No. I05

RESTORING MANGROVES IN A TIDAL DRAINAGE LOSS AREA: AN ATTEMPT TO CHALLENGE THE MORPHODYNAMICS, OCEAN DYNAMICS AND CLIMATE UNCERTAINTIES IN THE WESTERN SUNDARBAN

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In western Sundarban, mangroves are found to be thriving only along the levee banks of tidal creeks and on the back shores of active tidal flats, which are flushed by tides twice daily. The areas away from the island shores are suffering from tidal drainage loss due to absence of tidal creeks, maturity of the island surface and less frequent inundation by tides, which have led to formation of hypersaline patches and mangrove dieback. Mangrove restoration projects are undertaken since 2010 in this region employing ecological engineering methods. However, the projects are not found to yield favourable results towards restoration of mangrove habitats. The present study is conducted in Patibunia Island and Henry's Island of south-western Sundarban to explore the reasons of failure in restoration of mangroves around the hyper saline patches. It is observed that the drainage ditches, many of which were dug with the aim of mangrove restoration, have been aggraded with sediments from tidal waterflow entering across the island shores during high tides. This aggradation provides the favourable environment for further encrustation of the surface with salts and the conversion of the nearby region into areas of tidal drainage loss, which hinder the growth and regeneration process of mangroves. Only the salt marsh heaths and high salt tolerant dwarfed mangroves can sustain for any temporal span in the hyper saline patches with encroachment of tidal surge waters during monsoon months and little moisture supply in the non-monsoon seasons. The study reveals that understanding of processes and sensitivity of mangroves are absent in such ecological engineering methods in restoration of mangroves in the region of western Sundarban, and that

some of the measures undertaken for the purpose of restoration, like the drainage ditches, are instead hindering mangrove growth at present due to tidal drainage loss.

Keywords: Aggradation, Climate uncertainties, Ecological engineering methods, Hypersaline patches, Ocean dynamics, Salt encrustation, Tidal drainage loss area

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Abstract No. I06

COASTLINE CHANGES IN THE MOUSUNI ISLAND, HUGLI ESTUARY, 1972 – 2020

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Mousuni is the most Habitat Island in Indian Sundarban as a part of Hugli Estuary and most southwest Island of Ganga Brahmaputra Delta. The coastlines of Island are changing their shape steadily due to natural (geology, hydrology, chemical, climatology) and anthropogenic (reclamation and deforestation) reasons in Estuary. Rapid coastline changes are very dangerous for natives. Here I present an assessment on coastline changes in Mousuni Island of 48 years since 1972 to 2020. In this study showed that shifting of shoreline, long and short term erosion accretion analysis, rate of erosion and their zone and land use and cover change. By multi dated satellite images showed that northwest, south and west part of Mousuni mostly affected by erosion in every year and eastern part protected in shadow zone of Namkhana Island and Pitt's Creek where direct influence of tidal flow is very less. In 48 years total loses of area of Mousuni 21.50%. Rate of erosion 15.19 ha/yr but rate of accretion only 0.3 ha/yr. Present area covered by Mousuni is 2609.75 ha. The role of different factors which such affects in several rates of change in shapes of the coastline and morphological change in Mousuni is explained. The stability of coastline and vulnerability is fare issues for livelihood of Mousuni. Land use and land cover map also prepared to observe how erosion and accretion affects the Island.

Keywords: Coastline change, Mousuni Island, Hugli Estuary, erosion, accretion, land use/land cover.

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Abstract No. I07

MANAGING THE COASTAL SQUEEZE AND WETLAND LOSS IN SAGAR ISLAND IN A SUSTAINABLE FRAMEWORK USING GEOSPATIAL TECHNIQUES

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The coastal squeeze with response to sea-level rise scenario will reduce the area of coastal salt marshes and mangroves due to the effect of blocked landward retreat path

by location of embankments and sea wall structures in and around the shorelines of Sagar Island like other areas of the reclaimed Sundarban. Similarly, the drainage channels within the estuarine island also will be modified and associated tidal wetlands will be squeezed due to their jacketed courses with protective embankments as the part of land reclamation process in the region.

The present study is carried out to identify such coastal squeeze and its nature of temporal changes with geospatial techniques. Increased cyclone vulnerability and sea-level rise vulnerability hindering the rapid restoration of lost wetlands due to the location of island interior infrastructures which restricted the landward retreat path of tidal wetlands within the coastal zones. Thus unhealthy mangroves, saltmarshes and degraded sand dunes fringed with erosive sea beaches represented the direct effects of coastal squeeze in the sea-facing island of Hugli estuary. Most of the inner island drainage channels are silted up and degraded into narrow water courses but behave differently in the tidal surges when overtopping and overflowing of salt waters occur in the low-lying tracts.

The study highlighted a sharp decline of salt marshes, mangroves, and intertidal wetlands over the previous decades along the sea shores and inner island channel banks. Finally, the study also provided a sustainable framework for the restoration of coastal wetlands to manage the effects of coastal squeeze in Sagar Island.

Keywords: Coastal Squeeze, Coastal Wetlands, Sea Level Rise, Cyclone Vulnerability, Embankments

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Abstract No. I08

A SPATIO-TEMPORAL CHANGE DETECTION ANALYSIS OF COASTLINE IN EAST MIDNAPORE COASTAL TRACT, WEST BENGAL

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Coastal tract is one of the most important zones where four energies viz. wave, tidal, terrestrial and atmospheric agents acts together to change coastal morphology as well as coastal morpho-dynamics. Our recent study solely emphasis on spatio-temporal change detection analysis in East Midnapore coastal tract, which can help to identify morpho dynamics of the coast. To meet the specific objective geospatial technology has been used. The satellite images i.e. Landsat 4 and 5 TM, Landsat 7 ETM^{+}, Landsat 8 OLI imagery from 1974 to 2020 have been used to detect shoreline change along the coastal tract of East Midnapore. This study incorporates spatio-temporal change of coastline using Geographical Information System (GIS) by ArcGIS environment. The result shows that a dramatic change in coastal morphology as well as spatio-temporal change of coast line along the coastal tract. The study can be helpful for better planning and Integrated Coastal Zone Management (ICZM).

Keywords: Coast line, Spatio-temporal change, Geospatial technology, Coastal dynamics

Abstract No. I09

COASTAL BEACH HEALTH ASSESSMENT THROUGH CRAB BURROWS ANALYSIS IN KANTHI COAST, INDIA

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Coastal beach is the most dynamic field in the world. Being the transition zone between land and sea, beach is a coastal landform facing the open sea and it is a gently sloping flat plain between low water lines of spring tide to the upper limit of wave action. It could be defined as a sloppy sand platform towards sea. About 45 km long Kanthi coast is stretches from the mouth of the tidal river Rasulpur in east to the mouth of Subarnarekha River in west. Kanthi Coast is associated with seven beaches, viz. Junput Beach, Shoula Beach, Mandarbani Beach, Tajpur Beach, Shankarpur Beach, Digha Beach and Talsari Beach from east to west. Through the burrowing activity by the Crab influences beach sediment texture, soil permeability, sediment attraction. Above those parameters have been quantified statistically (Mean grain size analysis by Folk and Ward, 1957; Sorting Measurement by Folk and Ward, 1957; Sediment Transport Model by Inman and Bagnold, 1963; Sand Transport Rate by using Threshold Shear Velocity by Bagnold, 1941) to assess whether it will degradational or depositional coastal beach. During field survey and laboratory work, it has been observed that crab burrow in coastal beach positively pronounce to coastal beach health. The eastern segment of Kanthi coastal beach is experienced as an accretion zone in respect to the western portion for dense crab habitat on the beach. Massive tourist pressure is observed at the western segment of Kanthi coast. Thus, crab habitat density is decreasing at the said portion due to overlapping the beach carrying capacity. Monitoring the tourist flow according to the beach carrying capacity is the only way to keep the beach sustainability.

Keyword: *Beach, Crab Burrowing Activity, Sediment Texture, Soil Permeability, Sediment Attraction, Beach Health.*

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Abstract No. I10

COASTAL EROSION: A CASE STUDY KERALA

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The south west coast of India comprises beaches and cliffs which advocates a highly dense coastal community of the region. The state of Kerala is situated along the south

west coast of India. It stretches along the coast of the Arabian Sea (Malabar Coast). The total length of coastline is about 592 kilometres. Landforms such as beaches, lagoons, barrier islands, beach ridges, paleo strandlines, alluvial plains, marshy plains, spits, mangroves and islands locally called as 'thuruthu' are observed along the coast. Another striking feature of the coast is high population density of the narrow coastal belt. This has aggravated human interference in shoreline change system. Construction of structures such as fishing harbours, ports, groins, sea-walls and beach sand mining for monazite ores, has highly altered the nature of coastline and induced changes. Nine coastal districts from Kasaragod in the north to Thiruvananthapuram in the south attribute the coastal belt of the state. Due to the Anthropogenic activities the region become vulnerable to the Erosional processes. Of the nine coastal districts, they being Kasargod, Kannur, Kozhikode, Malappuram, Thrissur, Ernakulam, Alappuzha, Kollam and Thiruvananthapuram (from north to south), the coastline of Thiruvananthapuram district is the most prone to erosion. Coastal erosion is the landward displacement of the shoreline caused by the forces of waves and currents. Coastal erosion results in the loss of life and property of the coastal fisher population. The extensive stretch of Kerala's coastline (63%) is eroding rapidly. The issue of shoreline changes due to both natural and anthropogenic activities. Most part of the Kerala coast is subjected to severe erosion leading to instability in the shoreline which is matter of concern that need to be tackle critically. Coastal Erosion taking place in the South West Coast of India has been highlighted in this paper.

Keywords: Kerala; Coastline; beaches; Coastal Erosion; Shoreline change

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Abstract No.J01

ON THE EXISTENCE OF PALAEO-CHANNELS OF ASSI RIVER IN BETWEEN VARANASI AND PRAYAGRAJ, UTTAR PRADESH, INDIA

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The Assi river at present is a small local ephemeral floodplain tributary of the Ganga river with a length of about 8 km and a catchment area of about 22 sq. km. flowing across the southern part of Varanasi city in the state of Uttar Pradesh in India. Assi river in Varanasi quoted in religious texts was once a pure and pristine large tributary like many other tributaries of the Ganga. It has now turned into a small filthy drain. The Government of India as well the city administrators wish to not only control and condition the pollution coming into and through it but also wish to rejuvenate it. The question connected with this stream, quite often discussed and discoursed in academic

and cultural circles here in Varanasi, is the place of its origin, status in terms of its length and catchment area and whether it can be called a river. There were claims and counter claims on the place of origin of even the present Assi. Most of its present catchment area is covered up by urban built-up space. There were references to suggest origin of Assi river near Prayagraj and flowing all through a distance of about 120 km up to Varanasi to meet the river Ganga. It is this reference that gave a fillip to take up the present study. Through on screen digitization from high, medium and coarse resolution remote sensing data--BHUVAN and Google Earth Image, Corona aerial photos, IRS P6 LISS-IV, Landsat-1, 3, 5, 7, 8--and a number of cross profiles from SRTM 30m DEM and 1m DEM generated from about 5000 DGPS points combined with field observations, the present study presents proof of existence of palaeo course of Assi river right from near Allahabad up to Varanasi.

Key Words: Assi river, Palaeochannel, Varanasi, Origin.

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Abstract No.J02

IDENTIFICATIONS OF LANDFORMS AND GEOMORPHOLOGICAL FEATURES OF KUTNI RIVER BASIN IN CHHATARPUR DISTRICT (M.P.) WITH THE HELP OF REMOTE SENSING AND GIS TECHNIQUES

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In this Paper Abstract has been researched to study of Identifications of Landforms and Geomorphological Features of Kutni river Basin in Chhatarpur district (M.P.) with the help of Remote Sensing and GIS Techniques. Kutni River Basin which is located in Rajnagar and Chhatarpur tehsil of Chhatarpur district of Madhya Pradesh state and covered between Longitude 79°38'13.729"E to 80°3'43.169"E and latitudes between 24°43'28.143"N to 25°3'40.766"N. The Study Area is spread over an area of approximately 615 sq. km. This study is carried out by using LISS-III Satellite image and (SOI-1:50,000) Topographic Sheets-54O/16, 54P/9, 54P/13, 63D/1. World famous Khajuraho temples are located in this Area. Landforms are interpreted on the basis of interpretation element keys namely such as- tone, texture, size, shape, color etc. and extract the specific information from the false color composites LISS-III Satellite images. In the study area, mainly presented is occupied by Bundelkhand Gneissic Complex comprising a variety of medium to coarse grained grainites, migmatites, gneisses etc. Apart from these above geomorphic units, Pediment, Pediment Corestone-Tor Composite, Pediplain, Inselberg, Residual Hill, Residual Mound and Ridge are mapped using IRS-ID LISS-III satellite imagery using visual interpretation technique. Remote Sensing and GIS offers detecting, analyzing and timecost effective way to fulfill these goals.

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Abstract No.J03

APPLICATIONS OF GIS AND REMOTE SENSING IN GEOMORPHOLOGIC STUDIES: A CASE STUDY FROM THE UPPER KOSI WATERSHED IN UTTARAKHAND

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Geomorphology is the study of landforms and their processes of the earth surface. In the effective management of natural resources such as land, vegetation, soil, water etc the geomorphological maps are very helpful. In the present age of technology, still the geomorphological studies and mapping are being done in traditional ways through exhaustive field surveys and using topographic sheets which are very time taking and expensive. The development of recent advances in mapping technologies, viz., Geographic Information System (GIS) and remote sensing (RS) have done revolutionary changes in geomorphic mapping and studies. The fundamental objective of the present paper is to demonstrate the application of the latest technologies of GIS and remote sensing in geomorphic studies using by employing a Himalayan watershed as a natural laboratory, viz., the Upper Kosi Watershed of the Kumaun Himalaya in the Uttarakhand State.

Keywords: Digital Elevation Model, Relief and Drainage Morphometry, GIS, Remote Sensing, Upper Kosi Watershed, Uttarakhand.

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Abstract No.J04

DYNAMICS OF SHORELINE CHANGES ALONG THE COAST OF SUBARNAREKHA AND BHUDHABALANGA RIVER ESTUARY, NORTH EASTERN COAST OF INDIA USING DSAS TECHNIQUE: A GEOSPATIAL TECHNOLOGY APPROACH

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The coastal zone is one of the most precious environmental and economic assets. To detect shoreline changes along the coast of the Subarnarekha and Budhabalanga river estuaries in Baleswar district, the current study used a geographic information system and a digital shoreline analysis system (DSAS). The shoreline was extracted using multitemporal satellite images from 1991, 2000, 2010, and 2021. The satellite data from 1991 to 2021 were processed using Envi, ArcGIS software and the shoreline are extracted. Endpoint rate, net shoreline movement, linear regression rate (LRR), and

least median of square are four statistical factors in DSAS that automatically quantify the rate of shoreline change in the form of erosion and accretion pattern. The shore line change analysis for the coast of Subarnarekha and Budhabalanga river estuary area from 1991 to 2021 shows that 44% of the coast is under accretion, 7% is under stable coast, and 23% is under erosion. The coast is progressive and regressive, with average rates of 1.08 m/year and 0.44 m/year, respectively, according to the findings. The study will give information on probable erosion and accretion near the Subarnarekha and Budhabalanga river estuaries, which will aid in the development of an adaptive shoreline management strategy.

Keywords: shore line change, linear regression rate, end point rate, DSAS, linear regression

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Abstract No.J05

A MULTI TEMPORAL ANALYSIS OF CHANNEL PLANFORM DYNAMICS OF THE SELECTED STRETCH OF GANGA-PADMA USING DIGITAL SHORELINE ASSESSMENT SYSTEM (DSAS)

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This study aims at measuring long term channel shifting of Ganga-Padma at its lower course; precisely from Sahibganj, India to Rajsahi, Bangladesh. The study also targets to prognosticate future lateral migration of the river banks to bring about the associate areas of erosion and deposition. The selected stretch is highly populated and has strategic importance since it demarcates the boundary between India and Bangladesh. Measurements of channel shifting was done for a time period of nearly 100 years (1923-2021). After necessary pre-processing, bank lines were manually digitized in case of topographical maps but Normalized Difference Water Index (NDWI) was performed to extract the bank lines from satellite images. Digital Shoreline Analysis System (DSAS) was used to estimate Bank line Change Envelope (BCE), Net Bank line Movement (NBM), End Point Rate (EPR) and Linear Regression Rate (LRR). The result exhibits high fluctuations in movements of both right and left banks in terms of advancement or retrogradation of the recent bank line compared to the oldest bank line over the time span. Such high oscillations of bank movements clearly illustrate high dynamicity of the river, in terms of frequent channel contraction and expansion, often imposing certain effects on livelihood of the residents of both the countries. The resultant effects of bank oscillations are associated with areas of high erosion at the concave bends namely; English Bazar and Jangipur of Malda and Murshidabad district, West Bengal, respectively and areas of high deposition at the convex bends, specifically in Auragabad of Bihar and Bhagwangola of West Bengal. Channel Sinuosity Index shows a gradual rise in the values, manifesting a meandering channel pattern.

Keywords: Bankline shifting; digital shoreline assessment system; geospatial analysis

Abstract No.J06

SHORELINE CHANGE ANALYSIS ALONG RATNAGIRI COAST, INDIA, USING DSAS

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The shoreline is one of the most significant characteristics of the earth's surface. Natural coastal processes such as waves, tides, littoral drift, and cyclonic storms, as well as coastal development, constantly affect the dynamic interfaces of both the terrestrial and marine environment making the shoreline highly dynamic. One such severely affected shoreline is the Ratnagiri shoreline, located on India's West Coast in Maharashtra state. This study aims to determine the shoreline changes along the Ratnagiri Coast by using the Digital Shoreline Analysis System (DSAS) version 4.0, an extension of ArcGIS software. The shorelines for 21 years (2001 to 2021) were extracted from multi-temporal satellite images having a spatial resolution of 30 m on the ground. The Linear Regression Rate (LRR) method was used to calculate rates of shoreline change for > 2,000 transects generated at 100 m intervals throughout the entire Ratnagiri coastline. The coastal lengths were classified as severe erosion, stable, and accretion coasts based on the rate of shoreline changes. The shoreline change analysis for the entire Ratnagiri coast for the study duration shows that around 48 km (18%) of coastline falls in a high-risk category, with an erosion rate of 5.32 m/yr and around 150km (54%) remaining steady. Around 78 km (28%) of coastline recorded accretion falls under the low-risk category with an accretion rate of 2.43 m/yr. The research also identified high-risk vulnerable places along the beaches, creeks, and estuaries of Kelshi, Jaigad, Gavakhandi, Bhatye, Guhagar, Jaitapur, and Harnai whereas low-risk zones such as cliffs and shoals are geologically confronted. The findings of the study can be used for further planning and development and disaster management. The findings of this study can be used for coastal planning and development enabling policymakers and stakeholders to have an efficient disaster management process.

Key Words: **S**horeline Change, Erosion, Accretion, Linear Regression, DSAS

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Abstract No.J07

CHANNEL MIGRATION ON DARJEELING HIMALAYAN PIEDMONT: A CASE-STUDY OF LOWER RAKTI KHOLA

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Channel migration is a natural process, occurs under the fluvial environment. But it affects the livelihood of the bank-line dwellers. Present paper deals with the river channel migration of lower Rakti khola (left hand tributary of Balasan) in the

piedmont zone of Darjeeling Himalayas. An attempt is taken to measure the magnitude and direction of shifting and the area under erosion and accretion process along lower Rakti by using the power of Geomatics. Lower Rakti channel is extracted from LANDSAT TM (1998) and LANDSAT OLI (2010 and 2020) and are superimposed together in order to observe the channel shifting tendency. Highest channel migration in south-west direction from 1998-2010 was detected at Simulbari Tea Garden area. Maximum channel migration has been occurred at Pankhabari and Rakti forest area in the north-east direction in the span of year 2010 to 2020. Area comes under the erosion and deposition zone is also measured under this present research. Highest erosion has been executed at Bamonpokhari forest region in the span of 1998 to 2010 along Rakti channel, which may responsible for the economic losses of bank line-settlers. Highest aggradation takes place at Simulbari along Rakti river, which may increase the potentiality of agriculture of that area in the span of 1998 to 2010. Highest erosional tendency has been found near Rohini Tea Garden and highest deposition takes place near the Makaibari Tea Garden in recent decade (2010 to 2020). These findings of the present research may useful for local authority to frame a conservation plan at studied reach to restore the fluvial environment along the studied reach of Rakti khola as well as for the sustainability of the livelihood of the bank-line settlers.

Key words: Magnitude and direction of shifting, erosion and accretion area

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Abstract No.J08

TECTONO-GEOMORPHIC EVIDENCES OF NEOTECTONIC IMPLICATION FROM MOUVANA DOME: INSIGHT OF AN ACTIVE TRANSVERSE FAULT ALONG THE ISLAND BELT FAULT (IBF) ZONE

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The present study was carried out to measure differentiation in neo-tectonic activity in the regions around the Mouvana Dome which is an isolated dome in the eastern segment of the Bela Uplift (BU) in the Island Belt Uplift (IBU). The Mouvana dome is separated from the Bela dome as well as the Bela flexure by a large transverse fault known as the Sharan Fault. The present work includes preparation of geological map which includes drainages, lithology, intrusives, faults and contours. Moreover, the field work was carried out to mark several neotectonic geomorphic landforms in the Mouvana dome. Several neotectonic features like strath terraces, knick points, triangular facets, river offset, etc. were documented in the region. Locations of these features were digitized and overlaid on the geological map of the Mouvana dome. A high resolution DEM (30m SRTM) was prepared to carry on the morphotectonic analysis of the region. The Mountain front class of the escarpment of the Mouvana dome was inferred by calculating the Mountain Front Sinuosity index (Smf) and Valley Floor Width to Height ratio (Vf ratio). Also the drainage analysis was carried

out using parameters like Hypsometric Integral, Stream Length Gradient Index (SLGI), Steepness Index (Ksn) and Profile Concavity (θ) of the Mouvana dome. The morphotectonic analysis shows difference in tectonic activity between the eastern segment and western segment of the Mouvana dome. The western segment depicts greater degree of tectonic activity than the eastern segment which could be the result of the active tectonic movement of the Sharan Fault. Moreover, the presence of the strath terraces in the western flowing drainages and its anomalous behavior proves the postulate.

Keywords: Neo-tectonic activity, Morphotectonic analysis, Geomorphic markers, Transverse Fault.

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Abstract No.J09

EVALUATING THE URBAN EXPANSION THROUGH URBAN LANDSCAPE MATRICES IN KOLKATA METROPOLITAN, PUNJAB BY USING REMOTE SENSING AND GIS

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Urbanization is the most dramatic form of constant land transformation. All over the world, urbanization has been occurring which can be measured using several procedures e.g., landscape matrices, cellular automata etc. This paper mainly focuses on analysing the urban expansion of Kolkata for four decades (e.g., 1990,2000,2010,2020) using GIS and satellite images. This paper also evaluates the spatial and temporal characteristics of urban expansion over time. Changing trends of land use/cover were also detected from the various year satellite image over time. The temporal landscape matrices can demarcate the urban expansion over time. Urbanization has largely been increasing in Kolkata which is somehow affected by the geomorphological settings of the city. Urban green space has been tremendously decaying gradually while the built-up area is rapidly increasing over time. Large scale urban expansion accelerated the huge sprawling development around the city which causes a dramatic reduction of green space and rapid transformation of the rural landscape under the process over time. Several others factors e.g. accelerated the urban expansion like rapid population, traffic, industry, land use etc. This study will help urban planners, policymakers and local government to understand the development pattern of the city and to execute sustainable urban planning to support SDGs as well.

Keywords: Urban expansion, urban landscape, remote sensing, GIS.

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Abstract No.J10

IDENTIFICATION OF ZONES AT RISK OF SOIL EROSION BY THE COMBINATION OF A GEOSPATIAL TECHNIQUES &AHP IN THE NORTH KOEL REGIONS: CASE OF THE DANRO WATERSHED

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Soil erosion, a natural process accelerated by humans, is one of the serious environmental problems facing in the Danro watershed in the Chotanagpur platue North Koel region of Garhwa district in Jharkhand. The major objective of this study is the qualitative mapping of areas at risk of soil erosion in Danro watershed using geospatial techniques and AHP method (Analytical Hierarchy Process). The main factors considered in this study are slope, drainage density, Land use & Land cover, soil, geomorphology and geology of the study region. The result of the study area shows that the erosion phenomenon is threatening the Danro watershed region. The study area has four classes ranging from low to very high erosion risk. It shows that more than 6% of the study area has a high to very high risk of erosion. The result also shows that erosion is very strong in the northern east part of the study area which is near Garhwa town, while the risk becomes low in the south east near region of the study areawhereas moderate areas of soil erosion comprised of 73.87 km2 within the Danro watershed. The overall results reveals that Danro watershed is found to be most prone to very high soil erosion, whereas parts of the lower, middle, and upper watershed regionsare significantly prone to high rate of soil erosion.

Keywords: Soil Erosion,North Koel region, Analytical Hierarchy Process, Geospatial techniques,

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Abstract No.J11

DETERMINATION OF THE FLOOD POTENTIALITY AND LIVELIHOOD OF THE PEOPLE USING REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM

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Floods are considered to be the most common natural disaster that affects major regions of North-East India as well as in Assam. The objective of this paper is majorly to evaluate the flood vulnerability which is primarily based on multi-criteria evaluation (MCE) conducted in the lower part of the Brahmaputra River of Assam. The important contributing factors selected for flood hazard include Drainage Density, Flow Accumulation, Slope and Elevation, LULC, Micro Watershed, Rainfall

Distribution, Population Density and Proximity to River. Remote Sensing (RS) and Geographical Information System (GIS) have been used to derive, integrate, and analysis of geographic layers of each of the themes. Four classes of flood hazard vulnerability– ranging very high, high, moderate and low– have been categorized on the basis of the estimation. It is noted that more than about 50 % of the total area of the watershed is under acute risk of flood and some places of the study area namely Barpeta, Lakhipur, Agia, Boungaigoan and Joytigaon are highly affected region on the other hand Ujanpara, Sarbhog and Dudhnoi areas are moderately affected by the flood during flood time and 42 % agricultural product damage during flood in the study area.

Keywords: Livelihood, Flood intensity, Brahmaputra river and AHP

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Abstract No.J12

GEO-DIVERSITY INDEX MAP OF PART OF WESTERN GHATS USING INTEGRATED GIS AND REMOTE SENSING APPLICATION

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The Western Ghats of our country are ubiquitous treasure of both biodiversity and geo-diversity. Of late very few insights have been found on the mapping of geodiversity of the western ghats in terms of geodiversity index maps. The current study employs integrated approach to generate Geodiversity index map of part of Western Ghats. The most popular definition of geodiversity is: "the natural range (diversity) of geological (rocks, minerals, fossils), geomorphological (landforms, processes) and soil features, which includes their assemblages, relationships, properties, interpretation and systems." (Gray,2004). Geodiversity assessment remains an open issue, since the very concept of geodiversity has been introduced in recent times and still lacks a definite agreement on its meaning (Ferrando,2021). Geodiversity assessment can be made using both qualitative and quantitate methods or either of the two. In the current study quantitive method is applied, which is based on a set of parameters and indicators to determine geodiversity index of the study area. Geomorphological, geological and soil map of the study area are utilized to generate geomorphic index map, geological index map, and soil index map by following the geocoding parameters proposed by Kale, Vishwas (2014).

Final geodiversity index map of the study area is obtained by integrating and reclassifying the index maps using AHP based classification techniques in GIS environment. The geodiversity maps can establish a vital tool for land planning and management, highlighting in a quantitative and realistic way the variety, distribution and interaction among the main elements of the physical landscape.

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Abstract No.J13

URBAN WATER RESOURCE MAPPING OF SELECTED FEATURES ON SPATIO-TEMPORAL SCALE WITH OPEN SOURCE RS & GIS APPROACH: A CASE STUDY OF AGARTALA CITY, INDIA

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Urbanisation is taking place all over the world, with rapid urbanisation over exploited water resources are one of the most vulnerable aspects of environmental degradation. Agartala city is one of the most rapidly urbanising capital cities in the North East of India. Extension of the city is from 23º45´ to 23º55´ N of latitude and 91º15´ to 91º20´ E of longitude. According to 2011 census population of the city was 400004 people. The present study attempts to proper utilization of Remote Sensing and Geographical Information System tools and techniques in order to water resource mapping of the city on spatio-temporal scale. Water resource mapping of selected features was done with the help of opensource techniques and data for this study. This approach is useful for the researchers, private and public both entities for the tackling of issues and management of water resource in urban areas.

Key-words: Urban, water resource, RS & GIS.

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Abstract No.J14

SMART MOBILITY PLANNING- PROBLEMS AND PROSPECTS IN PRAYAGRAJ.

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Prayagraj is one of the largest and most populous cities of Uttar Pradesh and also is developing as a smart city, One of the main components of “smart city” is sustainable and fast mobility. However, the accelerating pace of urbanization has caused several issues. With increase in number of private vehicle, traffic congestion, accidents, delays, and pollution levels etc. have increased. All this necessitates a comprehensive and integrated mobility planning for Prayagraj. Use of Geographical Information System(GIS) coupled with geomorphology of the city is highly desirable in this context, for study of mobility patterns, traffic management, demand supply balance of public transport etc.

This paper attempts to study the scope of smart mobility planning with special reference to needs of Prayagraj as a smart city, keeping in mind the geomorphology, slope dynamics of the city studies via GIS. There exists certain problems that hinder smooth flow of traffic of goods and people like encroachments, unsatisfactory public transport infrastructure, land acquisition challenges etc. which the paper attempts to

study. Analysis of existing transport networks, scope of development of new multi modal transport networks like metro rail networks, ensuring intermodality among various public transport etc. is also suggested which again needs to be studied keeping in mind the geomorphology. Keeping in mind the specific findings from aforementioned analysis, a comprehensive plan with special focus on problem areas like Johnstonganj, Allahpur, Rajapur etc. is attempted.

To maintain the sustainability of cities, sustainable and smart mobility is essential. Fast and efficient and environmentally friendly mobilization of goods and people is also bound to enhance economic and social development.

Keywords: geomorphology, mobility planning, smart city, GIS.

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Abstract No.J15

INTEGRATED HYDROGEOMORPHOLOGICAL STUDY OF THE CHHOTI KOLI SINDH WATERSHED, IN THE PARTS OF UJJAIN AND DEWAS DISTRICT OF M.P., USING SPATIAL AND MCDM TECHNIQUES

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Present work deals with the assessment of groundwater potential in the falling in the villages of Chhoti Koli Sindh Watershed, in parts of Ujjain and Dews district, Madhya Pradesh. The study is based on remote sensing and GIS approach. In this study IRS P6 LISS-III data (23.5 M spatial resolution) with path 96 and Row 55 of Indian remote sensing satellite and Resourcesat IRS, P6 LISS-III data has been utilized to analyze the onscreen interpretation and delineate different geomorphic units, lithological formations, lineaments and drainage. By integrating the above parameters the hydrogeomorphological map is prepared on 1:50000 scale. The Hydrogeomorphics units include pediplain, pediment, valley fills and scarpments. Of these pediplain cover the largest area.

A Multi Criteria Decision Making (MCDM) technique is also employed as Analytic Hierarchy Process for groundwater potential zone mapping. The rating and waitages calculated using AHP reveals that the study area of Chhoti Koli Sindh may be divide into four groundwater potential zones viz. very high, high, moderate and poor potential zones and the very high potential zone cover 7.11% of the total area, high potential zones covers 67.80% and poor potential zone cover about 0.20% of the total area. The potential zone mapping of the area will be useful in future sustainable development of these resources.

Key word: Remote Sensing, GIS, Groundwater, Hydrogeomorphology, Groundwater potential Zones.

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Abstract No.J16

EVALUATING THE RELATIVE TECTONIC RESPONSE OF THE FLUVIAL SYSTEMS USING MULTI-CRITERIA ENTROPY METHOD: A CASE STUDY OF THE RANGIT BASIN, INDIAN HIMALAYAS

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The Rangit catchment is nestled within the active tectonic region of Eastern Himalayas in the states of Sikkim and West Bengal, India. The role of tectonics in this catchment is visibly indicated by the presence of fluvial systems under erosional regime and associated geomorphic features, alongside frequent seismic activities. The streams in the Rangit Basin were extracted from the ortho-corrected ALOS PALSAR DEM. To assess the tectonic response in the fluvial systems, several indices such as the asymmetric factor, hypsometric integral, elongation ratio, stream gradient index and valley width-height ratio have been calculated for all 16 sub-catchments along with the trunk-stream of the Rangit. Besides, morphometric indices such as relief ratio, relative relief, planform curvature, dissection index, ruggedness number and stream power index have been evaluated for these drainage units. These attributes have been collated and analysed by the multi-criteria Entropy Method. Finally, the Index of Active Tectonics (IAT) values for individual sub-catchments were mapped to determine the intra-basin variation of relative tectonic activity in the Rangit Basin. Before performing the analysis, the parameters were checked for redundancy by the Variance Inflation Factor-induced multicollinearity diagnostics.

Overall, the concerned region has extremely rugged topography and characterised by high relative relief, steep gradient and highly dissected segments. The Main Central Thrust (MCT), which is located between the Greater Himalayas and the Lesser Himalayas, roughly divides the catchment into right and left bank tributaries. The left bank tributaries of the Rangit display higher degree of tectonic control as compared to the right bank tributaries. The notable difference in tectonic activity across two flanks of the MCT suggests that the MCT is active during the Holocene.

Keywords: Himalayas, Tectonics, ALOS PALSAR DEM, Main Central Thrust, Entropy

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Abstract No.J17

TERRAIN ANALYSIS OF JATAYU GANGA WATERSHED KUMAUN HIMALAYA, UTTARAKHAND USING REMOTE SENSING AND GIS TECHNOQUES

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In the study, an attempt has been made to delineate the distinct geomorphic units in Kolar river sub basin, Nagpur distract, Maharashtra of Central India, using integrated remote sensing and Geographic Information System (GIS) techniques especially Shuttle Radar Topographic Mission (SRTM), Digital Elevation Model (DEM) of 90 m resolution by analyzing the elevation, slope and image characteristics. DEM of study area has been generated from SRTM elevation data of 90 m resolution using software ArcGIS ver. 10.1. The analysis of the remote sensing data included delineation of the various terrain features, such as geology, structures, geomorphological units and their characters. Geologically, study area consists of Deccan trap, Quartz muscovite schist and small patches of the sandstone and limestone. From

the DEM and satellite data the structure, processes and factor are clearly observed on the landforms, which give a complex appearance to slope pro- file. The steep escarpment slope which are followed by the talus slope or debris slope with convex profile make it clear that DEM and satellite data plays very important role in the landform delineation.

In the present study, an attempt has been made to demonstrate application of the latest geospatial technologies, i.e., Remote Sensing and Geographic Information Science (GIS) in terrain analysis by employing a watershed from the Kumaun Lesser Himalayan region, viz., the Jatayu Ganga as a natural laboratory having an area of 78.81 km^2. For terrain analysis of the watershed, Shuttle Radar Topographic Mission (SRTM) satellite data having 90m resolution was used. The terrain features, i.e., digital elevation model (DEM), absolute relief at an interval of 300m, relative relief map at an interval of 100m, slope map at an interval of 10^0 and aspect map for eight different directions were developed for the study area from the SRTM data using appropriate GIS techniques. The study reveals that the study area has a complex mountainous terrain having average absolute relief of 1715m (sd 374m) which varies in between minimum 620m to maximum 2344m from the mean sea level and the largest (42.79%/33.64km^2) area of the watershed falls under high absolute relief group (1801 to 2100m) while the smallest (3.34%/2.63 km^2) area falls under very high absolute relief group (>2100m). The average relative relief stands at 337m (sd 107m) which varies in between minimum 116.15 m to maximum 713.63m and the largest (31.04%/24.41km^2) area of the watershed falls under medium relative relief group (301m to 400m) while the smallest (6.31%/4.96 km^2) area falls under very high relief group (>500m).The average slope stands at 22.57^0 (sd 9.84^0) which varies in between minimum 7.8^0 to maximum 68.83^0 and the largest (38%/29.60km^2) area of the watershed falls under steep slope zone (20^0 -30^0) while the smallest (9%/6.73$km^{2)}$ area falls under gentle slope zone (<10^0). The aspect map reveals that the largest (20%/15.65km^2) area has south-eastern aspect while the smallest (8%/6.57km^2) area has western aspect. The hypsometric integral value of 63% indicates that the terrain of the study area is passing through the young stage of geomorphic development. This Remote Sensing and GIS base study has wide implication for planning civil engineering, agricultural and horticultural works for sustainable development.

KEY WORDS: Jatayu Ganga Watershed, Remote Sensing and GIS Application, Kumaun Himalaya, Terrain Analysis, DEM.

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Abstract No.J18

GEO-MORPHOMETRIC ANALYSIS OF THE TONS RIVER BASIN USING SRTM AND GIS TECHNIQUES: A GEOGRAPHICAL CASE STUDY

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The Tons River Basin is located in the Kaimur Range (Upper Vindhyan) at an elevation of 610 m, with a linear and areal length of approximately 264 km and 16,860 sqkm, respectively. The morphometric characteristics were used to carry out a quantitative approach to the Tons River basin development. SRTM, DEM and Landsat8 data is used to create the drainage network. The trellis pattern dominates the drainage basin upstream, while the dendritic pattern dominates the basin's midsection and downstream. The drainage density suggests that the basin has a permeable subsurface and a dense vegetation cover. Larger form factor values indicate a higher flow peak for a shorter drainage area. High roughness number and relief ratio results indicate that the Tons River Basin is prone to soil erosion. The current study demonstrates that the Tons River Basin is less prone to flooding, less prone to soil erosion, and an excellent supply of surface water. This research would aid in the utilisation of water resources and would be expanded for the long-term development of the Tons River basin area. Using GIS, these research attempted to build a link between morphometric drainage parameters and hydrologic properties of the basin. As a result, the current study's goal is to quantify morphometric characteristics (linear, areal, and relief aspects) as well as hydrologically define the Tons River Basin. This useful information might aid in the planning of soil and water resources, as well as basin management.

Keywords: Tons River Basin, Morphometric Analysis, Quantitative Approach, Drainage Pattern, GIS, Basin Management.

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Abstract No.J19

APPLICATION OF GEOMORPHIC INDICES: BURI RIVER, INDIA AND BANGLADESH

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The Indian state of Tripura and some parts of eastern Bangladesh is characterised by westerly convex anticlines and their intervening synclines belonging to the Chittagong–Tripura Fold Belt (CTFB). The west-flowing Buri (110 km in 2017) originates from the Baramura Range and falls into the Meghna River in Bangladesh plain. Topographical sheets, satellite images, and oral history suggest that the river is changing its sinuosity since 1932-33. The aim of this work is to study its planform change and the reason behind it.

The planform of the Buri is digitised for 1932-33 (Survey of India 'inch' maps), 1962 (Corona photos), 1975–88 (Landsat-1 MSS & Landsat-5 TM data), and 2017 (Resoucesat-2 L4fmx data). Based on curvature of the meander belts and change in the river course, the Buri is divided into 36 reaches – 33 of them alluvial. The sinuosity index of each reach is calculated for the four survey/imaging years to determine the degree of change. Shuttle Radar Topography Mission elevation data (3 arc second tiles) of the region is utilised to detect structural control on drainage using profile analysis, SLK Index and Basin Asymmetry Factor (AF). Finally, chi-map of the Buri and its surrounding basins is taken into consideration to observe the topographic stability of this region.

Results show that changes in channel length and sinuosity are mostly confined to the alluvial reaches of the Buri. Notably, near Jampai (Reach–9), the channel length decreased from 4.56 km to 4.18 km and the sinuosity decreased from 1.6 to 1.4. In the stretch (Reach–17) between Nabachandrabari and Gholaghati, the channel length decreased from 9.45 km to 5.64 km and the sinuosity decreased from 2.1 to 1.2. From Sipahijala to Kasba (Reach–20), length decreased from 4.46 km to 3.09 km with decrease in sinuosity from 2.0 to 1.3. The long profile of the Buri shows certain convexities along the profile, which connote presence of anticlines which are corroborated by morphotectonic indices. The variation in the SLK Index along the river profile detects the steepness in the river reaches. A basin AF of 31.9 specifies that it is a right-asymmetric basin. The chi map of this area shows that the water divide is migrating towards Buri basin at its headwater region.

The possible reason behind the anomalies might be the neotectonic activity in the CTFB. Another probable cause can be the increase in sediment load due to landuse change and/or landslides. Any statistically significant change in long-term rainfall records close to the basin is not present.

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Abstract No.J20

IDENTIFICATION OF LANDSLIDE SUSCEPTIBILITY ZONE (LSZ) OF MANDAKINI RIVER BASIN, UTTARAKHAND, INDIA

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Mandakini river emerges from Chorabari glacier & meets with Alakananda river at Rudraprayag. The river is lying over the highly tectonically active terrain of

Uttarakhand. Main frontal thrust (MFT) is lying near Guptkashi, Ukhimath under this basin. The objective of this paper is to identify the landslide susceptibility zone (LSZ) under Mandakini basin by using the frequency ratio (FR) model. Slope, plan curvature, aspect, elevation, distance from river, soil, lithology, LULC, distance from fault line, topographic wetness index raster layers are prepared in RS-GIS environment to feed the model of landslide susceptibility. SRTM DEM, LANDSAT OLI images of the studied basin are extracted from Earth Explorer. Data are also extracted from GSI data repository for the required analysis. Kedarnath, Rambara, Sonprayag, Gaundhar, Badhani taal are located under very high landslide-susceptible zone. According to frequency ratio (FR) model, lithology (FR 10.6) and elevation (FR 5.9) mostly give impact on the landslide occurrences in Mandakini basin. 45% area under Mandakini basin fall under very highly vulnerable zone as per AUC and needs immediate action plan.

Keywords: LSZ, FR model, AUC

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Abstract No.J21

TERRAIN ANALYSIS OF MATHUGAD WATERSHED IN GARHWAL HIMALAYA, UTTARAKHAND

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In the present study, an attempt has been made to demonstrate application of the latest geospatial technologies, i.e., Remote Sensing and Geographic Information Science (GIS) in terrain analysis by employing a watershed from the Garhwal Himalayan region, viz., the Mathugad as a natural laboratory having an area of 77.12km^2. For terrain analysis of the watershed, Shuttle Radar Topographic Mission (SRTM) satellite data having 90m resolution was used. The terrain features, i.e., digital elevation model (DEM), absolute relief at an interval of 300m, relative relief map at an interval of 300m, slope map at an interval of 10^0 and aspect map for eight different directions were developed for the study area from the SRTM data using appropriate GIS techniques. The study reveals that the study area has a complex mountainous terrain having average absolute relief of 2258m which varies in between minimum 1506m to maximum 3043m from the mean sea level and the largest (40.31%/31.1km^2) area of the watershed falls under high absolute relief group (1800 to 2400m) while the smallest (7.36%/ 5.68km^2) area falls under very high absolute relief group (>3000m). The average relative relief stands at 2161m which varies in between minimum 1456m to maximum 2997m and the largest (42%/24.41km^2) area of the watershed falls under medium relative relief group (1766m to 2161m) while the smallest (8.67%/ 7.69km^2) area falls under low relief group (2608m to 2997m).The average slope stands at 30^0 which varies in between minimum 10^0 to maximum 50^0 and the largest (27.27%/21km^2) area of the watershed falls under moderate slope zone (10^0 -20^0) while the smallest (2.74%/2.12km^2) area falls under very steep slope zone (>50^0). The aspect map reveals that the largest (22.23%/17.15km^2) area has

South Eastern aspect while the smallest (6.39%/4.93km^2) area has North Western aspect. The hypsometric integral value of 65.8 indicates that the terrain of the study area is passing through the young stage of geomorphic development. This Remote Sensing and GIS base study has wide implication for planning civil engineering, agricultural and horticultural works for sustainable development.

Key Words: Mathugad Watershed, Remote Sensing and GIS Application, Kumaun Himalaya,Terrain Analysis,

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Abstract No.J22

THE IMPACT OF COVID-19 ON GEO-TOURISM IN CHITRAKOOT DURING THE FIRST EIGHTEEN MONTHS OF THE PANDEMIC

Dr. Pranay Kant Biswas, Dr. Uttara Singh

Tourism has been considered as a very important vehicle for socio-economic development of a state or country. Geo-tourism is defined as tourism that sustains or enhances the distinctive geographical character of a place - its environment, heritage, aesthetics, culture, and the well-being of its residents. Geo-tourism is otherwise referred to as the knowledge based tourism. It seeks to provide tourists with relevant information on the formation of a place's geology and geomorphology.

Chitrakoot is one of the major tourists' destinations of India not only for Religious Tourism (Hinduism) since ancient era but also having enough of other tourism potential such as wild life tourism, adventure tourism and natural tourism. Chitrakoot, mainly known as the Pilgrimage destination has a variety of beautiful and cheerful scenic landscape best suited for tourism activities.

Chitrakoot is one of the districts that have enormous and diverse tourist attractions. It has beautiful land features. Strict restrictions on incoming travellers in an effort to control the spread of the Covid-19 pandemic badly hit India's tourism industry for nearly 18 months. International tourists visiting India brought in a sizeable $30 billion in foreign exchange in 2019, according to government data. The earnings fell by over 76%, to around $7 billion in 2020, following the pandemic-induced lockdown since March that year. Industry experts, online travel agencies, travel agents and other market participants all expect the government's decision to help boost revenues of the tourism industry ahead of the upcoming winter season and New Year's Day.

Chitrkoot district located in Uttar Pradesh was a developed district from the point of view of Geo-tourism before COVID-19. In the present research paper, the damage done to the tourism due to the pandemic has been analyzed. At the end of the research paper , suggestions have also been given to increase Geo-tourism based on the findings.

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Abstract No.K01

LANDSLIDES AND ITS MANAGEMENT IN INDIA

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Landslide is terrestrial hazard, natural hazard and landslide promoted in the Himalayan region by human activities. The cultural landscape covered maximum natural landscape from Jammu Kashmir, Himachal Pradesh, Uttrakhand, Nepal, Bhutan, Sikkim, Arunachal Pradesh, Mizoram, Manipur . These states have covered by the newly constructed Himalayas region, near about 5.5 lakh km2 area covered under the the tertiary Himalaya, due to slope, precipitation, deforestation, dam ,reservoir ,tourism ,building, the tunnel, railway track, road, airport, multi storage buildings are main factors for the landslides in the Northern hilly region of India. In the southern part of India landsliding is not recorded in the last centuries but in the Northern India affected every year landsliding hazard. Landsliding has been divided into many types such as rockfall, debris, Rock slump, couples, many incident happened in the last two decades such as Malpa landslide, Joshi Math landsliding , Kedar Ghati landsliding This is responsible in destroying biodiversity, soil , animals, Agriculture area, buildings ,road ,railway tracks, tourism and other human activities. The loss of landslide disaster can be controlled by human policy and activities. There are two types activities first pre- disaster activities and second post disaster activities. Many human factors are causes of landsliding those activities can be controlled by the good management policy and use of high level technology, after landsliding post disasters management such as helicopter, new constructions, settlement, population, rehabilitation ,medical help ,Colony development, Migration of population, small scale industries, social awareness ,corporation of NGO, regional consciousness, afforestation, social forestry, check dam, well mechanized drainage system, remark the landslide area, marking vertical slope area , marking earthquake prone zone etc.

Key word - Landslide, rockfall, debris, Rock slump, rehabilitation

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Abstract No.K02

STRESS RELATED PERMEABILITY VARIATION AS THE MAJOR CAUSE OF SLOPE FAILURE

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Slope failure is very common problem in mines and cut slopes. A number of slope failures take place in mines with increasing depth of mining. Most open cast mines today go very deep and the chances to encounter groundwater becomes very high. Deeper mining also changes stress conditions and any unfavourable condition can initiate slope failure. Porosity and permeability are two very important material

parameters which gets affected with the depth of mining. Both the parameters are significantly affected by stress variation. In rock mass, which contains discontinuities in many forms, both porosity and permeability can become very complex to understand and therefore their role in destabilising the slopes cannot be understood clearly. Instability issues like planar, wedge and toppling failure are generally found in discontinuous rock mass but addition of pore pressure or permeability changes with stress can have very adverse effect of design life of slopes. Stress related permeability changes have been studied by various researcher, both experimentally and numerically but very few studies have correlated this knowledge to stress related failures in deep mining conditions. An attempt has been made in this study to assess stress related permeability changes and examine their role in destabilising the slopes. The present study has been performed by collected previously published works and the results obtained from numerical modelling of an iron ore mine.

Keywords: Deep mining, slope failure, permeability, rock mass

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Abstract No.K03

NAVAL DIPLOMACY CONCERNING DISASTER MANAGEMENT IN THE INDO-PACIFIC: MAJOR INITIATIVES BY UNITED STATES OF AMERICA AND INDIA

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US-Indo naval cooperation concerning HADR relief operations developed because of the natural disasters occurred in the previous years, especially that was the Tsunami, hits in Indian Ocean in December 2004. That was the standout episode for the US-Indo Naval Diplomacy on disaster relief in the Indian Ocean. United States Navy (USN) has established HADR cooperation as an essential element of their concerns about the security of the Indo-Pacific region. To examine the cooperation and coordination between these two democracies, the paper is categorized between three sections. United States of America has a long tradition to provide security to the weaker states and it is known as a worldwide donor of humanitarian aid, while India has recently emerged as a practitioner in disaster relief operations. Disaster relief efforts of both countries will be highlighted in the first section of the paper, it will emphasize that, how the Indo-pacific region suffered most as a disaster-prone region and how US and India both are emerging as a leader to provide humanitarian assistance and organize disaster relief operations. Second section of this paper examines the naval diplomacy of both states concerning disaster relief operations. The impact of both countries' diplomacy in this region is an important factor that how it is a critical aspect particularly for China. Furthermore, diplomatic relations between both the countries will highlight the strategies and concerns and those things should be followed by other countries, established in the Indo-pacific region. Last section of

the paper will evaluate the episode of US- Indo naval cooperation and also give some inferences about that, how it is beneficial for their bilateral relations and also for the Indo-Pacific region.

Keywords: Disaster Relief, US-Indo Naval Diplomacy, Indo-Pacific, Humanitarian Assistance

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Abstract No.K04

IMPACT OF NATURAL DISASTERS ON SOCIO-ECONOMIC DEVELOPMENT OF JAMMU AND KASHMIR

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This article explores interaction between the natural disasters and socio-economic development. This study depicts the impact of natural disasters on the dwellers of Jammu and Kashmir. It also examines the resilience mechanism followed by people and measures implemented by the government in response to these natural disasters. The broad objective of this paper is to examine the various contributors of natural disasters which are related to socio-economic development of a region. To know about the role of dynamic natural disasters on socio-economic development both offline and online available literature was examined. The analysis of available literature depicts that there are links between disasters and resource management. The cross examine geographical literature suggests that Jammu and Kashmir is a disaster prone area which is affected by multiple natural disasters like earthquakes, avalanches, floods, climate change and landslides. These destructive disasters generally affect the different spheres of life and particularly the socio-economic development of a region. In order to diminish the disaster risk, the disaster risk reduction and management system, infrastructure and early warning system need to be strengthened. The need of the time is to develop the technology in such a manner to understand and cope the climate. The government should form an agenda that will help to reduce the frequency of natural disasters by implementing development policies and strategies to reduce the people's vulnerability. Government should design a sustainable development policy to meet the urgent needs as well as minimize the long term negative consequences of disasters. The analysis conclude that natural disasters have diverse socio-economic impacts depending on nature, intensity and type of disaster.

Key Words: Socio-Economic development, Natural disasters, Jammu and Kashmir, Sustainable development, Property loss

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Abstract No.K05

IMPACT OF CLIMATE CHANGE ON RICE PRODUCTION IN AGRO-CLIMATIC ZONES OF BIHAR

Dr. Sadaf[5]

One of the important global issues in today's world is that of climate change. It is one of the greatest environmental, social and economic threats facing the world. Agriculture is the most vulnerable sector to climate changes due to its high dependence on rainfall and temperature. Due to the climate change, production and yield of agricultural crops are decreasing rapidly. Nowadays, agriculture is badly affecting by intensity of droughts, floods, tropical cyclones and other increasing climatic hazards. These problems lead to accelerate the problem of food security and poverty. Agriculture in Bihar contributes about 19 percent to state Gross Domestic Product and provides employment to about 70% of working force in rural areas. For India, particularly in Bihar, warmer temperature and increased variability in rainfall shows huge impact on agricultural production. This paper aimed to examine the impact of rainfall variability on rice production in agro-climatic zones of Bihar. The study is based on secondary sources of data obtained from the Directorate of Economics & Statistics, Govt of Bihar. For the study, district-wise rainfall and rice production data from 2001 to 2010 covering Bihar State obtained from the Directorate of Economics & Statistics, Government of Bihar. A Standardized Precipitation Index (SPI) has been developed for classifying years, seasons, districts and zones in categories like, normal, drought and excessive rains. The study revealed that there is a significant relationship between rainfall variability and rice production in all agro-climatic zones.

Keywords: Climate Change, Standardized Precipitation Index (SPI), Rainfall Variability, Agricultural Production, Agro Climatic Zones, Food Security, Poverty.

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Abstract No.K06

A SAGA OF LOST RIVERS: RIVER DISCONTINUITIES AND DEGENERATION FROM INDIAN SUNDARBAN

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Indian Sundarban is characterized by an intricate network of tidal creeks and rivers over a deltaic plain. Indian Sundarban has been facing serious environmental challenges one of which is river decay. Adi Ganga, a southward diversion of river

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Hugli and was the actual route of Ganga to the sea got abandoned around 1740. Similarly, river Matla has got much decayed in the last 50 years, owing to clogging. River Bidyadhari, also got decayed after 1833. Several creeks have become defunct even within the island units of Sundarban – like, Edward's creek of Namkhana, Chhatua khal, near Kankandighi of Mathurapur II block, Sheyalpheli khal of South Basanti island unit, Rangabelia khal near Pakhiralaya of Gosaba Island Unit. Some creeks have become defunct due to anthropogenic stress the best example of this is Hukaharaniya of Kultali block. Chhatua river near Kankandighi of Mathurapur II was 12.344 km in length in the year 1968,which decreased to 9.702 km in 2021 . The most remarkable change marking Mathurapur II Island Unit II is the decreasing distance between Raidighi river and Chhatua Khal near Kankandighi, which has decreased from 142.827 m in 1968 to 33.762 m in 2021.This paper takes into account the decayed rivers of some of the island units by overlay analysis using SOI toposheets and recent satellite images. These decayed rivers need to be replenished so that the drainage system of the islands of Indian Sundarban are revived. Waterlogging during episodes of cyclones, embankment breaching and inundation can then be prevented to a larger extent.

Keywords: Indian Sundarban, Disasters, River decay, Morphological equilibrium

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Abstract No.K07

ISSUES OF TACKLING THE DISASTER RISK REDUCTION (DRR) AND CLIMATE CHANGE ADAPTATION (CCA) IN THE PACIFIC ISLAND COUNTRIES (PICS)

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The social costs of catastrophes continue to rise across the globe, and Pacific Island nations are among the most susceptible. This is mostly due to a mix of high risk exposure and a variety of social, economic, physical, and political weaknesses. This research adds to the expanding corpus of studies aimed at understanding the causative variables of DRR and CCA in PICs. Numerous solutions dealing with community-based DRR and CCA overlap have been recognized by academics and development practitioners. As a result, there is a significant drive to merge the two domains in order to improve assistance efficacy and eliminate community misunderstanding. The DRR and CCA programs are shown to demonstrate how these concerns are addressed in the Pacific. Many techniques are used to minimize susceptibility and strengthen local people's resilience to the climate change impact and catastrophes. In this research, an attempt has been made to highlight how DRR and CCA may be merged for greater assistance efficiency, as well as ways in which these two sometimes intersecting sectors might be better integrated in existing and future initiatives. Projects that deal with susceptibility comprehensively and focus on the whole requirements and capacities to demonstrate to help in increasing community pliability.

This study employs a variety of data gathering strategies, including a comprehensive literature analysis and a survey of web-based networks linked to DRR and CCA internationally, with a focus on Pacific island nations. Community initiatives seem to incorporate a variety of expertise and abilities for the sake of the betterment of the community if a multi-stakeholder and multi-sector strategy is deliberately developed.

Keywords: Climate change, Disaster, Pacific Island Countries, Risk Reduction

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Abstract No.K08

NATURAL RESOURCE MANAGEMENT THROUGH INTEGRATED WATERSHED MANAGEMENT FOR SUSTAINABLE LIVELIHOOD IN KUMAON HIMALAYA, UTTARAKHAND

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The Kumaon Himalaya present an incomprehensible mixed risk prone ecosystem largely due to land degradation, hydrological discrepancies, low productivity, soil erosion and a pauperized subsistence economy. There is a need for sustainable strategy for redressal of the pressing natural and socio-economic problems. The watershed has been recognised as a unit for integrated resource management, where management is not merely limited to land, water and biomass; but also concerned with integration for self-reliance and holistic development of the rural population. In an operational context, this would mean integrating different uses and management of resources through an inter-disciplinary approach, and towards alleviation of poverty.

The present paper assesses the current situation in the Nana Kosi micro watershed and also suggests strategies for the sustainable development & livelihood.

Key words: Hydrological Discrepancies, Land Degradation, Biomass, Soil Erosion, Sustainable Strategy, Holistic Development, livelihood.

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Abstract No.K09

AN IMPACT OF FLOOD ON SOCIO-ECONOMIC STATUS – A CASE STUDY OF SAMPLE VILLAGES IN JOSHIMATH BLOCK, UTTARAKHAND

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Natural hazards have caused a great deal of trouble for mankind throughout history, and their effect on national economies has also been noted. Landslides, cloudbursts, earthquakes, and floods are all common natural hazards in the Himalayan region. Floods have proven to be the most destructive of them all. Floods have had a major effect on the socio-economic lives of those who live near river basins or low-lying

areas. The study aims to see how floods affect people's socio-economic lives in sampled villages in Uttarakhand's Chamoli district. The study is based on categorical (qualitative) and computable (quantitative) data which is collected from 3 sampled villages (Raini, Tapovan, Chormi). The qualitative data is collected through in-depth interviews with local people during the post-flood period, and the quantitative data is collected through random sampling of the population in selected villages. Following data collection, MS Excel was used to analyze the data, and Arc-GIS was used to create the study map. The study's findings show that the recent flash flood in Chamoli district harmed the villages' social and economic conditions.42% of people say floods are quite frequent in the sampled villages which in turn impacts their employment.54% of people in the sampled village suffered from unemployment. It is also evident from the results that floods have caused infrastructure damage (84%) which in turn had impacted the children's education as well. To deal with such issues we should promote group engagement in disaster coping strategies by increasing individual participation through seminars about coping methods and also provision of emergency food, water, drugs, and shelter for those affected.

Keywords: Natural Hazardous, Socio-economic, Flood, Chamoli, Arc-GIS

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Abstract No.K10

DETECTING FLOOD PRONE AREAS IN LOWER KELEGHAI RIVER BASIN, WEST BENGAL: A GIS BASED ANALYSIS

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Flood is one of the most devastating quasi-natural disasters in India and around the world, which causes severe damages to environment and man-made structures every year. As landuse changes continues at an unprecedented rate, the damage caused by natural and quasi-natural disaster keeps increasing. To identify maximum extent of flood prone areas of any basin area there are many methods and strategies to adopt. This study incorporates GIS based weighted multi-criteria analysis to determine flood prone areas in lower reach of the Keleghai River basin. To meet the specific objective nine flood contributing factors such as elevation, slope, rainfall, geomorphology, drainage density, distance from river, LULC, stream power index (SPI) and topographic wetness index (TWI) have been taken into consideration to integrate in ArcGIS environ by using weighted overlay method and finally flood hazard map have been generated. The result depicts the flood hazard zones viz. severe, high, moderate, low and very low, which can be helpful for better planning to prevent flood damages and management of flood in the study area.

Keywords: Flood hazard, weighted overlay, GIS, Stream Power Index, Topographic Wetness Index, management of flood

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Abstract No.K11

AN ANALYSIS OF THE DISASTER PREPAREDNESS AND CAPACITY BUILDING OF ODISHA FOR THE TROPICAL CYCLONES OCCURRED DURING 1999-2021

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The coastal Indian state of Odisha is immensely vulnerable to any cyclonic activity in the Bay of Bengal. This, along with its 41 million population according to the Census 2011, makes it a region where hazards can have highly disastrous consequences. The Super Cyclone of October 1999 which killed over 10,000 people of the state and rendered millions homeless, is remembered as an apocalyptic failure of the administration. However, since then, the disaster preparedness and response of the state government towards cyclones has shown commendable improvement reflected in the lower number of deaths due to cyclone, which has come down from 10,000 in 1999 to double-digits in the recent years. The focus of this improvement was based on capacity building leading to the successful establishment of community-level warning, building of multi-purpose cyclone shelters under National Cyclone Risk Mitigation Project and construction of an Early Warning Dissemination System with last-mile connectivity. A comprehensive study and understanding of these efforts could help prevent large scale deaths in any disaster. This paper analyses the disaster preparedness plans and response of the government of Odisha to the major tropical cyclones developed between 1999-2021 such as the super cyclone of 1999, Phailin, Hudud, Fani, etc. and closely examines the capacity building institutions that help in reducing the state's vulnerability to cyclones by taking into consideration, variables such as evacuation measures, availability of food and drinking water, etc.

Keywords: Odisha, Cyclone, Disaster preparedness.

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Abstract No.K12

GEOSPATIAL ANALYSIS OF THE CONFORMED AND DEATH CASES DURING FIRST AND SECOND WAVE OF COVID-19EPIDEMICS IN SOUTHERN STATES OF INDIA

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The general objective of this study was to compare first and second wave of the covid - 19 – epidemic at district level in Karnataka, Tamil Nadu and Karnataka, the southern states of India. To meet the general objective, five specific objectives were set as first to analyse the overall trend of confirmed as well as death cases using space time cube, second to find the Emerging Hotspots of confirmed as well as death cases during first

and second wave, third to model the confirmed cases of second wave in relation with the confirmed cases of first wave, fourth to model the death cases of second wave in relation with the confirmed cases of second wave and finally to find the spatial pattern of residuals obtained from spatial relation modelling. COVID19-India API dataset was used for conformed and deceased Cases. To visualise & analyse the space time pattern of COVID -19 cases, space time cube was created of spatiotemporal Covid data. Thereafter statistically significant emerging hot spots were identified using space time cube as input. For space time pattern analysis the time period of the first wave was determined as 22nd April 2020to 31stDecember 2020 and of the second wave as 15th April 2021 to 15thJune 2021.To model spatially varying relationships covid-19 cases during second were given as dependent variable and covid-19 cases during first wave were set as Explanatory Variables. The results obtained from space time cube for the first wave the overall increasing trend direction was obtained for conformed cases (trend statistics = 4.4572, Trend p-value = 0.000) and for deceased cases (trend statistics = 4.3201, Trend pvalue = 0.000). In case of second wave the overall increasing trend direction was found from space time cube for conformed cases (trend statistics = 6.3112, Trend p-value = 0.000) and for deceased cases (trend statistics = 6.2508, Trend p-value = 0.000).Emerging Hot Spot Analysis shows in case of first wave 19 consecutive and 02 new hot spots of confirmed cases and 12 consecutive and 01 new hot spot of deaths cases. Moreover in case of second wave 29 consecutive and 03 new hot spots were found of confirmed cases and 12 consecutive and 04 new hot spots were found of deaths cases. The results of the Ordinary Least Squares (OLS) linear regression show the strong positive relationship in between both the variables in confirmed as well as death cases. In case of confirmed cases there were 15 districts below - 0.5 Std. Dev (standard deviation) and 16 districts above + 0.5 Std. Deviation. In case of death cases there were 06 districts below - 0.5 Std. Dev (standard deviation) and 07 districts above + 0.5 Std. Deviation. The Spatial Pattern of the residuals of conformed and death cases are statistically significant highly clustered. Results indicate the districts having high urban agglomeration in Kerala, Karnataka and parts of the Tamil Nadu got successive high no. of corona – 19 confirmed cases and deceased cases.

Keywords: Covid-19, Spatial Autocorrelation, Ordinary Least Squares Regression, Morans I and Geostatistical Analysis.

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Abstract No.K13

ASSESSMENT OF EARTHQUAKE-TRIGGERED LANDSLIDES ALONG NH 1D IN J&K, INDIA: USING MULTIVARIATE APPROACHES

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The aim of present study is to investigate the impact caused by earthquake-induced landslides along NH 1D from Sonamarg to Kargil, J&K, India. We present a newly compiled earthquake dataset of landslide-triggering earthquakes from 1992-2016 to understand the relationship between these two geological processes in this region. The comprehensive dataset includes observations of both earthquake-related and landslide-related damages. We tried to estimate the relationship between earthquakes and landslide using regression analysis and a quantitative model of landslide damages of 2005 Kashmir earthquake with landslide related damage. Our analysis shows that there is a gradual decrease in landslide occurrences with respect to different earthquake events. The regression analysis shows that only small percentages of landslides (7.5%) were triggered by the earthquakes. We then demonstrate that the model can be used to provide order of magnitude estimates of the impact of future earthquakes by examining the distribution of landslide probabilities due to hypothetical scenario earthquakes. Our analysis also highlights that besides earthquakes, other processes like hydro-meteorological, geotechnical characteristics, in-situ geological properties of the region substantially control landslide occurrences in this region.

Keywords: Earthquakes, Landslides, Triggered, Geotechnical, NH 1D, Himalaya, Regression**.**

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Abstract No.K14

GANGA-BHAGIRATHI RIVER BANK EROSION AND ITS IMPACT ON MARITAL STATUS OF THE EROSION VICTIMS: A CASE STUDY

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The present study aims to identify the impact of river bank erosion on the marriage of the erosion victims. To satisfy the aim of the study, 19 erosion affected study units have selected along the banks of the Ganga-Bhagirathi river in the Jangipur sub-division of Murshidabad district, West Bengal. Pearson's correlation analysis and multiple linear regression analysis have performed using SPSS software. The result of the study shows that population displacement due to river bank erosion has adverse impact on the marriage of the erosion victims. People of safe zone don't want to marry with the people living along the river banks. Marriages generally happen within the local area. The correlation between percentage of marriage within the local area and frequency of population displacement due to river bank erosion stands positive (r= 0.717) and significant. The result of multiple linear regression analysis shows that river bank erosion has an adverse impact on the marriage of the people living along the river banks.

Keywords: River bank erosion, erosion victims, Population displacement, Marriage.

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Abstract No.K15

KOSI FLOOD HAZARD AND DISASTER MANAGEMENT

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The Kosi River in north Bihar plains is a major tributary to the Ganga river system and has long been considered as a problematic river due to recurrent and extensive flooding and frequent changes in its course. The river has changed its course in a westerly direction and it has laterally moved nearly 150 kilometers during the last two centuries. Despite a long history of flood control management in the basin, the Kosi river continues to bring a lot of misery through extensive flooding and often known as "Sorrow of Bihar". This paper revisits the Kosi flood problem and presents an in-depth analysis of channel dynamics, trend and pattern of flood, its impact and also re-examines the flood control measures in the basin. The paper is based on secondary data collected from different agencies, micro level primary survey and field observation in flood prone area. The paper reveals that the flood-prone areas and the flood damages in the basin are on the increase. The paper also critically evaluates poor disaster management facilities and unscientific flood control measures in the basin.

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Abstract No.K16

DISASTER MANAGEMENT & MITIGATION FOR SUSTAINABLE DEVELOMENT

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The India Sub-Continent due to unique geographical, locational, cultural, economical, religious, political & humanistic & geological features has the distinction of being on of the most vulnerable areas to natural hazards causing colossal losses of life & property disasters like floods, Cyclones volcanos, droughts, earthquake, landslides, storms, air/rail accidents, hurricanes, tornadoes, typhoons tsunamial nino, food shelter for war refugees & victims of terrorists attacks etc visited by the country.

IDNDR (International Decade For Natural Disaster Reduction)

The united nations declared the last decade (1990-99) as the International decade disaster Reduction (IDNDR). The main efforts in this decade was to reduce, through concerted international action loss of the damage to property & social & economic distruption caused by natural disasters in developing countries Government of India (National level is observing the current decade as the natural decade for disaster reduction (NDDR) after the completion of INDDR ministry of Agriculture govt. of India. Nodal ministry of natural disaster decided to observe 29 Oct. as NDDR every

year to commemorate the day a super cyclone had hit orrisa in 1999. The basic objective of NDDR is create public awareness & educate the people about the impact of natural disaster & Importance of disaster preparedness & nmtigation.

With an objective to mitigate disaster & make Indian society particulary the vulnerable group resilient to adverse impacts of disasters, various initiatives have been taken at national, state & others level (Block, Village, Region, Zone).

HIGH POWERS COMMITTEE ON DISASTER MANAGEMENT PLANS.

Last decade was setting up one of the most significant events high powered committee at the initiative of the Prime Minister to look into the issue of disaster management planning at the National, state & & Districts lavel five sub group wear consitute under the HPC to look into the various aspects of disaster management planning for as water & climate related hazards, geological hazards, chemical industrial/nuclear disaster, accident related disaster biological disaster.

NATIONAL COMMITTEE FOR DISASTER MANAGEMENT :

Under the chairman ship govt. of India also established a national committee for disaster management. The committee has the representative management. The committee has the representative of National centre for disaster management & state Political parties. This committee supposed to suggest the institutional & legislative measures for strengthening the existing disaster management structure of the country.

NATURAL DISASTER REDUCTION & MANAGEMENT :

SCOPE (scientific committee on problem of the environment). ICSU setup a committee in meterological organization) set of many institutions for reduction of disaster as-UNEP (United nations environmental program) MAB (man & biosphare setup by UNESCO) WCP (world climate programme) etc.

IGBP-ICSU setup a council Oct. 1988. IGBPOC (International geosphare-biosphare programme council) Sattelite, Ramote sensing technologies environment monitering, G.I.S. etc help to IGBP

HDGC (Human Dimention of global change for environmental problem & natural hazards), UNU (United Nations Universities), ISSC (International Social Science Council), IFIAS (International Federation of Institutes for Advanced Studies), UNDRO (United nations disaster relief co-ordinator), ICSU (International Council & Scientific Unions etc) institute/organization/council/committee/NGOs/National/ Central/State/Districts/Block level help by economic status.

International bodies, Environmental NGOs pollution control equipment manufactuers. International funding bodies GEF, National & International NGOs & funding organization working in different countries including, India, Central/state minsters & departments of agriculture, Disaster preparedeness, Relief & rehabilitation universities & institutions engaged in rehabilitation, training, research & consultancy in the areas of emergency management & disaster education for earthquakes. landslides, avalanches, floods famines, fires, cyclones, storms, air/rail accidents, hurricanes. tornadoe, tsunamis/El-Nino, La-Nino, food & shelter for war refugees & victims of terronts attacts, National & International funding agencies, United nations

specialized agencies, recycling, rural & urban planning, sustainability, poverty alievation, employment generation, quality assurance & certification bodies more then 15000 ISO certifide companies in India willing to adhere to latest standards. Under Distance Education in M.Sc. are started in specilized branch as ecology & environment, disaster mitigation, sustainable development, land use planning, perception of environment & adjustment to national hazards & disasters & total quality management.

UNDP PROJECTION STRENTHENING DISASTER MANAGEMENT CAPOCITY.

Disaster risk management programme (DRMP) set up by Govt. of India & the UNDP to accelerate capacity building in desaster reduction and recovery activities at the national level & in some of the most vulnerable regions in the country through community based & gender senstive approaches. It is designed to as sit the states in the country which are must prone to natural disasters such as Assam, Meghalaya, Sikkim, U.P. Uttaranchal, Delhi, Maharastra, West Bengal, Tamilnadu, Odisa, Gujrat. This programme continued in 169 districts in 17 regions. Urban earthquake vulnerability first phase 6 Distts. Select in U.P. as Agra, Meerut, Bareily, Lucknow, Kanpur & Varansi.

HAZARED MAPPING & VULNERABILITY ASSESSMENT OF BUILDINGS.

Ministry of urban development a vulnerability atlas of India had been prepared during the period 1994-97 in which the earthquake, cyclone and flood hazard etc Maps for 25 states & Union territory of India had been prepared at a scale of 1:2500000, In this maps the areas of the dsitricts prone to the various intensities of the hazard may be clearly visible.

STRENGTHENING OF INFORMATION TECHNOLOGIES.

Remote sensing, GIS, GPS, Computer modeling & expert system & electronic information management system (collection storage & retrieval dissemination of information) in managing situation caused by natural disasters, India laid great emphasis on using the various state of the art technologies Active and ongoing efforts are being made for mordernizing the disaster management control rooms. More effective & community friendly database are being compiled to keep track of past events & benifit from the experiences of their management.

MONITORING & IMPACT ASSESSMENT OF NATURAL HAZARDS (DROUGHT, FLOOD, CYCLONE USING SPACE TECHNOLOGY)

India uses space technology for near real time impact assessment of drought. flood & cyclone as a national programme significant technological programmes have been launched by the department of space using technology national agricultural drought assessment and monitoring & flood incidence monitoring & inundation area assessment.

DISASTER WARNING SYSTEM (DWS) :

Department of telecommunication (DOT) systems such as teligrams, telex & telephones are often among the first causalities dunng cyclone situation resulting indelayed warning massages DWS of rapid &direct dissemination of cyclone warning

is operate though INSAT DWS is working along thecoastal areas where 250 DWS sets have been installed in small administrative units like BDO & Police stations District lavel headquaters & states etc.

HUMAN RESOURCE DEVELOMENT (HRD) :

HRD is an important aspect capacity building A central sector scheme in1993 covering aspects of disaster management as including human resource development research consultant services & documentation of disasters NCDM (National centre for disaster for management) was estabished at the Indian Institute of public administration (IIPA) at New Delh & 18 states of India setup faculties in disaster management. The nodel center is networking with various Central/States Govt ministies, training institutions, autonomous organization & universities in organizing training programmes, workshops, seminars & research activities etc related to disaster mitigation & management. The Nodal center has also developed a good network with International institutes/organization working in the area of disaster management such as Asian disaster preparednes center Bangkok, Asian disaster reduction centre Kobe, Centre for excellence in disaster management. Hawai, Oxford Brooks, University, Oxford etc.

PROGRAMME ON ENHANCING EMERGENCY RESPONSE (PEER)

Capacity building programmes are required on continuous basis conversing as many organizations (Armed forces, para military forces) civil defence & concerned central states Govt officials. NGOs & representatives of public besides tasks forces/units) responsible for search & rescue operation are set up for these purpose A regional project on PEER for capacity building has been launched by the Asia disaster Preparedness Centre Bangkok in countries like India, Nepal Indonesia & Philippines aproposal is also under consideration in Govt. of India for raising a specialized Disaster Response Unit (SDRU)

FUTURE VISION IN DISASTER MANAGEMENT : It is a multi sectoral multidisplinary subject which involes many role players (Govt/NGOs/Community) resolves should work together for the goal of a disaster should work together for the goal a disaster free India. There should be a proper planning at a various levels from National level to community level, which can include disaster preparedness & mitigation along with disaster response. By these approaches we can reduce the imapct of various disasters & can have safer communities & India stops mitigation the situation inanticipation of floods may include advance preparedness, construction of shelters, setting up of a advanced warning systems stocking up of relief materials including food & medicines & setting up of a control rooms for co-ordination of all rescue & relief efforts. The Nodal agency for disaster management in the country, the ministry of Home Affairs in collaboration with the United State Department for Agriculture Forest Services (UNDAFS) has developed a programme for institutionalizing the incident command system (IDRN (India Disaster Resource Network) has setup which is envisaged as an online resource inventory for disaster management, disaster mitigation the seventry & natural extent of a natural disaster remains outside, mortal hands, However with proper management & foresight the loss of life & property in such incident can be prevented.

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Abstract No.K17

BIG DATA AND GEODRIVERS: A STEP TOWARDS SUSTAINABILITY SCIENCE

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Geography is the way of looking at the world cumulatively on its physical systems and its environmental-societal dynamics through the lenses of time, place, space and scale. Its domain consists of vigorous synthesis of human actions, his surrounding physical environment, socio-political, economic systems dynamics acts as its element. The great achievements of big data analytics in geography towards achieving sustainable development have encouraged the anticipation from big data to solve big issues efficiently through relevant technological revolutions. This paper aims to present a viewpoint of big data in global environmental change and disasters studies over the decades by exploring and summarising the current status of big data applications. It can be very valuable in guiding future earth and sustainability science research by employing space-time specific methodologies. The results shows that geo-drivers have been playing pivotal role in sustainability science research with spatio-temporal perspective due to its interdisciplinarity, transdisciplinarity and multidisciplinarity approach.

Keywords: Geographical driver, Big Data, Global Environmental change, Disasters, Geospatial analysis, Sustainability science, Sustainable development goals.

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Abstract No.K18

AN ANALYSIS OF GLOBAL INTERNAL DISPLACEMENT THROUGH THE LENS OF CLIMATE CHANGE

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The movement of people from one place to another is a very common phenomenon in today's world. In the past few months, especially since the onset of the COVID 19 pandemic, we have heard news related to the migration of people, and it has attracted

world wide attention. However, the movement of the population occupies a significant place and requires urgent steps from policy makers, if it is forced, especially due to climate change.

Internally displaced persons are "Persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border" (Guiding Principles on Internal Displacement, 1998). Internal displacement is usually treated as a distinctive form of movement of persons due to its internal and forced character. A recent Report on Internal Displacement (GRID) 2021 reveals that the total number of people who are internally displaced has reached a record 55 million by the end of 2020. During a year marked by intense storms and persistent conflict, 40.5 million new displacements were triggered across the world by disasters and violence, the highest annual figure recorded in a decade. Disasters triggered over three times more displacements than conflict and violence combined. In this backdrop, it is very pertinent to analyse the world wide figures of internally displaced people and to study the regions that are facing severe issues due to climate change. The study is based on secondary sources of data, collected from UNHCR, Global Report on Internal Displacement (2021), IOM, World Migration Report (2020) and various other government published reports.

Key Words: Internal Displacement, Forced Migration, Climate Change, Conflict, Violence

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Abstract No.K19

ASSESSMENT OF IMPACT OF DISASTER AND HAZARD ON SOCIAL LIVELIHOOD OF JAUNPUR DISTRICT

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Every year Jaunpur district is affected by natural outbreaks and calamities due to heavy rain storms in the district, there is heavy loss of crops in the agricultural area and along with it human life is also affected. They are affected by floods and due to excessive temperature increase in summer drought also occurs due to which there is heavy damage to the crops due to which the human community is also affected due to weather events the crops are damaged due to excessive fall in winter temperature in the district. There is heavy damage in the rainy season along with heavy storms a large amount of agricultural and human communities are affected by the rain.

Therefore, the main objective of the study is to assess the seasonal extreme events disaster outbreaks in summer, winter and rainy season.

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Abstract No.K20

AN ANALYSIS OF IMPACT OF SHIFTING AGRICULTURE UPON FOREST FRAGMENTATION USING GEOSPATIAL TECHNOLOGY- A CASE STUDY OF KALIONI RIVER BASIN, ASSAM

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Shifting Agriculture is one of the most primitive form of subsistence agriculture This type of agricultural practice endangers flora and fauna of the region and is a silent threat to ecological patch dynamics, stripping the region of natural vegetative cover and accelerating soil loss. The practice generates patches of land which now are open systems and will change spatially and over a temporal frame . This is attempt to study the change in forest cover and subsequent fragmentation initiated at minor scales induced by traditional shifting agriculture. Quantitative methods like Normalized Difference Vegetation Index (NDVI), Advanced Vegetation Index (AVI) , Shadow Index (SI), Bareness Index (BI) and Soil Adjusted Vegetation Index (SAVI),along with satellite imagery have been used to estimate areas under duress due to anthropogenic impact. The study was carried out to assess landscape change dynamics due to natural as well as anthropogenic causes specifically like shifting agriculture. Evaluation of the affected areas will be useful for effective flood hazard management of the Kalioni river basin in Assam.

Keywords : ecology, shifting agriculture , hazard , habit fragmentation, temporal

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Abstract No.K21

THE IMPACT OF TOURISM ON LOCAL LIVELIHOOD: A CASE STUDY OF RISHIKESH, UTTARAKHAND

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Tourism has huge potential to upgrade socio-economic conditions and standard of living of local people. It is used as a major tool to enhance the economic condition of a particular region. The growth of tourism is one of the cause of infrastructural development, opportunities of employment and income generation that enhance the standard of living and livelihood of local people in the study region. This study intends to examine the impact of tourism on local livelihood in Rishikesh town, that is situated in Dehradun district of Uttarakhand, surrounded by Himalayan mountains on three sides and has holy river Ganga flowing through it. Various types of tourism like Spiritual, Yoga and Health, Adventure, Wildlife and leisure tourism attracts plethora of tourists from all over the world in Rishikesh and put impact on livelihood of local people of this region. Tourism is also helpful in controlling the out migration for searching jobs from the region. Further explained with some suggestions to improve the livelihoods of people of study region by spreading awareness, advertisement and publicity on tourism promotion, increasing tourism activities, new tourist spots and products and promoting rural tourism, enhancing the inclusiveness of women and

other deprived communities, training on ecotourism and conducting skill development for local villagers on handicraft and local goods etc. Furthermore this paper is concluded by illustrating about the sustainable livelihood goals such as SDG 1, 2, 8, 9 are considerable to achieve the sustainability, so that tourism enrich livelihood to the grassroots level of local people in the region. The present study is descriptive in nature and the paper is based on secondary data.

Keywords: Rishikesh, Opportunities, Livelihood, Economic, Tourism, Sustainable

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Abstract No.K22

LIVELIHOOD ISSUES IN THE CONTEXT OF RECURRENT FLOODS IN EASTERN UTTAR PRADESH: A CASE STUDY OF *BAHRAICH* DISTRICT

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Several parts of Eastern Uttar Pradesh (EUP) are inundated by floods every year owing to its geographical location. Recurrent floods however get transformed into disasters owing to the vulnerable population. This vulnerability is a product of social inequalities and state apathy. The present paper tries to understand the impact of recurrent flooding in Bahraich district of EUP on livelihood of people. Floods push people to migrate out of their villages into nearby and far-off cities like Lucknow in Uttar Pradesh and Ludhiana in Punjab. The out-migration however is not a random phenomenon as it has a definite pattern. Social inequalities in the form of caste and gender influence livelihood choices and out-migration pattern of the people. The paper, through the use of ethnographic method, tries to explore how people deal with structural vulnerabilities and physical hazards like floods. It also tries to understand the mutual constitution of disasters and social vulnerabilities. In the context of agriculture no more remaining as a viable livelihood option owing to seasonal fluctuations in weather including extreme weather events like floods and reduced land holdings, sustainable livelihood become a challenge. The paper is an exploration in this direction. The present paper is an outcome of an ICSSR funded research project titled- "Livelihood Issues in Disaster Context: Case of Floods in Bahraich District of Uttar Pradesh."

Key Words- recurrent floods, sustainable livelihood, social structure, disasters, migration

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Abstract No.K23

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आपदा प्रबंधन और दीर्घकालिक विकास : भारत के विशेष संदर्भ में

महीप चौरसिया[1], डॉ0 प्रमोद कुमार तिवारी[2], रोहित चौरसिया[3]

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आपदा एक अचानक व अनिश्चित घटने वाली घटना है जो मानव जनित या प्राकृतिक हो सकती है। इसके कारण देश के सामाजिक, सांस्कृतिक व आर्थिक भूदृश्यों को हानि होती है और दीर्घकालिक विकास प्रभावित होता है। विभिन्न प्रकार की आपदाएँ और उससे संबंधित खतरे भी होते हैं। जैसे भू–भौतिकीय जनित (भूकंप, सुनामी, ज्वालामुखी), जल जनित (बाढ़, भूस्खलन, तरंग अभिक्रिया), जलवायु संबंधी (असामान्य जलवायु, मौसमी दशाएँ), जैव जनित (कीटाणुओं, विषाणुओं, जहरीले पदार्थों) तथा मानव जनित (आतंकवादी गतिविधियाँ, युद्ध, आगजनी, आंदोलन, हड़ताल) आदि। इस तरह की आपदाओं से उत्पन्न खतरों के कारण देश की अर्थव्यवस्था पर नकारात्मक प्रभाव पड़ता है। भारत उच्चावचीय, जलवायविक व सांस्कृतिक विविधता के कारण हमेशा से आपदा प्रभावित क्षेत्र रहा है। इसलिए इन आपदाओं को रोकने के लिए कुशल प्रबंधन की आवश्यकता है। आपदा प्रबंधन के द्वारा योजनाओं का निर्माण होता है। आपदा प्रबंधन खतरों को खत्म नहीं करता बल्कि कम करता है। प्रस्तुत शोधपत्र में भारत के संदर्भ में आपदा, आपदा प्रबंधन और दीर्घकालिक विकास के अंतर्सम्बंधों का विश्लेषण किया गया है। जिसके लिए द्वितीय स्रोत से प्राप्त आँकड़ों का प्रयोग किया गया है। सामाजिक, आर्थिक और सांस्कृतिक तथ्यों को स्पष्ट करने के लिए भारत के भौतिक तथा सांस्कृतिक मानचित्रों व तालिकाओं का प्रयोग यथा स्थान पर हुआ है। यह शोध पत्र व्याख्यात्मक व विश्लेषणात्मक अनुसंधान पर आधारित है।

संकेत शब्द :– आपदा, प्रबंधन, दीर्घकालिक विकास, संवृद्धि।

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Abstract No.K24

ASSESSMENT OF FLUORIDE CONTAMINATION IN GROUND WATER OF BIRBHUM DISTRICT, WEST BENGAL

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Fluoride contamination in groundwater leads to health hazard specially diseases like dental or skeletal fluorosis and others.The main source of fluoride is geological structure along with other sources like soil,ground water,crops etc. In addition to fluoride-affected 20 Indian states, specified regions of Birbhum and Purulia districts of West Bengal have been declared to be fluoride-polluted by the Public Health Engineering Department (PHED).The present study area i.e. Birbhum district lies at the north eastern end of Chotanagpur Plateau and slopes down and merges with alluvial plains of the Ganges. Groundwater is the main source of drinking and irrigation in most of the part leading towards contamination. Present study tries to explore the prevalence of fluoride and its hazardous effect on the population with special emphasis on geology, geo-hydrological and socio-economic background of

contamination. The main objective is to identify different risk zones of contamination in association with physical and socio-economic factors based on secondary block level data. Out of 19 Community Development blocks, seven blocks are severely contaminated (more than permissible limits of 1.5 ppm) and selected for assessment in this study. Thrust has been given on the health impact of population to access their vulnerability.

Keywords: Fluoride contamination, Health Hazard, Fluorosis, Geo-hydrology, vulnerability

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Abstract No.K25

COMPARATIVE STUDY OF DISASTER OCCURRED IN YEARS 2010 AND 2013 IN ALMORA CITY WITH REFERENCE TO DISASTER RISK REDUCTION APPROACH

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This paper deals with the comparative study of disasters occurred in years of 2010 and 2013 in Almora city. Almora city is situated in east of Uttarakhand state, lies in the middle Himalaya. Almora is solely a city with hilly terrain which is affected by natural disasters very often. Almora city has evident severe natural disaster in year 2010 and 2013 .caused heavy damage to physical and public resources. Secondary data has been used in this research paper and Arc GIS and EARDAS software has been used for mapping. The main cause of disaster is not the proper drainage of rain water in the city. This paper focuses on suggesting methods of disaster risk reduction for city to deal with hazards and disasters.

Key words: comparative, middle Himalaya, Uttarakhand, hazards, disasters, disaster risk reduction

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Abstract No.K26

IMPACT OF TOURISM DEVELOPMENT ON SOCIO-ECONOMIC ENVIRONMENT OF KUMAUN HIMALAYA

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The Kumaun Himalayan region of Uttarakhand with its magnificent natural beauty, diverse landforms, beautiful lakes, and glaciers, extraordinary mountain peaks, and religious pilgrimage sites makes most ideal tourist destination site. Some of the major destination sites of Kumaun region such as Nainital, Almora, Ranikhet, Kausani, Bageshwar, Pithoragarh, Champwat, Kathgodam, Corbett National Park and Udhamsingh Nagar has shown increasing tourism trends for both domestic tourist arrivals and foreign tourist arrivals. The heavy influx of tourist has provided job opportunities to local people accelerating local economic growth. And has also created ripple effects by increasing consumption of good and services in other sectors related to tourism.

This paper aims at identifying impact of tourism development on local society and economy of Kumaun Himalaya using variety of parameter such as occupational structure, connectivity and assessibility, socio-cultural practices, language, food habit etc.

Keywords : Tourism, Kumaun, Destination, Landforms.

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Abstract No.K27

LAND USE DYNAMICS IN INDIA

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The population in India has increased significantly which has put pressure on its economy as well as on land and other natural resources. The land man ratio is decreasing and will continue to intensify further in future. The demand for land is enormous and it results in large scale land transformations. The changes in land use have significant impact on livelihood of population as well as on ecological conditions. This paper attempts to examine the land use dynamics during the period of 1990-91 to 2010-11 and its ecological implications by budgeting different category of land use in India as a whole as well as among its states. The present study finds that India is passing through a critical phase of land transformation. The net sown area is decreasing along with land under pastures and miscellaneous trees etc. Similarly results shows that the urban population growth also had significant negative association with agricultural land. On the contrary, the urban population growth rate had strong positive association with non-agricultural land use change. This means that increase in urban population in the country results in increase in the non-agricultural

land use mainly through urban expansion. Land under non-agricultural sector has increased substantially at the cost of agricultural and ecological sector. This makes the country ecologically fragile.

Key words: land use budgeting, ecological implication, agricultural land use and non-agricultural land use

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Abstract No.K28

STRESS RELATED PERMEABILITY VARIATION AS THE MAJOR CAUSE OF SLOPE FAILURE

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Slope failure is very common problem in mines and cut slopes. A number of slope failures take place in mines with increasing depth of mining. Most open cast mines today go very deep and the chances to encounter groundwater becomes very high. Deeper mining also changes stress conditions and any unfavourable condition can initiate slope failure. Porosity and permeability are two very important material parameters which gets affected with the depth of mining. Both the parameters are significantly affected by stress variation. In rock mass, which contains discontinuities in many forms, both porosity and permeability can become very complex to understand and therefore their role in destabilising the slopes cannot be understood clearly. Instability issues like planar, wedge and toppling failure are generally found in discontinuous rock mass but addition of pore pressure or permeability changes with stress can have very adverse effect of design life of slopes. Stress related permeability changes have been studied by various researcher, both experimentally and numerically but very few studies have correlated this knowledge to stress related failures in deep mining conditions. An attempt has been made in this study to assess stress related permeability changes and examine their role in destabilising the slopes. The present study has been performed by collected previously published works and the results obtained from numerical modelling of an iron ore mine.

Keywords: Deep mining, slope failure, permeability, rock mass

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Abstract No.K29

DISASTER MANAGEMENT

Puushottam Sharma

All communities and countries are vulnerable to disasters, both natural and man-made. Not only India but also whole world is facing various natural disasters (Drought, flood, Cyclone, Tsunami, Earthquake, Landslide, Hail Strom, Volcanic Eruptions, etc.) from ancient time which strike causing a divesting impact on human life, environment and economy. Various disasters like earthquake, Tsunami, volcanic

eruptions, landslides, forest fires, flood and cyclones are natural hazards that kill millions of peoples and destroy billions of dollars of habitat and property each year. The tremendous growth of the world's population and its increased concentration often in hazardous environment has escalated both the frequency and severity of natural disasters. With the tropical climate and unplanned growth proliferation none engineered constructions which make the disaster prone areas more dangerous. Developing countries suffer more or less by natural disasters. Asia tops the list of casualties due to natural disasters. Among various natural hazards, earthquakes, Tsunami, landslides, cyclones, droughts and floods are major disasters adversely affecting very large areas and population in the Indian sub-continent. India is one of the hazard prone countries in south Asia. Among these natural disasters risk are extremely high. These hazards destroy huge property and affect million peoples. This paper presents a glimpse of natural disasters and disaster management system in India.

Keywords: Drought, Flood, Tsunami, Cyclone, Earthquake, Landslide, Volcanic Eruptions, Environment, Management, Property.

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Abstract No.K30

A STUDY OF FLOOD DISASTER IN INDIA IN 2021.

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Floods are considered as the most common natural disaster which effects the population globally. It resulted in destruction of infrastructure and massive human casualties. Floods are considered as the leading reason of natural disaster fatalities worldwide and also responsible for about 6.8 million fatalities in the 20th century. India has been vulnerable to the disasters such as floods, landslides, cyclones, droughts, earthquakes etc., because of the geo-climatic conditions. Among all other catastrophes, large scale damage and destruction are caused by floods and around 40 million hectare of geographical area of the country is vulnerable to floods. In India, floods are recurrent phenomena and affect the lives, livelihoods, infrastructure and renders large population homeless. Its causes are climatic change, heavy rainfall, cloud bursting, deforestation, inadequate drainage system etc. Therefore, an attempt has been made to study the loss (both the human loss and infrastructure) experienced by different states of India in 2021 due to flood disaster.

Key words - Flood, Disaster, India, Human fatalities, Infrastructure loss.

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Abstract No.K31

DISASTER HAZARDS AND LIVELIHOOD

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In this paper we will discuss the hazards and how it is differ from disaster also including the types of disaster for example natural disaster and human induced. Hazards like flooding, extreme temperatures, earthquakes, hurricanes, mudslides and volcanic eruptions these all phenomenon play strong role to describe the term disaster.

Now in the era of rapid growth and development disaster whether it is natural or man made are making damage to human lives and social economic infrastructure human caused vulnerability destroy the livelihood of people that affects the agriculture, environment, health, housing, drinking water and education all way around. Disaster hazards and livelihood all three terms are interrelated and form a complex cyclic relation among all. Human being searches for their livelihood that needs to change and process the environment as well as man-made infrastructure, scientifically that actions are responsible for the disaster and hazards.

"If Man will continue act unsystematically for his livelihood and that somehow or anyhow result in to disaster."

Key Words: - Natural disaster, growth & development, socio-economic infrastructure, complex cycle, vulnerability.

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Abstract No.K32

ASSESSMENT OF FLUORIDE CONTAMINATION IN GROUND WATER OF BIRBHUM DISTRICT, WEST BENGAL

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Fluoride contamination in groundwater leads to health hazard specially diseases like dental or skeletal fluorosis and others.The main source of fluoride is geological structure along with other sources like soil,ground water,crops etc. In addition to fluoride-affected 20 Indian states, specified regions of Birbhum and Purulia districts of West Bengal have been declared to be fluoride-polluted by the Public Health Engineering Department (PHED).The present study area i.e. Birbhum district lies at the north eastern end of Chotanagpur Plateau and slopes down and merges with alluvial plains of the Ganges. Groundwater is the main source of drinking and irrigation in most of the part leading towards contamination. Present study tries to explore the prevalence of fluoride and its hazardous effect on the population with special emphasis on geology, geo-hydrological and socio-economic background of

contamination. The main objective is to identify different risk zones of contamination in association with physical and socio-economic factors based on secondary block level data. Out of 19 Community Development blocks, seven blocks are severely contaminated (more than permissible limits of 1.5 ppm) and selected for assessment in this study. Thrust has been given on the health impact of population to access their vulnerability.

Keywords: Fluoride contamination, Health Hazard, Fluorosis, Geo-hydrology, vulnerability

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Abstract No.K33

COMMUNITY-BASED RIVERINE FLOOD RISK ASSESSMENT: A CASE STUDY OF THE MAYURAKSHI RIVER BASIN, INDIA

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Riverine flood, a common natural hazard in the Mayurakshi River Basin (MRB) of India induces frequent changes in the landscape morphology and societal transformations. Therefore, a community risk assessment (CRA) is attempted in the context of riverine floods in the rarh plains of the MRB based on the nature of flood hazard and social vulnerability. Flood hazard is measured in terms of flood frequency, depth and durations while the social vulnerability is assessed using its physical, economic, demographic and social-infrastructural components. The present study is executed over a statistically significant sample size of 2382 households across the 43 villages spread in 5 community development (C.D.) blocks. The analytic hierarchy process (AHP) has been applied for the risk assessment and the relative importance index has been used to quantify the community behaviour. The results portray that the C.D. blocks such as Kandi having the maximum flood magnitude depicts a strong negative relation (R^2=0.63) with economic vulnerability while the lesser flood-prone C.D. blocks such as Nabagram have strong positive relation (R^2=0.66) indicating a typical societal transformation coevolved with flood hazards. The ANOVA shows that the religion-based community risk differs significantly in terms of economic and social-infrastructural vulnerability while income-based community risk differs for hazard propensity and total vulnerability. The main driving force leading to this difference in vulnerability and risk is the agricultural distress intensifying the labour migration that brings higher per capita income through foreign remittances. Besides, community behaviour and different adaptation strategies also play important roles in community risk.

Keywords: Community vulnerability; Risk analysis; Agricultural distress; Remittances; Community behaviour

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Abstract No.K34

THE IMPACTS OF CLIMATE CHANGE ON THE LIVELIHOODS OF THE FIJIAN COMMUNITY

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Pacific island countries such as Fiji have negligible contribution towards global climate change but will bear the brunt of its consequences. Fiji is primarily impacted by climate change due to rapid sea-level rise, ocean acidification, rising temperatures, and more extreme rainfall events. Fiji's wet and dry seasons are expected to be more extreme. Communities in low-lying coastal regions will be impacted by salinization of water and land and increased exposure to flooding events. Temperatures on the islands will continue to rise, resulting in an immediate increase in the number of hot days and nights. The trends in rainfall are highly uncertain and are strongly influenced by climatic variability. Nonetheless, extreme rainfall events will increase in frequency, increasing the risk of flooding and landslide exposure. In the long term, tropical cyclones are expected to become less frequent but more intense. These changes will significantly impact livelihoods and health in a country where over half of the population relies on natural resource-based agriculture and fisheries and where natural capital fuels tourism, which employs nearly 40% of the population. Unless climate change adaptation is prioritized across health, water and sanitation, livelihoods, and disaster risk reduction, it can trigger widespread, strong negative feedback loops between livelihoods and health. Loss of livelihood has a detrimental effect on people's ability to afford healthcare and nutritious foods. By 2050, up to 4% of the population may be pushed into poverty annually due to climate-related disasters resulting from property damage, loss of income sources, and severe health problems that impair work capacity.

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Abstract No.K35

A GEOGRAPHICAL STUDY OF THE IMPACT OF DISASTER AND HAZARD ON THE HUMAN LIFE OF THE DISTRICT IN LAKHIMPUR KHERI DISTRICT

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Disasters arise as a result of environmental outbreaks. That is, the disaster is the result of the negative relationship of human with the environment. When disaster enters human life, it assumes a terrible form. All kinds of severe climatic events are also outbreaks. But when they start having a deep impact on human life, then these disasters take the form of Hazard. That is why it is said that all hazards are disasters

but not all disasters are hazards. Hazard harms the social, economic, environmental life of the human community in a systematic way. Disaster which is a practical form of environmental damage. When natural calamity comes, it seems without hearing that there must have been damage at the local level. District Lakhimpur Kheri is an area located in the Gangetic plain of Uttar Pradesh. Only the disasters that come on the terrestrial area come here. In Lakhimpur Kheri district, disasters generally occur due to storm, heavy rains, drought, earthquake, etc.

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Abstract No.L01

GEOLOGICAL SITES IN LEH DISTRICT, UT LADAKH: IMPLICATIONS FOR PROMOTION OF GEOTOURISM

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The Geotourism is associated with geological attractions, sites and destinations. In concise, Geotourism is a vehicle to advance Geoconservation, recognize Geological heritage (Geoheritage), and esteem Geological diversity (Geodiversity) of a particulate place. India is rich in assorted physical features and cultural heritages. In terms of geology, almost all rock types and structures ranging from the Achaean to recent exist in India. Geotourism can play a vital role in exposing and expressing this great country to the rest of the world. In the present work, Geotourism sites existing in the Leh district, UT-Ladakh has been focused to express their geological characteristics, so that local and abroad tourists could be enlightened about formation of subcontinent, the largest Himalayan mountain range, the fate of Tethys Ocean and paleoclimatic conditions of the region. Preliminary study on geological sites including Quaternary lake deposits in surrounding of Leh city, Glacial Moraines from Phyang to Nimmu village, Indus suture zone, Sand dunes of Nubra valley, Hot springs of Panamic, Hot springs of Chumathang and Puga, Nidar Ophiolites, Indus Molasse deposites (Hemis section), Ladakh Batholith (around Taru village), Zebra strip pattern of Lecogranites and Pegmatite veins at Chumathang village, Tsomoriri crystallines and Garnet hill. Growth of urbanization has posed a threat against the preservation of Geoheritage sites in Ladakh, hence, it has been recommended to preserve and safe guard these sites for the promotion of geotourism, to educate the present and future generations regarding the evolution of Himalayas and for geoscientists who visit this place day in and day out to understand the hidden geological features.

Key words: Geotourism, Tethys Ocean, Ophiolites, Ladakh Batholith

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Abstract No.L02

GEOTOURISM AND GEOMORPHOSITES - A CASE STUDY OF UMANANDA ISLAND OF ASSAM

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In Assam, there is considerable diversity of geological structure and relief of terrain, as well as numerous changes in the landscape. Here great variety of natural or semi-natural objects exist which can be of immense interest to tourist. In this paper an attempt has been made to study the geotourism potential of Umananda Island which is located in the middle of mighty Brahmaputra River. Umananda Island is often called as the smallest inhabited islands of the world and happens to be one of the most important tourist attractions of Assam that attracts tourist from Assam and its neighbouring states. Again in this paper an endeavour has been made to evaluate Umananda Island as a geomorphosite. Geomorphosites are commonly regarded as landforms having scientific value. But since many geomorphosites have scenic component, they can also have economic value in the sense that they are exploitable for the purpose of tourism. In this study, using library and field studies Umananda Island is evaluated as a geomorphosite and its geotourism potentials has been studied.

Keywords: Geotourism, geomorphosite, landforms, Umananda Island

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Abstract No.L03

ANALYSIS OF GEOMORPHOSITES FOR ASSESSMENT OF TOURISM POTENTIAL OF TARAFENI RIVER BASIN, WEST BENGAL, INDIA

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River basin, being a fundamental geomorphic unit (Chorley, 1969), portrays distinctive features and processes in different climatic environment. Its catchment area influences the livelihood of the people living in it. Therefore, proper understanding of the rivulets, streams and the resultant landforms are of utmost importance in developing and implementing watershed plans. Tarafeni river basin of west Bengal, with its typical geological structure, geographical terrain, stream beds with silt, sand, pebble, gravel, boulder present some distinguishing sites in its riparian landscape. Some locations have now become destinations of visitors from various places. Present work highlights on the study of geomorphosites of the basin and also analyse the prospect of geo-tourism in Junglemahal area for the well-being of its original inhabitants.

Keeping all these in mind the main objectives of the present study are:

1. To identify and map the important locations, i.e., geomorphosites with available resources and infrastructural facilities
2. to analyse the accessibility of the places for assessing the potentialities of sustainable tourism development

In the present study, the geo-informatics approach has been taken into consideration. The database has been managed (edit, manipulation, and analysis) with statistical software and is mapped primarily with the help of GIS software. General cartographic principles have been followed for representing the output of the analysis.

Keywords: River Catchment, Riparian landscape, Geomorphosites, Livelihoods, Geo-tourism

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Abstract No.L04

GEOTOURIST DESTINATION OF RUDRASAGAR LAKE, A RAMSAR SITE OF TRIPURA, INDIA

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The Rudrasagar Lake is one of the most important natural wetlands and famous geo-tourism centres, located on the Gomti River valley of the State of Tripura with about 1.8 km^2 geographical area. This wetland has an international significant under the Ramsar Convention (Site no.1572). The lake holds immense value in terms of bio-diversity, environmental resources, aquatic plants, animals, scenic beauty and thousands of seasonal migratory birds. In addition, it is also famous for the lake Palace called "Neermahal" which is the major tourist attraction throughout the year. This paper investigates potentialities of Rudrasagar wetland as a geo-tourist destination of Tripura along with the identification of major obstacles as a basis for the sustainable development of the geotourism. Field observation and determination of strengths, weaknesses, opportunities and threats by SWOT analysis and geographical information systems (GIS) are used for identifying its gravity in between environmental conservation and exploration of the geotourism.

Keywords: Aquatic habitat, Neermahal, Ramsar site

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Abstract No.L05

IMPACT OF GEO-TOURISM ON RURAL LIVELIHOOD: A CASE STUDY OF SIKIAJHORA, ALIPURDUAR, WEST BENGAL

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Geotourism focuses on the promotion of nature, especially the geology and geomorphology of a site. This paper aims to show how geo-tourism contributes the

local livelihoods and how the decisions taken by the planning authorities reflect people's livelihood priorities. Sikiajhora is one of the new developing tourist spot in Dooars region of Alipurduar ditrict, West Bengal. The study is descriptive in nature and is based on both primary and secondary data. The main tourism product in Sikiajhora is jhora (water bodies), dense forest with native flora-fauna and wilderness in dramatic scenery and lightly populated areas. Local self help group started boat riding in jhora where tourist enjoyed a lot. Opposite to Sikia jhora is the Kalkut forest and the places like Jaydevpur, Sahibbandh, and Hatipota in nearby areas are also being developed for tourism. Local people made a beautiful park along side the jhora from sitting where tourists can see and feel the total scenic beauty of jungle and jhora. Most households of Sikiajhora rely on a range of natural resource uses, and on off-farm income from employment. The cash income generated from tourism becomes very useful. However, diversified strategies are essential in Sikiajhora because of the high rainfall is a common occurrence. Landscape and nature in the region have a strong power of attraction for all nature lovers. The lack of alternative off-farm income, few training opportunities for skill development can increase the benefits from tourism. The existence of good management, infrastruture and sustainable development in the future should create conditions for growth and development of all types of sustainable tourism, including geo-tourism.

Key words: scenic beauty, employment, infrastructure, sustainable development

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Abstract No.L06

USE OF AHP TECHNIQUES FOR DETECTION OF TOURISM POTENTIALS SITES IN WARE BEACH IN RATNAGIRI DISTRICT, MAHARASHTRA (INDIA)

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The AHP techniques used for the detection of potential sites for tourism activities in Ware Beach in Ratnagiri District, Maharashtra (India) based on beach scenic value (BSV) and beach scientific investigate value (BSIV). Nine criterions including beach morphology, landscape features, beach sand colour, beach sunrise and sunset view, beach water clarity, size of the area, coastal slope, adjacent land use and seas, lakes and streams have been used for this analysis. AHP-OS software used to calculate the pairwise comparison matrix and determination of the weights for selected criterions and parameters. Consistency ratio, CR=0.08 values shows acceptability of the results. Beach sunrise and sunset view show higher suitability for tourism activities whereas landscape features and beach morphology show moderate suitability and other features show less suitability for these activities. AHP technique is most suitable for the detection of suitable sites for coastal tourism.

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Abstract No.L07

AN ANALYSIS OF IMPLICATION OF GEOMORPHOSITES IN TOURISM: A STUDY ON GEO-TOURISM IN THE LONAR LAKE OF MAHARASTRA

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Geomorphosites are geomorphological landforms that have acquired a scientific, cultural, historical,economic value due to human perception or exploitation. The value of geomorphosites is known to the public and to scientists from other disciplines. Therefore, it is necessary to heighten the public profile of geomorphosites and finally to protect them under a legal framework. Tourism that is associated with this geomorphosites or geological attraction is known as Geo-tourism. The main aim of the study is to analyse the origin of Lonar lake. It also tries to evaluate the geomorphological features of the lake. Lonar Lake (lake of lagoon), formed 52000 years ago due to the crash of a meteor into the earth at an estimated speed of 90,000 km/hr, in Buldhana district of Maharashtra. This is a meteorite- impact crater which has attracted geologists, astronomers, ecologists across the globe for study as well as tourism purposes. The uniqueness of this crater is that it was formed on a stratum of hard igneous rocks known as basalt rocks. This crater contains saline and alkaline water only one of its kind in Asia, which depicts unique limnology and biodiversity. Recently the water of this lake turned pink, which attracts the tourist most. It is due to a large presence of the salt-loving Haloarchea microbes, which produces pink pigment. The paper also asses the implication of this site on Geo-tourism in the region.

Keywords: Geo-tourism, Geomorphosite, Meteor lake, Lonar Lake, Buldhana.

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Abstract No.L08

POTENTIAL OF HERITAGE TOURISM IN PUNE DISTRICT: A CASE STUDY OF JUNNAR TAHASIL

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Tourism is considered as one of the world's largest industry. India is a developing nation. The Government and their agencies as well as private sector units and individuals are taking various measures to promote tourism. Pune district is highly rich by its scenery, spiritual base and its culture. Tourism industry will change the future of the district and will improve the social, cultural, economic status of the district; this was the main motive behind selection of this study area. In the recent years tourism has grown in India from local economic activity to a major global

industry giving employment to a large number of peoples at various levels. Maharashtra is a land of forts with its 350 odd forts. The ASI, an agency controlled by the union government, controls 29 of the important forts. The state archaeological department controls 39 other forts and 99 forts are unprotected forts. The remaining 183 forts are either controlled by the revenue department, which knows little about archaeology or are privately owned. Pune district is one of the India with great potential forts tourism. Thus, Pune is rich in physical, cultural, historical, archeological, heritage and religious sites. Even though there is a great potential for forts tourism in Junnar tahasil of Pune district because the district lacks planning for tourism and supporting infrastructure.

In this paper an attempt is made to study the Geographic Information System (GIS) will be as a tool for site suitability for known as well as unknown forts in the Junnar tahasil of Pune district of Maharashtra. With considering gravity of this subject, the research has under taken Junnar tahasil of Pune district. Moreover, such study may provide potential forts sites to increase the tourist to be visited, to boost tourism in the Pune to its full potential. To prepare a new tourist map of study area with adequate and update Forts Information System (FIS) with the help of GIS technique. Besides such study may helpful to planner, archeologist, historian, administrators, layman and one who are interested in research in the felid of tourism may get the benefit.

Key: Archeological, Heritage, Geographic Information System (GIS), Forts Information System (FIS).

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Abstract No.L09

IDENTIFICATION OF GEOHERITAGE SITES IN CHITRAKOOT REGION

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Chitrakoot region situated in chitrakoot and satna district of Uttar pradesh and madhy pradesh state of india. Due to its religious importance and close association with epic Ramayana chitrakoot (hill of wonders) is a hallowed center of pilgrimage. Geographically Chitrakoot region is situated in the northern Vindhya Range. Kamad Giri, Hanumaan Dhara, Janki Kund, Lakshman pahari, and Devangana famous religious mountains are part of chitrakoot parvatmala. Geological Survey of India (GSI) declared geo-heritage sites/ national geological monuments for protection and maintenance. Due to lack of identification no sites of chitrakoot got place in proposed list.Despite having diverse geographical locations, Chitrakoot is known only a center of pilgrimage. Motive of this paper is to identify and convey brief about the idea of Potential Geoheritage sites and geotourism in chitrkoot region of Uttar pradesh and madhy pradesh.

Keywords- pilgrimage, Geological Survey of India, National geological monuments, Geomorphosites, geotourism.

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Abstract No.L10

छत्तीसगढ़ राज्य में भूवैज्ञानिक पर्यटन के आयाम

डॉ. कावेरी दाभड़कर, डॉ.सुशीला एक्का, डॉ. गीता सिंह

शासकीय बिलासा कन्या स्नातकोत्तर महाविद्यालय बिलासपुर (छ.ग.)

भू–वैज्ञानिक पर्यटन वैज्ञानिक भौगोलिक क्षेत्रों के पर्यटन से संदर्भित है तथा जो सांस्कृतिक विरासत की दृष्टि से महत्वपूर्ण है। प्राकृतिक तत्वों की बहुतायतता प्रमुख पर्यटन उत्पाद है एवं किसी क्षेत्र के पर्यटन विकास का मौलिक आधार है। इन प्राकृतिक तत्वों में भू–वैज्ञानिक कौतुहल का समावेश होता है साथ ही जैव–अजैव घटकों से संयोजित इन भूवैज्ञानिक संरचनाओं के साथ सांस्कृतिक परिदृश्य सौंदर्यात्मक अनुभूति एवं विरासत का सुंदर समावेश होता है। भूवैज्ञानिक पर्यटन एक अद्यतन संकल्पना है जो प्राकृतिक क्षेत्रों के पर्यटन के साथ–साथ उनके संरक्षण व संवर्द्धन के मूल्यों को संजोता है क्योंकि उस क्षेत्र का महत्व उसके सांस्कृतिक मूल्यों में भी है।

छत्तीसगढ़ प्राकृतिक सौंदर्य की दृष्टि से एक समृद्धशाली राज्य है। प्राकृति की गोद में लिपटी आदिवासी संस्कृति, धान की बालियों के मध्य महानदी, शिवनाथ नदी का प्रवाह, झरने, प्रपात, क्षीप्रिकाएं एवं घने वनाच्छादित आवरण के मध्य अवास्थित अभ्यारण्य छत्तीसगढ़ को भूवैज्ञानिक पर्यटन दृष्टि से समृद्ध बनाते है। छत्तीसगढ़ राज्य भूवैज्ञानिक पर्यटन की दृष्टि से अपार संभावनाओंवाला राज्य है। छत्तीसगढ़ प्रदेश की सांस्कृतिक विरासत, पौराणिक संदर्भ एवं पुरातात्विक खोज ने भू–वैज्ञानिक विन्यासों को नया आयाम दिया है। प्रस्तुत शोध आलेख छत्तीसगढ़ प्रदेश के पर्यटन को भू–वैज्ञानिक दृष्टिकोण से विवेचन का प्रयास है जोकि अवलोकन एवं द्वितीयक संदर्भों पर आधारित है।

तथ्यों से संदर्भित अनेक पर्यटन स्थल हैं जैसे सीताबेंगरी गुफा, त्रिवेणी संगम राजीम, तुरतुरिया इत्यादि। रामझरना, नाट्यशाला गुफाचित्र के साथ–साथ अश्चुताश्य–निश्चुताश्य की विभिन्न स्थालाकृतियों से युक्त कुटुमसर गुफा एवं गर्म स्त्रोत के झरने–तातापानी एंव मदकू द्वीप जहां छठवीं शताब्दी के मंदिरों की श्रृंखला है, जो छत्तीसगढ़ में पर्यटन विकास के आधारस्तम्भ हैं।

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Abstract No.L11

THE IMPACT OF COVID-19 ON GEO-TOURISM IN CHITRAKOOT DURING THE FIRST EIGHTEEN MONTHS OF THE PANDEMIC

Dr. Pranay Kant Biswas, Dr. Uttara Singh

Tourism has been considered as a very important vehicle for socio-economic development of a state or country. Geo-tourism is defined as tourism that sustains or enhances the distinctive geographical character of a place - its environment, heritage, aesthetics, culture, and the well-being of its residents. Geo-tourism is otherwise referred to as the knowledge based tourism. It seeks to provide tourists with relevant information on the formation of a place's geology and geomorphology.

Chitrakoot is one of the major tourists' destinations of India not only for Religious Tourism (Hinduism) since ancient era but also having enough of other tourism potential such as wild life tourism, adventure tourism and natural tourism. Chitrakoot, mainly known as the Pilgrimage destination has a variety of beautiful and cheerful scenic landscape best suited for tourism activities.

Chitrakoot is one of the districts that have enormous and diverse tourist attractions. It has beautiful land features.

Strict restrictions on incoming travellers in an effort to control the spread of the Covid-19 pandemic badly hit India's tourism industry for nearly 18 months. International tourists visiting India brought in a sizeable $30 billion in foreign exchange in 2019, according to government data. The earnings fell by over 76%, to around $7 billion in 2020, following the pandemic-induced lockdown since March that year. Industry experts, online travel agencies, travel agents and other market participants all expect the government's decision to help boost revenues of the tourism industry ahead of the upcoming winter season and New Year's Day.

Chitrkoot district located in Uttar Pradesh was a developed district from the point of view of Geo-tourism before COVID-19. In the present research paper, the damage done to the tourism due to the pandemic has been analyzed. At the end of the research paper , suggestions have also been given to increase Geo-tourism based on the findings.

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Abstract No.M01

जल–प्रबंधन में जल–निकासी सुविधाओं का महत्वः प्रयागराज जनपद (उ. प्र.) का एक भौगोलिक अध्ययन

देवेंद्र प्रताप सिंह

शोध छात्र, भूगोल विभाग, लखनऊ विश्वविद्यालय, लखनऊ, उत्तर प्रदेश– 226007।

तीव्र गति से वृद्धिशील आबादी, आर्थिक विकास तथा सामाजिक एवं पर्यावरणीय लक्ष्यों की सुरक्षा के लिए जल प्रबंधन अत्यंत ही आवश्यक घटक है। जलवायु परिवर्तन तथा मानव निर्मित अन्य परिस्थितियों के परिणामस्वरुप वर्तमान समय में जल संसाधनों का प्रबंधन एक प्रमुख मुद्दा बनकर सामने आया है। आवासीय क्षेत्रों तथा मानवीय गतिविधियों वाले स्थलों पर उपयुक्त जल निष्कासन प्रणाली के अभाव में जल प्रबंधन संबंधी चिंता और भी अधिक व्यापक हो जाती है। बेहतर भौगोलिक दशाओं में स्थित होने के कारण भारत में प्रतिवर्ष वर्षा द्वारा जल पर्याप्त मात्रा में प्राप्त किया जाता है, साथ ही देश के अधिकांश भागों में भूमिगत जल का स्तर भी उच्च है। किंतु जल संग्रहण तथा जल निकासी प्रणालियों की अपर्याप्तता के कारण जल की अधिकांश मात्रा उपयोग के दौरान ही नष्ट हो जाती है। प्रयागराज जनपद गंगा के मध्यवर्ती क्षेत्र में स्थित होने तथा जल संसाधनों में समृद्ध होने के कारण अपना एक विशिष्ट महत्त्व रखता है। जनपद में प्रवाहित होने वाली नदियों से लगभग प्रत्येक वर्ष यहां बाढ़ का सामना किया जाता है। उपरोक्त परिस्थितियों के संदर्भ में वर्तमान अध्ययन के अंतर्गत, जनपद में जल प्रबंधन के प्रयासों के अंतर्गत जल निकासी प्रणालियों के महत्व का मूल्यांकन किया गया है। यह अध्ययन द्वितीयक आंकड़ों पर आधारित है, जिन्हें भारतीय जनगणना कार्यालय, भारत सरकार तथा जिला सांख्यिकी पत्रिका, उत्तर प्रदेश जैसे स्रोतों से प्राप्त किया गया है। संकलित किए गए आंकड़ों को उपयुक्त सांख्यिकीय विधियों का उपयोग करके तथा सारणीयन एवं चित्र के माध्यम से अध्ययन को आसान बनाया गया है। अध्ययन में यह निष्कर्ष निकलकर सामने आया है कि जनपद में सभी विकासखंडों में जल प्रबंधन को बढ़ावा देने के लिए जल निकासी प्रणालियों का विकास किया जाना अत्यंत ही आवश्यक है।

बीज शब्दः जल प्रबंधन, जल निकास प्रणाली, जल प्रदूषण, सीवर संयंत्र, जनसंख्या वृद्धि, ग्रामीण विकास।

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Abstract No.M02

सकरी नदी द्रोणी में मानवीय गतिविधि का पर्यावरणीय एवं पारिस्थितिकीय प्रभाव : नवादा जिला के संदर्भ में एक अध्ययन

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पारिस्थितिकी तंत्र एक संतुलित व्यवस्था का परिचायक है। जिसमें लोचता (सहन शीलता) का विशेष गुण पाया जाता है। इसके वाबजूद विगत कुछ दशकों में मानव ने पारिस्थितिकी एवं पर्यावरण को व्यापकरूप से असंतुलित करने का कार्य किया है। जिसके परिणाम स्वरूप वैश्विकतापन, जलवायु परिवर्तन जैसी समस्याओं के साथ बाढ़ एवं सूखा जैसी समस्याओं की आवृति में वृद्धि हुई है। जिसमें तीव्र जनसंख्या वृद्धि के साथ मानव के भौतिकवादी प्रवृति ने व्यापक योगदान दिया है। अध्ययन क्षेत्र बिहार का नवादा जिला दक्षिण बिहार के मैदान में स्थित है। यहाँ प्राथमिक क्रियाकलाप की प्रमुखता देखने को मिलती है परंतु यहाँ आर्थिक विकास के साथ मानवीय गतिविधि की जटीलता बढ़ती जा रही है। जिसका यहाँ के पर्यावरण एवं परिस्थितिकी पर नाकारात्मक प्रभाव दृष्टिगोचर हो रहा है। प्रस्तुत अध्ययन का उद्धेश्य इन्हीं प्रभावों का अध्ययन करना है।

शब्द कुंजी – पारिस्थितिकी तंत्र, बाढ़, सूखा, मानवीय गतिविधि,

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Abstract No.M03

ENVIRONMENTAL IMPACT OF LARGE DAMS: A CASE STUDY OF TEHRI DAM, UTTARAKHAND

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Water is lifeline for any civilization but due to its unequal distribution and misuse world is facing water crisis. The problem become more acute in developing countries like India due to high population growth that put more demand on limited water resource. Solution to water crisis lies in management of water resources and one of the best way is to build Dams to store water for multipurpose uses like irrigation, electric generation, drinking water and flood control etc. But due to growing environmental awareness worldwide a debate started whether lagre dams are sustainable way to manage water resources? This paper presents various environmental impacts of Tehri Dam which is tallest dam of India and fifth tallest in world. It also analyses Tehri dam imapct on river flow, sedimentation cycle, biodiversity , changes in physical and chemical water quality and land use changes both upstream and downstream of the dam.

Keywords: Tehri Dam , Environmental impact, river flow, water quality.

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Abstract No.M04

THE QUALITY OF GANGA RIVER IN PRAYAGRAJ DISTRICT OF UTTAR PRADESH

Kirti Varma

The river Ganga, considered as one of the most sacred rivers across the globe, is undergoing severe deterioration in recent times owing to the increasing demand of freshwater and subsequent pollution load. It is one of the alarming environmental concerns as a large population depends upon its water for various purposes including domestic, agricultural, and industrial purposes. Therefore, it is important to maintain the health of the river water as it directly or indirectly affects the health of the human population and thus, also the health of ecosystem as a whole. This study encompasses the assessment of river water in Prayagraj region of Uttar Pradesh to understand the status of water quality of the river in this particular region with major focus on the issue of eutrophication. Eutrophication is one of the most important concerns related with water quality and is caused by the enrichment of the river with nutrients like nitrate and phosphate. It leads to the depletion of oxygen levels and subsequent death of aquatic plants and animals. This increases the organic pollution load on the river water body leading to depletion of its quality. Therefore, it is of utmost importance to determine the sources of these nutrients in order to curb the water pollution and enhance its quality.

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Abstract No.M05

URBANISATION AND RIVER HEALTH STATUS IN PUNE MUNICIPAL CORPORATION (PMC): AN APPROACH TOWARDS SUSTAINABLE URBANISM

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An urbanisation in Indian cities is changing the faces of the society as well as the urban spaces. The natural resources are getting affected due to an ever increasing population in most of the urban areas. Water resources like rivers are more prone to development in the urban areas. Mula and Mutha are the two rivers which flows through the PMC area independently and in confluence afterwards. Both the rivers are seen to me polluted by industrial waste, untreated sewage discharge, household waste and many more. This has led to increasing nutrient content in the river water simultaneously decreasing various other essential aspects in the river water crucifying the biotic community. The rich nutrient content in the river water also has been responsible for increased eutrophication activity in the rivers which has significantly

decreased the depth of the river bed. These two rivers are heavily polluted by discharging 125 MLD of untreated water by PMC and hence MPCB has classified these river into class IV water quality category and the CPCB categorised these two rivers in I priority for regaining the water quality (CPCB, 2019). The study area is now facing various health related issues due to deteriorating water quality. An international efforts for making our cities sustainable in terms of its ability to sustain long term viability by reducing consumption, waste and harmful impacts on people and place while enhancing the overall well-being of both people is the major concern of today's world. A long-established approaches to study the river health is the measurement of physical, chemical and some biological characteristics but urbanisation is also responsible for deteriorating river health in PMC. The study makes an efforts to develop approach towards sustainable urbanism by considering the river health status with the help of associated factors of urbanisation.

Keywords: River Health, Urbanism, Urbanisation, Sustainable, Sanitation

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Abstract No.M06

WATERSHED ANALYSIS OF GOHERI RIVER BASIN IN AMBEGAON TEHSIL OF PUNE DISTRICT

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Water is main need of animals, trees and man, so watershed management is essential for future of man and nature. So the present work concentrates on evaluation of watershed management in the study area finding out solution to mitigate scarcity problems. The study area is North West part of Ambegaon Tehsil of Pune District of Maharashtra. It located in upper part of Ghod River. In the study area main stream is Goheri River and her catchment.

For the study I used published and unpublished data. The Total Geographical area is 66.84 sq.km. The main information is regarding the surveys. The government programs or schemes are not reached in this region the general drainage pattern is of dendrites. The number of streams including in these areas are 336. The study area has suitable for small gully plugs and small weirs for soil and water conservation. The studies mainly depend on drainage pattern, therefore it is necessary to plan systematic, scientific and society based programmes for fulfillment of requirement of water resources.

Key words: Watershed , Drainage, Water Conservatin

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Abstract No.M07

A GEOGRAPHICAL APPRAISAL ON SPATIO-TEMPORAL VARIATION OF GROUNDWATER LEVEL IN NADIA DISTRICT, WEST BENGAL

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Groundwater is one of the most widely used natural resources in India and it is one of the major sources for drinking, irrigation and ecosystem. The groundwater withdrawals depend on groundwater recharge which is mainly controlled by climatic and geomorphic factors. Over exploitation by human being along with climate change, the groundwater level of Nadia district is continuously fluctuating which increases the risk of arsenic hazard. This study examines the 20 years records of observed groundwater levels and rainfall over the Nadia district in West Bengal. Groundwater data have been collected from CGWB and IDW interpolation technique has been used in GIS environment to prepare groundwater level map. Mann-Kendall trend test has been implemented to examine the trend in rainfall pattern. Pearson's correlation coefficient has been used to bring out the correlation between rainfall distribution and groundwater fluctuation. Landuse/landcover, NDVI maps have been prepared and correlated with groundwater level to understand the geomorphic factors behind spatial variation in groundwater level. Rainfall trend also analysed using Mann-Kendall Trend Test to find the relationship between climate change and temporal variation in groundwater level. The study revealed that the variation in geographical factors and climate change are responsible for the fluctuation in groundwater table.

Keywords: Climate change, Groundwater fluctuation, IDW interpolation, Mann-Kendall trend test, NDVI, NDWI

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Abstract No.M08

DYNAMICS OF LAND USE/ LAND COVER CHANGE USING REMOTE SENSING AND GEOSPATIAL TECHNOLOGY: A CASE STUDY OF THIRUVANANTHAPURAM URBAN AGGLOMERATION, KERALA

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Land use/ land cover change is a principal theme needs global recognition in the present scenario for monitoring and managing rapid environmental changes. It is a key source of information in the field of ecological planning, environmental

management and sustainable development. Based on remote sensing and geospatial techniques the current study made an attempt to monitor the changes in land use/ cover patterns of Thiruvananthapuram urban agglomeration of southern Kerala for the period of 1966, 1991 and 2018. For this survey of India topographical maps of 1966, 1991 and Landsat 8 OLI images of 2018 were used. Manual digitization and topology correction were employed for topographical maps and maximum likelihood supervised classification method was used for satellite image to obtain five major classes of land use, viz, agricultural area, built-up area, mixed vegetation, waterbody and barren land. The land use dynamic index was calculated to identify the relative intensity of land use changes over 1966- 1991 and 1991-2018. The result unveils a significant increase in built-up from 6.15% to 41.73% and barren land from 0.28% to 0.91%. All other land use/ land cover classes exhibit a decreasing trend, most significantly by settlement with mixed vegetation (71.67- 48.56%) and agricultural area (20.27-7.20%). The waterbody shows comparatively slight decrease. The decreasing trend in settlement with mixed vegetation and agricultural area were directly linked with increase in population and built-up facility. The findings of the study focused on instantaneous need for sustainable and ecofriendly development.

Key words- Land use/ Land cover dynamics, Remote sensing, GIS, Urban agglomeration

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Abstract No.M09

EFFECT OF RIVER RAMGANGA ON THE GROWTH OF URBAN SPRAWL OF BAREILLY CITY

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Spatial and temporal growth of a city is function of geomorphic processes that operate in the vicinity of a city. Geomorphic processes act as both facilitator as well as constraint in the growth of urban sprawls. River is an important geomorphic agent that determines the spatial expansion of a city over the time. The land use pattern of a city is also governed by geomorphic process thereby influencing the direction of urban sprawls. The study area of the present study is Bareilly city which is surrounded by river Ramganga from the western side. The objective of the study is to assess the spatial and temporal growth of the urban sprawl of Bareilly city and to determine the influence of river Ramganga on its expansion especially on the western side. The methodology involved in the study is basically primary in nature based mainly on satellite imageries. The land use change detection maps are prepared using ArcGIS which help in assessment of the spatial and temporal change in the urban sprawl and the effects of river Ramganga on the expansion of the city. The findings of the study show a significant change in the expansion of the urban sprawl in all directions over last decade. The expansion of city in the western side is constrained by presence of

river Ramganga. The river course presents a land use pattern of cropland and vegetation. The population of the city is about 9 lakh and the growing population has impacted the land use pattern along the river significantly over the last decade.

Key words: Geomorphic processes, Spatial, Temporal, Urban sprawl, expansion.

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Abstract No.M10

URBANISATION AND RIVER HEALTH STATUS IN PUNE MUNICIPAL CORPORATION (PMC): AN APPROACH TOWARDS SUSTAINABLE URBANISM

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An urbanisation in Indian cities is changing the faces of the society as well as the urban spaces. The natural resources are getting affected due to an ever increasing population in most of the urban areas. Water resources like rivers are more prone to development in the urban areas. Mula and Mutha are the two rivers which flows through the PMC area independently and in confluence afterwards. Both the rivers are seen to me polluted by industrial waste, untreated sewage discharge, household waste and many more. This has led to increasing nutrient content in the river water simultaneously decreasing various other essential aspects in the river water crucifying the biotic community. The rich nutrient content in the river water also has been responsible for increased eutrophication activity in the rivers which has significantly decreased the depth of the river bed. These two rivers are heavily polluted by discharging 125 MLD of untreated water by PMC and hence MPCB has classified these river into class IV water quality category and the CPCB categorised these two rivers in I priority for regaining the water quality (CPCB, 2019). The study area is now facing various health related issues due to deteriorating water quality. An international efforts for making our cities sustainable in terms of its ability to sustain long term viability by reducing consumption, waste and harmful impacts on people and place while enhancing the overall well-being of both people is the major concern of today's world. A long-established approaches to study the river health is the measurement of physical, chemical and some biological characteristics but urbanisation is also responsible for deteriorating river health in PMC. The study makes an efforts to develop approach towards sustainable urbanism by considering the river health status with the help of associated factors of urbanisation.

Keywords: River Health, Urbanism, Urbanisation, Sustainable, Sanitation

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Abstract No.M11

LAND MORPHOLOGY AND SOIL STABILITY OF SUNAR SUB-BASIN, RIVER KEN

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Deformation of the earth surface is a regular process. Composition and textute of the land are important in deciding shape and growth of cultural landscape of any region. Degeration of the land is the result of both physical as well as anthropogic extrimites on the lithosphere. Soil erosion is a major threat to water availability in the semi-arid regions. The dissected Bundelkhand land sphere is experiencing frequent drought, along with limited soil depth is susceptible to a high rate of erosion. Further the nature of landuse has increased the intensity of soil erosion and land degradation. To estimate soil erosion revised universal soil loss equation (RUSLE) is applied on Sunar sub-basin of the Uppar Ken basin. Findings of this investigation is drown after the analysis of various parameters such as rainfall erosivity factor (R), soil erodibility factor (K), slope length (L), slope steepness factor (S), crop management factor (C) and practice management factor (P). Land use land cover (LULC) derived from Satellite data of Sentinel 2A Digital Elevation Model (DEM) was integrated into the modelling.

Keywords: Degradation, Soil erosin, Water Scarsity, RUSLE

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Abstract No.M12

IDENTIFICATION OF CHANGE IN LANDUSE PATTERN WITH URBANIZATION OF JAUNPUR CITY, UTTAR PRADESH USING GEOSPATIAL TECHNOLOGY

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Rapid increase in population of an urban area creates vital impact on landuse pattern and their environment. The city Jaunpur has experienced rapid growth of population in recent decades. This study aims to analyse the increasing trend of population of Jaunpur city and its impact on the landuse between the period 2000 and 2020. It is important to study the constant decrease in the area of natural source of water and surface runoff as well as decrease in number of ponds of the study area. Rills and gullies of river Gomati has been filled with solid waste and garbage to level them for widening of roads and development work of the city. This condition not only

decreases the area of water infiltration but also make ponds shallow and create condition of flash flood in city area.

Related data on urban population has been obtained from the census of India and Landsat imagery have been used to assess the change in landuse. GIS technique has been employed to determine the dynamics of these variables and supervised classification has been deduced. Thus on the basis of study it has been found that increasing urbanization has created adverse effect on the city habitat as its expansion is rapidly encroaching upon the rills, gullies ponds and agricultural areas .

Key words: Urbanization, Landuse, Gullies, Surface run-off, Flash flood .

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Abstract No.M13

पटना जिले के बिहटा प्रखण्ड में सिंचाई प्रबंधन का एक संक्षिप्त भौगोलिक अध्ययन

आदर्श कुमार विद्यार्थी

भूगोल विभाग पाटलिपुत्र विश्वविद्यालय पटना

समान्य परिचयः– यह अध्ययन क्षेत्र पटना जिले के बिहटा प्रखण्ड में सिंचाई प्रबंधन से सम्बंधित है। यह कृषि प्रधान प्रखण्ड है और यहाँ के किसान अनेक फसल उगाते है। यहाँ की जलवायु मानसूनी है, अतः यहाँ कृषि की सफलता बहुत हद तक सिचांई की समुचित व्यवस्था पर निर्भर है इसलिए यहाँ सिंचाई के साधनों का विकास एवं उनका प्रबंधन अति आवष्यक है।

हम जानते हैं कि खेतों में कृत्रिम तरीकों को अपनाकर पानी पहुँचाने को सिंचाई कहते हैं। कुआँ, नलकूप, नहर, पइन, आहर, तालाब सिंचाई के प्रमुख साधन है। मानसून की सीमित अवधि तथा अनिष्चितता ने सिंचाई की आवष्यकता को बढ़ावा दिया है।

उद्देष्यः– बिहटा प्रखण्ड में सिंचाई की वर्त्तमान स्थिति को ध्यान में रखते हुए सिंचाई के उचित साधनों के उपाय एवं प्रबंधन का पता लगाना हैं एवं खेतों में अधिक सिंचाई से मिट्टियों पर क्या प्रभाव पड़ता है उसकी समीक्षा करना है।

सिंचाई की मुख्य समस्याएँः–

(1) जल रिक्त तालिकाएँ जैसे तालाब, पोखर, आहर, पईन का तेजी से भराव के कारण, वर्षा जल का संचयन नहीं हो पाता है जिसके कारण भूमिगत जल स्तर गिरता जा रहा है।

(2) यहाँ छोटी नहर है जिसमें समय पर पानी नहीं आता है जिसके कारण नलकूपों पर सिंचाई निर्भर करता है।

विधितंत्रः–

इस शोधपत्र में प्राथमिक एवं द्वितीयक आँकड़ों का सहारा लिया गया है। लघु सिंचाई विभाग एवं प्रखण्ड के कार्यालयों से प्रमुख आँकड़ों का संग्रह किया गया है।

निष्कर्षः–

ग्रामीण विकास में सिंचाई प्रबंधन की महत्वपूर्ण भूमिका है। यहाँ के किसानों की अर्थव्यवस्था कृषि से जुड़ी है और कृषि का आधार मुख्य रूप से सिंचाई हीं है। अतः सिंचाई के विस्तार होने से फसल उत्पादन में वृद्धि हुई है जिससे ग्रामीणों तथा किसानों के जीवन स्तर में सुधार हुआ है।

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Abstract No.M14

भारत के सिंचाईतंत्र की भौगोलिक समीक्षा

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मानव की तीन मूल आवश्यकताओं में से एक भोजन या आहार की जरूरत होती है। वर्तमान समय में इस मूल आवश्यकता का सीधा संबंध कृषि क्रियाकलाप से है। कृषि क्रिया कलाप से ही भारत में आज बढ़ती हुई जनसंख्या का पोषण हो रहा है। प्रारंभ में यह कृषिकार्य अवैतनिक एवं अनियोजित तरीके से हुआ करते थे। स्वतंत्रता के बाद भारत की जनसंख्या काफी तीव्रगति से बड़ी है। जनसंख्या के वृद्धि के परिपेक्ष में भारत में फसल की उत्पादकता को भी बढ़ाना जरूरी था। 1966-68 के दौरान भारत में मौनसून की अनिश्चितता का दौर आया, फलतः भारत में अकाल का सामना करना पड़ा। इसी समय भारत में फसल की उत्पादकता बढ़ाने के लिए विभिन्न विकल्पों पर विचार होने लगा। कृषि वैज्ञानिकों की सलाह आई की अगर भारतीय कृषि को मानसून पर निर्भरता खत्म कर दिया जाए तो सत्य सघनता बढ़ जाएगी तथा कृषि उत्पादकता अधिक हो जाएगी। इस कार्य के लिए भारत के नदियों से नहर निकालकर सिंचाई का प्रबंध किए जाने का सिलसिला चल पड़ा। यहां यह स्पष्ट करना उचित होगा कि सिंचाई के चलते फसल उत्पादकता 6 गुना बढ़ जाती है तथा कृषि क्रिया कलाप की आवृत्ति बारहमासी हो जाती है। जिसके कारण भारत आज उत्पादन में आत्मनिर्भर बन सका है। विशेषकर धान, गेहूं, मक्का का उत्पादन ज्यादा तेजी से बढ़ा है। यह सबप्र गति के पीछे भारत की सिंचाईतंत्र का हाथ है।

प्रस्तुत शोधपत्र में भारत के सिंचाई तंत्र का संक्षिप्त समीक्षा करने का लक्ष्य रखा गया है। जिसमें नहर, तालाब, कुआं, नलकूप आदि सिंचाई के विकल्प पर विचार किया जाएगा। विश्लेषण के दौरान स्वतंत्रता के समय तथा अध्ययन समय के बीच सिंचाई के आंकड़े पर समीक्षा होगी। इस शोधपत्र में द्वितीयक आंकड़े का प्रयोग किया जाएगा तथा सिंचाई संबंधित तथ्यों का अध्ययन कर शोध विश्लेषण लिखा जाएगा। संबंधित साहित्य का अध्ययन किया गया है। भारत में कृषि क्रांति का मुख्य कारण सिंचाई का विकास ही रहा है। प्रस्तुत शोधपत्र भारत के सिंचाईतंत्र का सामान्य परिचय प्रस्तुत करेगा जिस पर आगे विचार करने की प्रेरणा जाएगी।

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Abstract No.M15

औरंगाबाद शहर में औद्योगिकरण और नगरीकरण एक भौगोलिक समीक्षा

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जैसा कि हम जानते हैं कि मानव आदि काल से रोटी और रोजगार के लिए एक स्थान से दूसरे स्थान पर स्थानांतरित होता रहता है। हमारा जो शोध क्षेत्र है वह दक्षिण पश्चिम विहार का हिस्सा है और समतल भाग यानी मैदानी भाग है। अध्ययन क्षेत्र के पूर्वी भाग से अदरी नदी बहती है। जिस पर एक बांध बना है अध्ययन क्षेत्र के पूर्वी और पश्चिमी सीमांत भाग में औद्योगिक केंद्र का विकास हुआ है। कुछ छोटे-मोटे उद्योग शहर के बीचो बीच वाले भाग पर भी विकास हुआ है। बिहार सरकार की एक संस्था BIADA इन उद्योगों के विकास तथा स्थापना के लिए प्रयासरत रहती है।

बिहार के शहर औरंगाबाद का शहर की आबादी 2011 ई. जनगणना के अनुसार 102,244 हुई है, जबकि 2001 ई. में औरंगाबाद की आबादी 79,351 थी, वहीं 1991 ई. में शहर की आबादी 47,492 थी। इन दो दशकों में औरंगाबाद शहर की आबादी लगभग 55000 बढ़ गई। अगर 2022 ईस्वी में जनगणना हुई तो जनसंख्या और बड़ी हुई ही पाई जाएगी। जैसा कि हम जानते हैं कि भारत सरकार ने 1991 में अपनी औद्योगिकी नीति में बदलाव लाया, ताकि उद्योग धंधों का ज्यादा से ज्यादा विकास हो सके। अध्ययन क्षेत्र का क्षेत्रफल 21.33 वर्ग किलोमीटर है। विगत दो दशकों में शहर की आबादी लगभग दो गुना से भी ज्यादा बढ़ गई है। इस शोध पत्र को तैयार करने में द्वितीयक आंकड़ों का सहारा लिया गया है, लेकिन शहर में तथा शहर के पश्चिमी तथा पूर्वी क्षेत्र में फैले उद्योग के कारण शहर की बढ़ती जनसंख्या के विषय में संबंध जा सकता है।

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Abstract No.M16

CHANGES IN URBAN GEOMORPHOLOGY DUE TO THE INTRODUCTION OF DELHI METRO RAIL

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The Spatial-Temporal Expansion of the Delhi Metro Rail has enhanced the Change in Land-use Pattern in Delhi. Initially this has led to more commercial development followed by mixed land use development of residential and commercial which ultimately changed Urban Geomorphology of Delhi. Both primary and secondary data collection method was used for the study. For primary data total 100 respondent were approached (Local Residents-50, Property Dealers and Real Estate Authorities-50). Also various maps for change in land-use pattern by Delhi Metro. Study found that great changes in Urban Geomorphology of Different areas of Delhi due to changes in land-use Pattern since introduction of Delhi Metro rail

Key Words: Delhi Metro Rail, Spatial-Temporal Expansion, Change in Land-use Pattern and Urban Geomorphology

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Abstract No.M17

A GEOGRAPHICAL APPRAISAL ON SPATIO-TEMPORAL VARIATION OF GROUNDWATER LEVEL IN NADIA DISTRICT, WEST BENGAL

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Groundwater is one of the most widely used natural resources in India and it is one of the major sources for drinking, irrigation and ecosystem. The groundwater withdrawals depend on groundwater recharge which is mainly controlled by climatic

and geomorphic factors. Over exploitation by human being along with climate change, the groundwater level of Nadia district is continuously fluctuating which increases the risk of arsenic hazard. This study examines the 20 years records of observed groundwater levels and rainfall over the Nadia district in West Bengal. Groundwater data have been collected from CGWB and IDW interpolation technique has been used in GIS environment to prepare groundwater level map. Mann-Kendall trend test has been implemented to examine the trend in rainfall pattern. Pearson's correlation coefficient has been used to bring out the correlation between rainfall distribution and groundwater fluctuation. Landuse/landcover, NDVI maps have been prepared and correlated with groundwater level to understand the geomorphic factors behind spatial variation in groundwater level. Rainfall trend also analysed using Mann-Kendall Trend Test to find the relationship between climate change and temporal variation in groundwater level. The study revealed that the variation in geographical factors and climate change are responsible for the fluctuation in groundwater table.

Keywords: Climate change, Groundwater fluctuation, IDW interpolation, Mann-Kendall trend test, NDVI, NDWI

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Abstract No.M18

ENCROACHMENT OF WATER BODIES: A CASE STUDY IN TWO URBAN CENTRES OF NADIA DISTRICT, WEST BENGAL, INDIA

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The term encroachment is mainly related to forceful capturing of any existing structure, undoubtedly it may be told that our Nature is totally encroached by anthropogenic activity, as a natural element the water bodies are also not beyond the grip of human being. The present paper highlights on an area which is part of lower Gangetic delta and all the socio-economic and cultural activity here is truly dependent upon the water bodies surrounding the area. The selected two urban centres- Krishnagar and Shantipur are in Nadia District, West Bengal. The selected two urban centres were chosen as ideal spots for residential growth in 17^{th} to 18^{th} century, and it is their location beside the rivers that caused the growth of such centres. Gradually residential growth in an unplanned manner became the criteria of urban area expansion for both the centres.

Objective of the study is to show the spots of encroachment of water bodies and analyse the impact of such encroachment at local and regional level. Study of satellite images, their comparison with previously published maps, review of literature revealing the local cultures are done along with field study as methodology of the research work. Impact of such encroachment on drainage, water availability for domestic and agricultural purpose is within the findings of the study.

Keywords: water bodies, encroachment, urban centres, drainage.

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Abstract No.M19

ASSESSING NEIGHBOURHOOD VULNERABILITY: A STUDY OF RELATIONSHIP BETWEEN NEIGHBOURHOOD SOCIO-ECONOMIC STATUS AND NEIGHBOURHOOD ENVIRONMENT

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Vulnerability has arisen as a complex theme of research in environmental studies, and assessing vulnerability has become a real concern in developing countries. Vulnerability refers to exposure to risk and the inability to avoid or absorb potential harm (Lavell et al., 2003). Identifying neighbourhood vulnerability is an attempt to help government officials, understand a specific neighbourhood's vulnerability, recognise infrastructural gaps and involve urban poor in the planning and implementation process. Multi-criteria decision making using Analytic hierarchy process has been used to identify vulnerable neighbourhoods of the city. Total 14 major neighbourhood environmental problems of the city, i.e. irregular supply of water, water quality problem, open drains, poor cleaning of drains, waterlogging, inadequate waste collection, waste accumulation in neighbourhood, overcrowding, narrow streets, air pollution, noise pollution have been used to identify environmentally vulnerable neighbourhoods of Azamgarh city. Similarly, socio-economically vulnerable neighbourhood in the city were identified using 6 decision factors, i.e. percentage low to very low income households, percentage respondents educated below graduation level, percentage respondents engaged in unorganised activities, percentage of houses made up of *kachcha*/mixed type of material, without a separate kitchen and without toilet facility in the houses, in different neighbourhoods. Analytic hierarchy process and Weighted linear combination technique has been used to identify socio-economically vulnerable neighbourhood. Furthermore, an attempt was made to identify the association between the neighbourhood environment and socio-economic condition of the neighbourhoods. The results revealed that there exists a strong relationship between neighbourhood socio-economic status and overall neighbourhood environment.

Keywords; Neighbourhood Environment, Neighbourhood Socio-economic status, Vulnerable neighbourhoods, Analytic hierarchy process, Weighted linear combination

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Abstract No.M20

ISSUES ASSOCIATED TO URBAN SPRAWL WITH SPECIAL REFERENCE TO LUCKNOW CITY, UP

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Urbanization is one of the most vibrant human activities in the present day context across the world , affecting the quality of urban life and its sustainable development.

Urban sprawl in simple terms refers to the rapid growth of the geographical context of cities and towns more than usual. This phenomenon mainly started with the industrial revolution in the nineteenth century when the economic and population growth facilitated the migration of people from rural to urban areas. Urban sprawl in context to Lucknow city post 2005 is increasing at a very rapid pace and attracting various sorts of issues in the socio-economic, environmental, demographic etc. arena. Thus, the present study is focused on dealing with the issues associated to urban sprawl in Lucknow city and also suggesting sustainable use of land to conserve the environment. The negative effects that urban sprawl can have on a community, its people and resources helps to realize why the urban planning is a very eminent aspect.

Keywords: Urban Sprawl, sustainability, urban expansion, urban planning

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Abstract No.M21

URBAN SPRAWL AND ITS IMPACT ON SUSTAINABLE DEVELOPMENT: A CASE STUDY IN ALLAHABAD CITY

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The present study deals with Urban sprawl and its impact on sustainable development. In the 20th century, cities and towns have been rapidly expanded. This trend is projected to remain stable in future and to affect land use patterns in multiple ways. In the case study of of Allahabad city, we observe a type of urban Sprawl that goes along with the waves of suburbanization. By 2050 close to 70% of the global population will live in cities. Many rural areas are converting into town and towns into cities, which increases urban expand. It is predicted that India will hold the largest population of the world by 2028 which will force to people for moving from rural to the urban areas. Urban Sprawl has resulted in loss of productive agricultural land, open green space and loss of surface water bodies

Keywords: Urban sprawl, sustainable development, Suburbanization, productive agricultural land

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Abstract No.M22

LAND MORPHOLOGY AND SOIL STABILITY OF SUNAR SUB-BASIN, RIVER KEN

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Deformation of the earth surface is a regular process. Composition and textute of the land are important in deciding shape and growth of cultural landscape of any region.

Degeration of the land is the result of both physical as well as anthropogic extrimites on the lithosphere. Soil erosion is a major threat to water availability in the semi-arid regions. The dissected Bundelkhand land sphere is experiencing frequent drought, along with limited soil depth is susceptible to a high rate of erosion. Further the nature of landuse has increased the intensity of soil erosion and land degradation. To estimate soil erosion, revised universal soil loss equation (RUSLE) is applied on Sunar sub-basin of the Uppar Ken basin. Findings of this investigation is drown after the analysis of various parameters such as rainfall erosivity factor (R), soil erodibility factor (K), slope length (L), slope steepness factor (S), crop management factor (C) and practice management factor (P). Land use land cover (LULC) derived from Satellite data of Sentinel 2A Digital Elevation Model (DEM) was integrated into the modelling.

Keywords: Degradation, Soil erosin, Water Scarsity, RUSLE

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Abstract No.M23

HYDRAULIC MODELLING OF RIVER BED SAND MINING AND VEGETATION-BASED BANKLINE PROTECTION MEASURES ALONG THE SILAI RIVER, WEST BENGAL

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Commercial extraction of sand from rivers and riparian zones has far-reaching deleterious effects on the riparian functionality and ecology. The Irrigation and Waterways Department of West Bengal has identified about 248 illegal sand mining sites along the major rivers of Rarh Bengal. Among these, massive sand mining has taken place along the middle course of the River Silabati in Paschim Medinipur over the last seven years (2014-2020). These have brought about substantial changes in the channel morphology together with alteration of the hydrological regime and ecological constitution of the riparian zone. This study undertakes a detailed analysis of the major mining sites herein, highlighting the bed degradation (formation of sand hollows, deep pools and sand roads) and destruction and consequent submergence of existing natural sand bars, which are the most distinguishable effect of mining, together with channel deepening and widening and loss of in-stream river biota (decreased fish population) due to increased turbidity and lowered DO concentration along such sites (ascertained from collected water samples). Another notable impact of mining has been the complete removal of riparian vegetation (examined from field and remote sensing datasets) that has not only caused loss of channel-floodplain connectivity but has also prompted channel and riverbank instability due to the increased hydraulic effect within the deepened pools that causes toe-scouring and subsequent bank collapse and loss of arable lands. Live vegetative buffers (Vetiver grass) lining such unstable banks can provide some relief to such hazards. 1-D hydraulic modelling in HEC-RAS of the Silabati River was used to examine the effect of the grass' aboveground biomass in providing bankline protection and to measure

changes in usual flow conditions due to sand mining. Such vegetative buffers have therefore been seen as a promising tool in providing overall channel and riverbank stability in these heavily affected sites.

Keywords: sand mining, channel morphology, riverbank instability, vegetative buffers, hydraulic modelling

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Abstract No.M24

SUSTAINABLE DEVELOPMENT AND PHYSICAL GROWTH OF AYODHYA CITY: A CASE STUDY IN URBAN GEOMORPHOLOGY

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Ayodhya city (Ayodhya- Faizabad Urban Agglomeration) is sacret place of India. The extent of the study area is 26° 41′ to 26° 80′ N latitude And 82° 12′ to 82° 20′ E longitude,along the right bank of river Saryu (Ghaghara). Ayodhya city has important place among Indian cities. . Ayodhya is sacret place not only for Hindu, but also to other religions of India. Ayodhya development is being invisaged as a Spiritual Center, Global Tourism Hub and a sustainable Smart city. Town planning heritage, infrastructure, urban design, renewal and transport would be included in the masterplan for new Ayodhya. Development represents the entire gamut of change by which the entire socio-economic tuned to the diverse basic needs and desires of individuals and social groups within that system moves from a condition of life which is materially and spiritually better. The present study evaluate the physical growth scenerio of the city with respect to it urban geomorphology and its possible impact, to suggest planning strategies in order to achieve the goal of sustainable development.

Keywords: Sustainable development, Infrastructure, Smart City, Indian cities, Inclusive development

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Abstract No.M25

ASSESSING THE SPATIO-TEMPORAL EFFECT OF URBANIZATION ON URBAN POLLUTION IN LUCKNOW

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Air pollution led by rapid urbanization has emerged as a major concern in today's era. It has an impact on the environment and social life of people. The consequences of

pollution have led to poor urban air quality in many Indian cities. The study examines the spatiotemporal concentration of Aerosol Optical Depth (AOD) and its relationship with the changing urban geomorphology in Lucknow. The seasonal spatiotemporal analysis was carried out for three composite years of 2001-2006, 2007-2012 and 2013-2018. MODIS sensor has been used to download the monthly datasets of Land Surface Temperature (LST), Normalized Difference Vegetation Index (NDVI) and AOD from 2001 to 2018. The urbanization parameters such as built-up, population and population density have been extracted from the Global Human Settlement Layer (GHSL) dataset for the years 1990, 2000 and 2014. The spatiotemporal assessment, implication of urbanization and urban pollution and its trend has been studied. Similarly, season-wise Pearson's correlation assessment has also been studied. Mann-Kendall trend test has been performed to understand the trend significance. The results show that there is an increase in AOD in urban and rural areas indicating an increase in anthropogenic activities over time. The increase of vegetation cover has also decreased the LST. The Pearson's r correlation for AOD-LST for all seasons varied between -0.4 to -0.5 except in the case of monsoon and the exact opposite result has been found for AOD-NDVI. LST and NDVI also have moderate negative correlation with the value ranging from -0.4 to -0.7. Further, the Mann-Kendall test was found to be significant for AOD. Major characteristics of urbanization, like, deforestation, industrialization, vehicular emissions etc. have been the main reason for the increasing pollution.

Keywords: Aerosol Optical Depth, Land Surface Temperature, MODIS, Global Human Settlement Layer, Mann-Kendall Test, Pearson's Correlation

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Abstract No.M26

कोराँव तहसील में भूमिगत जल परिवर्तन के कारण एवं प्रभाव

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जल ही जीवन है पृथ्वी तल के नीचे स्थित किसी भूगर्भिक स्तर की सभी रिक्तियों में विद्यमान जल को भूमिगत जल कहते हैं। वर्तमान अध्ययन क्षेत्र प्रयागराज जिले में कोराँव तहसील में भूमिगत जल के संदर्भ में है। सम्पूर्ण जल (शुद्ध एव लवणीय) का महासागरों में 97.39 प्रतिशत, हिमटोपियों, हिमखण्ड, हिमनद के रूप में 2.01 प्रतिशत भूमिगत जल 0.58 प्रतिशत है। सम्पूर्ण जल मण्डल का 2.6 प्रतिशत भाग शुद्ध जल हिमखण्डों तथा हिमनदों के रूप में है। 22.21 प्रतिशत भूमिगत जल के रूप में है।

भूमिगत जल का प्रतिशत दिन प्रतिदिन घटता जा रहा है जो लोगों के पीने का प्रमुख माध्यम है। विश्व पटल पर देखा जाये तो केपटाउन में भूमिगत जल लगभग समाप्त हो गया है और भारत में चेन्नई भूमिगत जल की विकट समस्या से गुजर रहा है। अतः वहाँ भी भूमिगत जल लगभग–लगभग समाप्ति की कगार पर है। अतः हमारा भी अध्ययन क्षेत्र एक पठारी क्षेत्र है, जहाँ पर भूमिगत जल का निस्पंदन अच्छी तरह से नहीं हो पाता है अतः यह क्षेत्र भी भूमिगत जल की समस्या से गुजर रहा है। जिसके बारे में यहाँ पर अध्ययन किया जायेगा। भूमिगत जल के कारणों एवं प्रभावों के बारे में अध्ययन किया जायेगा।

भारत के यदि मानचित्र को देखा जाये तो पठारी क्षेत्रों में भूमिगत जल की अधिक समस्या है वहीं मैदानी क्षेत्रों में भूमिगत जल प्रचुर मात्रा में उपलब्ध है। मेरा अध्ययन क्षेत्र प्रायद्वीपीय पठारी नोज का उत्तरी हिस्सा है। वहाँ पर भूमिगत जल की समस्या अक्सर बनी रहती हैं। अतः भूमिगत जल की कमी के पीछे प्रमुख कारण–संरचना, वर्षा की कमी, ढ़ाल, अत्यधिक सिंचाई है।

प्रभाव यदि इसी तरह भूमिगत जल का दोहन होता रहा तो मनुष्य को पीने योग्य पेयजल की उपलब्धि नहीं हो पायेगी, फसलों के लिए सिंचाई के साथ–साथ मानव के भोजन एवं रहन सहन पर प्रतिकूल प्रभाव पड़ेगा।

कुंजी शब्द– संरचना, वर्षा की कमी, अत्यधिक सिंचाई, निष्पंदन की कमी।

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Abstract No.P01

SUSTAINABILITY OF WATER QUALITY IN ALLUVIAL GANGA PLAINS AND VINDHYAN PLATEAU IN MIRZAPUR DISTRICT, UTTAR PRADESH, INDIA

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In the present and future, water will be a vital resource challenge for the world's social and economic growth. Water scarcity is spreading across Asia due to increasing water demand, bad management practises, and irregular rainfall patterns. However, rising global water demands and bad management practises have already wreaked havoc on the ecosystem over decades. The social, economic, financial, and health benefits of proper water quality management are enormous. Water resource quantity and efficiency, as well as economic health and social well- being, are all dependent on sustainable growth. As a result, this paper aims to highlight the state of water quality using selected sample sources obtained from Mirzapur District's Alluvial Ganga Plains and Vindhyan Plateau regions. The primary goals of this research paper are to assess the quality of water supplies in the study area and make recommendations to politicians, officials, and people. To collect primary data, Stratified Random Sampling was chosen. Field investigations were performed in the Mirzapur district of Uttar Pradesh between July 2012 and June 2013 since this research was conducted in 2012-14. To cover both physiographic divisions, water samples were obtained from seven villages: three from the Alluvial Ganga Plains (Semara, Bainsa, and Kelawela) and four from the Vindhyan Plateau (Lalapur, Sikta, Baruha, and Salaiya). The water quality study was conducted using twenty-one (21) water quality parameters. Each village collected one surface water (Pond/Check Dam) and two ground water (Well/Tube Well/Hand Pump) sample.

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Abstract No.P02

STATUS ASSESSMENT OF URBAN GREEN SPACES IN KOLKATA MUNICIPAL CORPORATION USING GEOSPATIAL APPROACH

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The present study is an attempt to assess and evaluate the status and distribution of urban green spaces in Kolkata Municipal Corporation over the thirty years of time period. The current study is primarily based on both spatial as well as non-spatial data; tools and techniques of geospatial technology. To get better results LULC change, LULC transformation, NDVI, NDVI transformation, per capita as well as per unit area wise green space have been calculated. Huge transformations have been observed under built-up, green space, open space and water body with 4104.39 ha, -2338.02 ha, -688.02 ha, and -1078.36 ha respectively over the study period. A drastic change has also been observed in per capita as well as per unit area wise green space from 1991 to 2020 with 18.18 m^2/city dweller and 0.38/km^2 to 12.46 m^2/city dweller and 0.27/km^2 respectively. The study area has 6 million floating population and 4.5 million residential population which cumulatively exert immense pressure on land transformation under green space to secure residential facilities, administrative services, business and commercial services, employment opportunities and medical services etc. The adverse impacts of rapid decline of green space could be definitely seen in air pollution, noise pollution, creation of micro climate within the urban centre like urban heat island and loss of biodiversity etc.

Keywords Urban green space (UGS) · Land use/land cover transformation· Per capita green space· Per unit area green space· Distribution of green space· Status of green space

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Abstract No.P03

MONITORING LAND USE LAND COVER CHANGES IN CHANDEL DISTRICT, MANIPUR, USING REMOTE SENSING AND GIS TECHNIQUES

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Land coverage is ever changing. The Land area usage has changed drastically due to anthropogenic activities. Monitoring the Land Use Land Cover Dynamics of a region is therefore, crucial for sustainable Management of Natural resources. This study illustrates the dynamics of Land Use Land Cover of the study area during several periods, namely, 1994,2003, 2014 and 2021 in the district of Chandel. Landsat Thematic Mapper series were used to produced Land Use Land Cover maps for the above-mentioned years. Supervised classification based on Maximum-Likelihood was

employed to classify the images into five classes, namely; Vegetation cover, Built-up, Agricultural land, Bare Soil and water Bodies. The LULC result indicates that during the period 1994-2003, vegetation cover has reduced by 2.97%, Built-up area increased by 76% while Agricultural land reduced by 2.87%. During 2003-2014 Vegetation cover increases by 6.5 %, built-up area grew by 163.9% while agricultural land dipped by 10.82%. 2014-2021 showed an increase in vegetation cover and built-up area by 3.19% and 26.98% respectively, while agricultural land was decreased by 18.70%. The study showed that proper management plan is needed for a sustainable environment.

Keywords: Land Use Land Cover, Supervised- Classification, Maximum-Likelihood, RS and GIS.

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Abstract No.P04

LAND USE LAND COVER ANALYSIS AND CHANGE DETECTION OF IMPHAL WEST DISTRICT, MANIPUR – A GIS & REMOTE SENSING PERSPECTIVE

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The extent of land coverage is quite diverse basing on the geographic region. Land cover usually refers to the physical characteristics of Earth's surface, captured in the distribution of vegetation, water, soil and other physical features. Land use defines the way in which land was used by humans and their habitats (such as agriculture, settlements, industry etc.). Land Use and Land Cover (LULC) changes play a major role in the study of global change. It has become an integral component in managing natural and monitoring change. In this study, Land cover change mapping and monitoring was done in the study area i.e. Imphal West District, Manipur. Satellite images for March, 2003 and January, 2019 were used for Land Use/Land Cover (LULC) Supervised Classification. Four LULC classes were decided for the classification purposes viz. Built-up Area, Water Body, Vegetation, and Others. Image Preprocessing was done using Landsat 7 and Landsat 8 images which were used to perform LULC classification for the years 2003 and 2019 respectively. Supervised LULC classification for 2003 and 2019 was performed based on Maximum Likelihood algorithm. Land Use Land Cover Maps were then produced for the years 2003 and 2019. Accuracy Assessment was performed after the classification. LULC Change Detection for the years 2003 and 2019 was performed subsequently. The most significant change was observed in the "Others" class (which includes areas such as wetlands, marshes, fallow lands, bare soil, etc.) with a decrease from 279.91 sq.km. in 2003 to 223.66 sq.km. in 2019, with a net decline of 56.25 sq.km. The overall accuracy of classification methodology is 80% and 80.9% respectively for the March and January images.

Keywords: Land Use, Land Cover, Supervised Classification, Change detection, Maximum Likelihood, Accuracy Assessment.

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Abstract No.P05

GEO-SPATIAL ANALYSIS OF LAND USE/LAND COVER CHANGES AND GEO-SIMULATION USING CA-MARKOV WITH ANN: A CASE STUDY IN BERHAMPORE, MURSHIDABAD.

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To meet their requirements, humans have always had to modify their surroundings. Increased extraction has harmed habitats and natural processes on a local, Regional and global scale. Unregulated population growth, industrial expansion, and economic Growth, on the other hand, is the primary contributor to the modification of land use. Every available piece of land must be exploited to the greatest extent possible to improve a Region's economic standing while minimizing future damage to the bio-environment. Land cover refers to the bio-physical body that has been observed on the earth's surface, whereas "land usage" refers to how this biophysical cover has been exploited. Land use tracking has become one of the most dependable and successful ways as a result of the advent Of remote sensing and geographic information systems (GIS). The land use and land cover of The study area changed significantly between 1991 and 2021. According to the image analysis, Built-up areas and forests or plantations cover increases 13.08 km^2 and 15.46km^2 respectively at the cost of agricultural land. The built-up area increased during the study period, with the high population growth rate and infrastructure expansion contributing to the growth of the built-up region.

Keywords: Land Use, Bio-Physical, Geographic Information System, Remote Sensing

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Abstract No. P06

LAND USE AND LAND COVER MAP USING GEOSPATIAL TECHNIQUES IN THE RAMGARH-NAUDIHA, SONBHADRA DISTRICT, UTTAR PRADESH

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This study mainly focuses on the usage of the geographic information system (GIS) and land use to identify the land use classification in Ramgarh-Naudiha region, which

is located in the district of Sonbhadra in Uttar Pradesh (UP) state, India. This paper mainly focuses on the classification and identification of the Land Use and land Cover in the period of 2018 based on the satellite data. The aim of this study was to investigate the effect of land use expansion on the natural environment of the Ramgarh-Naudiha, Sonbhadra district, Uttar Pradesh. Different remote sensing and GIS techniques were applied, such as digital image processing using Un-supervised classification and image indices. Un-supervised classification was applied on the Landsat 8 (2018). Landsat images 2018 were Geo-referenced, Radio-metrically and atmospherically calibrated to detect the changes in the Land Use Land Cover. Agricultural land is the main class in the study area.

Keywords: Land Use and land Cover, RS&GIS and Unsupervised.

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Abstract No. P07

INDICATOR BASED INHERENT FOREST VULNERABILITY USING MULTI CRITERIA DECISION MAKING ANALYSIS IN THE DARJEELING DISTRICT OF WEST BENGAL

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Forests are among essential natural resources having implications over global fresh water distribution, carbon cycle and biodiversity. Forests are characterized by several inherent properties specifically canopy cover density and species diversity which enhance their resilience. These resources have been affected by various climatic and non-climatic stressors since last few decades. Thus, assessment of inherent forest vulnerability is essential for lessening the forest vulnerability and increasing resilience. We used twelve site-specific factors in Darjeeling district of West Bengal in India namely forest fragmentation, vegetation types, biological richness, disturbance index, temperature, rainfall, soil types, land use/land cover, geology, geomorphology, normalized difference vegetation index (NDVI) and normalized difference water index (NDWI) for assessing their contribution to forest vulnerability. These factors were assigned weights in Analytical Hierarchy Process (AHP) and integrated in geographical information system (GIS) to prepare forest vulnerability map. The results revealed that more than half area of the district (57.3 %) was high to very highly vulnerable. Forest fragmentation, NDVI, biological richness and disturbance index were identified the most influencing factors of inherent forest vulnerability in the study area. Assessment of inherent forest vulnerability may help in articulating effective policy measures for enhancing the forest cover in priority

areas. Furthermore, the study may provide a baseline for regional to local level inherent forest vulnerability assessment globally.

Keywords: Inherent forest vulnerability; Site-specific indicators; AHP; GIS; Darjeeling

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Abstract No. P08

ANALYZING NIGHTTIME LIGHTS FOR SOCIO-ECONOMIC DEVELOPMENT: A CASE STUDY OF DELHI-NCR REGION

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It is of great significance to timely, accurately, and effectively monitor land use and land cover in city regions for reasonable development and utilization of urban land resources. In this study, social-economic activity changes are investigated by using Remote Sensing and Geographic Information Systems (GIS) in the Delhi-NCR. We show that nighttime lights are positively associated with these location-specific indicators of human development, and that the variation in nighttime lights can explain a substantial share in the variation in these indicators. Night-light data, which provides a numerical measure of brightness of the earth during the night, is a direct result of human activities and holds enormous potential in economic analysis. From a policymaking perspective, night-light data can be useful in several ways. In addition, it has good influence in order to maintain the sustainable development of modern society. This has encouraged analysts and policymakers to supplement the National Accounts Statistics (NAS) with new and innovative data sources, including the use of big data to produce better estimates. We conclude that nighttime lights are a good proxy for human development at the local level.

Keywords: LULC, Night-light, Remote Sensing and Geographic Information Systems, NAS.

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Abstract No. P09

औरंगाबाद जिले में जल की उपलब्धता की समस्या:एक भौगोलिक अध्ययन

जल अजैविक या भौतिक संघटक का एक महत्वपूर्ण घटक है। यह जीवमंडलीय तंत्र में सभी प्रकार के जीवों के लिए अत्यावश्यक तत्व है। जल के बिना किसी प्रकार का जीवन संभव नहीं है। जल का उपयोग उद्योग, परिवहन,कृषि, भवन निर्माण एवं घरेलू क्षेत्रों में किया जाता है। औरंगाबाद जिले में कुछ वर्षों से ट्यूब वेल के पेय जल के सेवन से फ्लोरिस के हो गए हैं। फ्लोराइड की मात्रा सीमित मात्रा से कई गुणा अधिक होने के कारण इस योग से बीमारियों की संख्या में वृद्धि हुई है। साथ ही मृत्यु दर बढ़ रही है। लोहा, नाइट्रेट,फ्लोराइड आदि धातु एवं अधातु मात्रा में पाये जाने के कारण ट्यूब वेल का जल सेवन के लिए अनुपयुक्त माना गया है। फलस्वरूप

जल की उपलब्धता एवं गुणवत्ता दोनों प्रभावित है। औरंगाबाद जिले की जमीन पथरीली है। भूमिगत जल का सभी जगह एक समान वितरण नहीं है क्योंकि जटिल और दृढ़ आधारभूत प्रायद्वीपीय पठार के उपरी मृदा आवरण है।

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Abstract No. P10

BI-DECADAL SCENARIO OF SALT WATER INTRUSION RISK AND ITS RELATION WITH MANGROVE SPECIES – A CASE STUDY OF COASTAL TRACT OF RAIGAD DISTRICT MAHARASHTRA

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Anthropogenic factors ought to increase stress on ground water resources and further boost up saltwater intrusion along the coastal zones. Raigad, a coastal district located on west side of Maharashtra, is observed to be vulnerable to salt water intrusion. Mangroves being the salt tolerant specie, has varied growth trend with some areas of exponential growth and some with stagnant growth trend. In the present research an attempt has been made to understand saltwater intrusion risk and its relation with mangrove varied growth during bi-decadal time frame. Saltwater intrusion risk has been assessed through GALDIT model. This model depends on hydrogeological parameters of a region. GALDIT scores for Raigarh district has been calculated for the year 2000 and 2019. Results reveal that GALDIT scores have increased from moderate vulnerable to highly vulnerable. Four distinct saline hotspots in the study area have been obtained from the analysis. Shivardhan, Murud, Alibag and Uran taluka shows increase in salinity. Representative mangrove patches in the hotspot zones reveals the fact that spatial growth of mangrove species is totally dependent on salinity of the area with *Avicennia marina* being most salt tolerant and *Excoecaria agollache* been least salt tolerant. The present research work can be implemented for conservation and plantation of mangrove forest in an area.

Key words: Salt water Intrusion, GALDIT, Mangroves, Remote Sensing.

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Abstract No. P11

CHANGE MATRIX ANALYSIS OF FOREST COVER IN SIBSAGAR DISTRICT, ASSAM

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In Assam, Sibsagar is one of the most important regions for inclusive development of forest conservation. Earlier, Assam is a land of "Jungle" but owing to increasing numbers of population and expansions of economic activities the forest cover of

Assam has been declining. Records stated that the ancient rulers of Assam are incredibly aware about the maintenance of forests. It was established through the act of "Ahom Ruler" who set up a separate arrangement of the forest. The management of timbers, forests exploitation and timber depots looked after by a separate wing during the "Ahom" period. The title awarded by the Ahom Kings to persons who employed in the occupation of the forest is "Kathakatia Baruah", "Kharikatia", "Kath Bharali", "Nahar Katia", Habiyal Baruah" etc. However, the Ahom ruler imposed taxes on a large variety of forests products. The Ahom ruler also appointed officers like Habial Barual and Kathkatia Baruah to look after forest products and forests timbers respectively. According to the Tungkhangia Buranji (history) Habial Baruah is an Ahom officer-in-charge of forest and forest revenue.

The present study used satellite data from Landsat ETM for the year 1991, 2001and 2016 and IRS-1c- LISS-III image for the year 2012.These data were taken from the Global Land Cover Database maintained by United States Geological Survey (USGS). For the year 1971, Survey of India (SOI) topographic map is used for ground work. The analysis of satellite data shows that the total area of forest cover in Sibsagar District, Assam was 361.25 km^2 in 1971 and afterward it was decreased to 122.83 km^2 in 2016.

Key Words: Jungle, Land Sat-ETM and IRS-1c- LISS-III.

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Abstract No. P12

WATER MANAGEMENT IN PRAYAGRAJ CITY

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Water is an important and the largest natural resource but only 3% is of freshwater. Water has multiple uses ranging from agriculture, industry and household use. The problem of water availability and quality are mounting problems and the problem is of social importance. Reports by World Bank as well and NITI Ayog have cautioned about looming water crises as both surface water and ground water both are depleting and the quality is declining. In such situations water management is need of hour. Water resource management is the activity of planning, developing, distributing and managing the optimum use of water resources. The current paper deals with the issues of problem and prospects of water resources in the Prayagraj city and suggest the water management practices suitable to geography, demand and availability. The study region is a metropolis water demand for water is continuously increasing. The methodology of paper is mainly based of secondary data sources. The maps of the region on water resources are prepared using GIS and to present data graph table and digrame are used. The findings suggest declining water table and declining availability of water. It finds some areas with severe shortage. The sustainable water management practices are required to ensure conservative of water resources in the region.

Key Words : Water Resources, Groundwater, Sustainability Management

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Abstract No. P13

EFFECT OF WEATHER AND STORAGE CONTAINERS ON SEED MYCOFLORA: A CASE STUDY OF *AZADIRACHTA INDICA*

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Seeds of medicinal plants, like those of agricultural and horticultural crops, carry a wide variety of micro-organisms like fungi, bacteria and even some viruses. Seeds may be attacked by the microbes while still borne on the trees in the field, during storage and subsequent handling before use. The storage methodology of seeds is found to be different at various places such as market, godowns, laboratories etc. They may be stored in gunny bags, tin box, glass bottles etc. Seeds are used as medicine. These seeds are found to be frequently contaminated by fungi (Roy *et al*. 1988, Mamatha *et al*., 2000). A preliminary survey of seed mycoflora was undertaken at four locations during the years 2018-2019. Chaurasia (1990) investigated that almost all medicinal seed samples were associated with a large number of fungi. Some of these had heavy contamination of toxigenic *Aspergillus flavus* strains. The drug manufacturers without examining the raw drug samples from microbial association manufacture the finished herbal drugs. Therefore, it is essential to pay adequate attention to the effect of weather on medicinal seed mycoflora.

Key: Medicinal seeds, seed mycoflora, fungi, bacteria.

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Abstract No. P14

बुंदेलखंड क्षेत्र में प्राकृतिक संसाधनों का वितरण प्रतिरूप : जनपद झाँसी (उत्तर–प्रदेश) के विशेष संदर्भ में

1. गरिमा 2. डॉ आर. जी. कुशवाहा

1. शोधार्थिनी, भूगोल विभाग, बुन्देलखण्ड विश्वविद्यालय, झाँसी (उत्तर प्रदेश)

2. एसोसिएट प्रोफेसर, एवं विभागाध्यक्ष, भूगोल विभाग अतर्रा पी0जी0 कॉलेज, अतर्रा बांदा (उत्तर प्रदेश)

प्राकृतिक संसाधन प्रकृति द्वारा प्रदत्त बहुमूल्य उपहार हैं जो मानव जीवन की विभिन्न आवश्यकताओ को पूरा करते हैं एवं मानवीय तथा सामाजिक कल्याण में भूमिका निभाते हैं प्राकृतिक संसाधनों के अंतर्गत मुख्य रूप से भू–भाग, पर्वत, पठार, मैदान, नदी, जल, मृदा, प्राकृतिक वनस्पति इत्यादि को सम्मिलित किया जाता है प्राकृतिक संसाधन ही किसी क्षेत्र के विकास को मूल आधार प्रदान करते हैं मनुष्य की उत्पत्ति के प्रारम्भिक काल से वर्तमान समय तक के प्रौद्योगिक एवं औद्योगिक विकास के मूल में प्राकृतिक संसाधन ही केन्द्रीय भूमिका में रहे हैं शोध क्षेत्र बुंदेलखंड एक विशिष्ट भौगोलिक एवं सांस्कृतिक प्रदेश है जिसमें प्राकृतिक संसाधनों का अपार भंडार पाया जाता है परंतु संसाधनों के दोहन एवं उनके विवेकपूर्ण उपयोग के अभाव में बुंदेलखंड क्षेत्र न केवल उत्तर प्रदेश राज्य में बल्कि सम्पूर्ण देश में अति गरीब तथा पिछड़े क्षेत्र के रूप में जाना जाता है इस क्षेत्र में प्राकृतिक और मानवीय संसाधनों के विकास की अपार संभावनाएं मौजूद हैं जिसका उपयोग करके इस क्षेत्र का सर्वांगीण विकास कर इसे आत्मनिर्भर ईकाई बनाया जा सकता है

मुख्य–शब्द : संसाधन,प्राकृतिक संसाधन, प्रौद्योगिकी, औद्योगिक विकास,सांस्कृतिक प्रदेश, विवेकपूर्ण उपयोग

Abstract No. P15

MORPHOLOGY AND HABITAT CHARACTERIZATION OF INTERMITTENT RIVERS AND EPHEMERAL STREAMS (IRES) OF CHANDRA PRABHA BASIN, MIDDLE GANGA PLAIN

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Intermittent rivers and ephemeral streams (IRES) are non-perennial that does not flow continuously in space and time. However, these are critical for sustained flow downstream, providing habitat for many organisms, and regulating chemical and biological processes. There are numerous IRES found in different geomorphic units of India, i.e. plains, plateaus and mountains. Due to climate change and water withdrawals for human activities, IRES are gradually increasing, which has implications for freshwater biodiversity and the ecosystem services that rivers provide to societies. Human societies interact with IRES in many ways, and some of these interactions can alter the intermittence, morphology, and habitat of these systems. Hydrological, morphology, and ecological processes of intermittence and their potential trends cannot be investigated without describing the many human-induced stressors of IRES and their interactions. Thus, proper management and restoration of these rivers need better understanding of their behavior.

The main objective of the present study is to understand the nature and hydrological processes of intermittence of a plateau-fed river system. Besides, the study intends to explore the human-induced stressors also. Specific questions that the study able to answer is; what are the processes that are expressed by intermittence or that caused intermittence? What are the anthropogenic stressors that alter the rate of intermittence? The interfluves area between the Vindhyan and the Ganga near Mirzapur-Varanasi region will be the critical zone observation area where the Chandra Prabha river basin is situated. The basin has its unique hydro-morphological characteristics in a humid subtropical climate characterized by monsoons. The present study will fill the research gap by generating a baseline data pertaining to hydrology, morphology and habitat characterization of IRES in a fine scale process study. The study also gives valuable input in landscape monitoring and management of headwaters and upstream catchments in the study area.

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Abstract No. P16

APPLICATION OF WATER QUALITY INDEX FOR ASSESSING WATER QUALITY OF NATURAL SPRINGS OF JAKHOLI BLOCK IN RUDRAPRAYAG DISTRICT

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Being the common source of a common resource, springs are considered as the lifeline of Himalayan inhibiters. The high reliability of population of the Himalayan

States on natural springs to fulfil their need of potable water makes study of its quality highly relevant. The present study explicates the water quality of the natural springs of nine villages of Jakholi block. The Jakholi block of Rudraprayag district is located in Garhwal division, between the coordinate 30° 37' to 30° 15'N and 79° 03' to 78° 50'E, cover an area of 497 km^2. The eight most prominent physiochemical components i.e. Nitrate, Fluoride, Iron, pH, Turbidity, Chloride, Residual Chlorine and Hardness that affects the water quality were analysed on the basis of standard set by Environmental Quality Standards (EQA), World Health Organization (WHO), and Indian Standards IS: 12500:2012 of drinking water quality. Water Quality Index has taken into consideration for assessing water quality of the natural sources. After analysis, it was concluded that all the parameters indicates the good quality of drinking water and hence make it suitable for drinking.

Key Words: Springs, potable water, scarcity, Physiochemical components, Water Quality Index.

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Abstract No. P17

PROBLEMS AND PROSPECTS OF WATER RESOURCE PLANNING AND MANAGEMENT FOR ENVIRONMENTAL SUSTAINABILITY IN KAUSHAMBI DISTRICT

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Water is one of the most essential natural resources for sustaining life. It is not only vital for sustenance of life, but equally essential for socio economic development. Its development and management play a vital role in agriculture production, environmental sustenance and sustainable economic development. In view of the rapid increase in population, urbanization and industrialization the demand for water for meeting various requirements is continuously increasing. Present water crisis is one of the burning issues in India and their states. Similar problems are seen in the Kaushambi district of Uttar Pradesh. It is a rural region having 3 tehsils and 8 blocks of total 15 population in which physiographic units consists of Trans Ganga and Doab Yamuna. The district has an agrarian economy. The district is facing numerous challenges in the water sector, which include reducing per capita water availability, the decline in ground water table in many areas and water pollution. The quality of surface water and groundwater is also deteriorating because of increasing pollutant loads from various sources. Climate change may also adversely affect the availability and distribution of water resources. So as to highlight the necessity of a more sustainable approach to water resource management. As a consequence increase water scarcity and its adverse outcomes will make a tough competition between agribusiness and other sectors of economy. Present study is an overview of all available resources, demand of water for agriculture and drinking purpose is increasing rapidly and resulting depleting water resources. The specific objective of this paper is to discuss the current status of water resources, their problems and

suggestions for proper planning and management of water resources for sustainable development in Kaushambi district.

Key Words – Sustenance, agrarian, pollutant, agribusiness, sustainable