Dr. Dericks Praise Shukla- Landslide Expert

Short Bio

Dr. Dericks Praise Shukla is currently Chairperson and associate professor in the School of Civil and Environmental Engineering Indian Institute of Technology Mandi. He has completed his Ph.D. in Remote sensing and GIS from University of Delhi in 2012 titled "Arsenic and heavy metal contamination and its remediation". Earlier, he has completed his bachelor in science from Ewing Christian College University of Allahabad and post-graduation from Jiwaji University in Remote Sensing and GIS. Before Joining IIT Mandi as assistant professor, he has worked as assistant Professor at Department of Geology and Ram Lal Anand College University of Delhi from August 2011- January 2015 and environmental consultant at J.M. EnviroNet for period of 4 years.

Dr. Dericks have currently co-authored and published 44 research work in reputed journal and 15 full papers in books, book chapter and conference proceedings. His h-Index is 16 with as total citations of 987. He has supervised three Ph.D. students and currently seven Ph.D. students are working under his guidance.

Position Title	**Modelling Expert**
Name of Expert:	**Dr. DERICKS PRAISE SHUKLA**
Date of Birth:	02-01-1982
Country of Citizenship / Residence:	INDIAN

Education:

College/ University / Institutions	**Dates Attended**	**Degree(s)/ Diploma(s) Obtained**
University of Delhi	2012	Ph.D. (Remote Sensing & GIS)
Jiwaji University	2004	MSc. (Remote Sensing & GIS)
Ewing Christian College, Allahabad University	2002	B.Sc. (Physics, Electronics, Mathematics)

Employment record relevant to the assignment:

Period	**Employing organization and your title/position. Contact information for references**	**Country**	**Summary of activities performed relevant to the Assignment**
Sept 2022 – till date	**Employer:** Indian Institute of Technology Mandi **Position Held:** Chairperson, School of Civil and Environmental Engineering, IIT Mandi **Contact Information for References:** Dean Faculty/ Registrar **Email:** deanfaculty@iitmandi.ac.in registrar@iitmandi.ac.in	India	Administration, Research and Teaching
Dec 2019 till date	**Employer:** Indian Institute of Technology Mandi **Position Held:** Associate Professor, School of Civil and Environmental Engineering, IIT Mandi	India	Teaching, Research, Administration, and Consultancy

Period	Employing organization and your title/position. Contact information for references	Country	Summary of activities performed relevant to the Assignment
	Contact Information for References: Dean Faculty/ Registrar **Email:** deanfaculty@iitmandi.ac.in registrar@iitmandi.ac.in		
Jan 2015-Nov 2019	**Employer:** Indian Institute of Technology Mandi **Position Held:** Assistant Professor **Contact Information for References:** Dean Faculty/ Registrar **Email:** deanfaculty@iitmandi.ac.in registrar@iitmandi.ac.in	India	Teaching, Research, Administration, and Consultancy
Aug 2011 – Jan 2015	**Employer:** Department of Geology and Ram Lal Anand College, Delhi University **Position Held:** Assistant Professor **Contact Information for References:** HOD, Geology Department **Email:** hodgeoldu@gmail.com	India	Teaching, Research, Administration, and Consultancy
Nov 2009 – Aug 2013	**Employer:** J.M EnviroNet Pvt. Ltd., 1st & 2nd Floor, S.C.O. 16, Sector-10A, Gurgaon (HR) **Position Held:** Functional Area Expert for EIA as consultant in the field of Remote Sensing and GIS **Contact Information for References:** Head **Email:** jmenviro@jmenvironet.org	India	Consultancy

Language Skills (indicate only languages in which you can work):

Language	Read	Write	Speak
English	Excellent	Excellent	Excellent
Hindi	Excellent	Excellent	Excellent

Adequacy for the Assignment:

Detailed Task Assigned on Consultant's Team of Experts	Reference to Prior Work/Assignments that Best Illustrates Capability to Handle the Assigned Tasks
RESEARCH PROJECTS	
Name of project:	**Probabilistic Earthquake – Earthquake Induced Landslide Multi – Hazard Analysis: Application to Shimla, Mandi, and Manali Sanction No : IIRS/DO/DMSP-ASCB/AS/2022/14**
Year:	2022-25
Location:	India
Client:	IIRS-ISRO

Main project features:	The main focus of the proposed work is to develop a new methodology that integrates the PSHA results, slope displacement equations, and other causative factors, to perform multi-hazard analysis for seismically active mountainous regions like The Himalayas. The proposal mainly focuses on a selected few cities of Himachal Pradesh state, where no prior studies have been performed. Even though the soil samples will be collected for geotechnical characterization, it is difficult to collect them at each grid of the selected regions. However, the material properties estimated from the collected soil samples will provide an idea of spatial variation in the selected regions. Further, the proposed methodology can be easily adapted for other regions with appropriate material characterization and seismicity parameters.
Position held:	**Co-Principal Investigator**
Activity	• Data collection and Field investigation in Shimla, Mandi and Manali • Development of Probabilistic Seismic Hazard assessment (PSHA) and slope displacement equations • Identification of Causative factor, influencing landslide and other multi-hazard
Name of project:	**Spatial distribution of Uranium and associated water quality parameters in Mandi, Kullu and Hamirpur Sanction No : 36(4)/14/22/2017-BRNS/36192**
Year:	2018-21
Location:	India
Client:	BRNS
Main project features:	The project has been proposed to study the uranium concentration and associated water quality parameters in the groundwater and surface water in and around three districts of Himachal Pradesh mainly Mandi, Kullu and Hamirpur. The main aim of the study to establish the baseline data on naturally occurring uranium levels and associated water quality parameters of groundwater / drinking water resources in the study region. Systematic district-wise grid sampling plan will be followed in the project and samples will be selected on the basis of utilization of aquatic environment by the population clusters. The study will establish a spatial map of the uranium and associated water quality parameters (16 nos.) in water sources in the region. The data can be used for intake and dose assessment to members of the public residing in the study area. Studies will be carried out to infer the cause of levels of uranium in water resource. The data will be a part of the national database of uranium and associated water quality parameters of DAE.
Position held:	**Principal Investigator**
Activity	• Field work was carried out in Hamirpur district for groundwater sample collection from manually operated hand pumps, dug well, bore well and natural water • Uranium concentration, Lifetime Average Daily Dose (LADD), Hazard Quotient, Annual effective dose and water quality index was calculated for all the 46 groundwater samples • The spatial distribution of uranium concentration was obtained for Hamirpur district
Name of project:	**Snow Mapping and its Parameter Estimation from Geospatial (AVIRIS-NG) and Field data Sanction No : EPSA/4.20/2017**
Year:	2017-19
Location:	India
Client:	SAC-ISRO

Main Project Features:	In the Indian Himalayan snow and glaciers not many studies have been carried out using hyperspectral satellite data. The hyperspectral sensors capture data in contiguous narrow bands of the electromagnetic spectrum and allow whole spectral curves to be recorded with individual absorption features. Therefore, hyperspectral remote sensing provides information related to surface material that can be exploited to characterize, quantify and perform automated detection of the targets of interest. With the availability of 4-8 m pixel resolution AVIRIS-NG hyperspectral data over a continuous electromagnetic spectrum spread over 380 – 2510 nm at 5 nm band interval over 57 sites in India and 1-2 in HP for snow and glacier studies, the applicability of this data is very high. Especially in the field of snow and glacier studies, estimation of snow grain size is required along with snow type mapping. Snow type mapping is required for development of an early warning system for snow avalanche. Hence hyperspectral satellite images can be used for preparation of snow type maps. Since applicability of hyperspectral AVIRIS sensor is not explored for study of snow/glacier parameters and characteristics in Indian context, this will be a good opportunity to do the same.
Position held:	**Principal Investigator**
Activity	• 57 sites in India were identified using field investigation for snow and glacier studies. • AVIRIS-NG hyperspectral satellite data at 4-8m pixel resolution over 380-2510 nm was employed. • The hyperspectral data was used for estimation of snow grain size and snow type mapping.
Name of project:	**Study of solute transport parameters through porous medium**
Year:	2018-21
Location:	India
Client:	Ministry of Environmental Sciences
Main Project Features:	In this project experimental setups of soil column, stratified porous media, fractured media will be constructed in lab which will depict the near real field scenario. The information about soil type, grain analysis, porosity, permeability etc will be gathered from field sampling and analysis. These values and stratified media soil column will be recreated in laboratory to get the near real field setup. In these soil column the various solutes/ contaminant will be passed and the dispersion behavior will be studied. These contaminant will be both reactive and non-reactive. The concentration of contaminant will be measured using various conductivity sensors, and a pre-calibrated curve (concentration vs conductivity in each soil media to be used) will be used to convert the conductivity in concentration. This will be used to observe the break through curves (BTC) for these contaminants. Numerical codes related to non-ideal transfer through heterogeneous porous media will be developed. These codes will be employed to simulate the observed BTC's for all types of solute by calibrating and optimizing different parameters. The obtained parameters then will be analyzed for statistical relations, especially mass transfer coefficient, dispersivity, physical properties of porous media and chemical properties of contaminant. These models will depict the near field scenarios and in future could be used to analyze the dispersion of ant contaminant in spatial domain as well as temporal domain. This will help to identify the areas that will become contaminated in near future within given time frame. This will be helpful in planning, managing and overall development of any location. Hence it will benefit the society in long term.

Position held:	**Co-Principal Investigator**
Activity	• In this project, field sampling was done for soil type, grain analysis, porosity, permeability data collection • Experimental setup of soil column, stratified porous media and fractured media was constructed in lab • The model depicted the near field scenarios for dispersion of contaminant in spatial domain and temporal domain
Name of project:	**Site selection studies for construction of bunds, gabions, diversion drains along steep slopes of Himachal Pradesh using digital elevation model and satellite images.** **Sanction No : DEM_HYDR1925**
Year:	2017-19
Location:	India
Client:	DLR (German Aerospace Centre)
Main Project Features:	This study investigated the extent to which satellite data both in the form of images as well as DEM may provide information on the location, pattern of sediment that may be stored at various places along the stream channel. As there are many cases of cloud burst and flash floods in this area of Mandi district, such information has a high relevance and utility. Using the geospatial techniques, we can analyse the slopes and mark suitable sites in the Mandi district, for creation of bunds, gabions etc so that the sediment can be trapped in the way of the 1st to 3rd order streams. This will convert the kinetic energy to potential energy and thus the effect of the velocity by which the water comes down in the streams will be reduced. Geospatial data reduces the need of tedious field surveys which are also very difficult to carry out in the rugged terrain of Himachal Pradesh. Due to rugged terrain, Himachal suffers most during the rainy season due to the blockage of roads, slope failures etc. After completion of this project, the suitable sites for creation of bunds, gabion walls, loose boulder check dams, community pond, contour staggered trenches and diversion drains as well as the most susceptible steep slopes will be available, which will be a precursor information for any planning activity.
Position held:	**Principal Investigator**
Activity	• Location affected by cloud burst and flash flood were identified using field investigation • Remote sensing technique were used to analyse the slope for creation of gabions and creation of bunds • Suitable sites were identified for creation of bunds, gabion walls, loose boulder check dams
Name of project:	**Comparison and analysis of DEM derived information from TanDEM and Drone DEM for Landslide study.** **Sanction No : DEM_GEOL0926**
Year:	2017-19
Location:	India
Client:	DLR (German Aerospace Centre)
Main project features:	DEM was created using drone images and compared with other datasets. Photogrammetric methods are promising tools to overcome such problems by reconstructing 3D from overlapping images of the surface. Airborne and terrestrial image acquisition platforms are possible data sources for comprehensive digital landslide modelling. This study presents a computer vision application of the structure from motion (SfM) technique in 3-D high-resolution landslide monitoring. Based on feature detection technique such as

	scale invariant feature transform (SIFT), image features can be detected, described, and matched between photographs. This can be used to create a sparse 3D point cloud, whose densification can be done using Clustering View for Multi-View Stereo (CMVS) algorithm. Finally, surface reconstruction will be carried out using Surface Reconstruction methods. For visualization and analysis of final 3D model, open source software CloudCompare/ MeshLab will be used.
Position held:	**Principal Investigator**
Activity	• A 3 dimensional digital elevation model was developed using Drone data • Landslide feature detection technique was used for scale invariant feature transform (SIFT)
Name of project:	**Semi-Automatic framework for preparation of LHZ & LSZ using machine learning techniques NRDMS/02/41/016(G)**
Year:	2017-19
Location:	India
Client:	NRDMS-DST
Main Project Features:	The focus of this research investigation was collection of parameters contributing towards the landslide and their impact modelling in GIS environment, development of efficient model for assignment of weightage & rating to different layers and evolving a semi-automated system for the development of LSZ & LHZ maps using satellite data & machine learning methods such as SVM in an efficient, accurate and cost effective way. The ground terrain temporal study like collection of parameters contributing towards the landslide and their impact modelling in GIS environment is the key issues. This project was carried out in Alaknanda river basin of Garhwal Himalaya from the origin of the river to Rudra Prayag. The length of the river is approximately 168 Kms in this stretch. This area has seen many landslides in the past. Buffer of 10 Kms on both side of river (shown in green colour in figure) will be considered for this study. This buffer has an area of approximately 2700 Sq. Km of the Garhwal area. The red and blue color in elevation map shows high and low altitudes respectively. All the sub-basins of the river, lying in Uttarakhand state of India are also shown in map. These LSZ maps are an important input for preparing the risk assessment of LSZ. These zonation maps show the areas that are prone to landslides and the safe areas, which in-turn help the administrators for safer planning and future development activities.
Position held:	**Principal Investigator**
Activity	• Field Investigation was performed in Alaknanda basin for obtaining a detailed field inventory • Machine learning algorithms such as information value, logistic regression and Fisher discriminant analysis were applied for LSM-LSZ preparation
Name of project:	**Facile, Low Cost Synthesis of Graphene/Zeolite composite and their Application in Removal of Heavy Metals from Water PDF/2016/000338**
Year:	2016-18
Location:	India
Client:	SERB-NPDF
Main Project Features:	In the present research, zeolite was synthesized using fly-ash by hydrothermal process. Huge quantities of fly ash are generated by power plants and their disposal is of global concern. Though, fly-ash is being put in use as raw material

	by concrete manufacturing and construction purposes, still remaining quantities are being dumped in the landfill sites. The dumping of fly-ash without proper treatment is a threat to the environment. Therefore, the possibility of using fly ash in synthesis of zeolites can be attractive for various applications. Researchers have reported that high content of aluminosilicates makes fly-ash an interesting start up material for synthesis of zeolites. Use of fly-ash in synthesis of zeolites partially solves the problem, thus minimizing the impact on environment and may turn a waste resource to a marketable commodity.
Position held:	**Mentor**
Activity	• Heavy metals concentration were from water were calculated • A composite low cost synthesis graphene/Zeolite composite were developed for the removal of heavy metal from water
Name of project:	**Arsenic and Heavy Metal Mapping in Water, Coal and Fly-Ash samples from Urjanchal (Singrauli) Area of Central India SR/FTP/ES-6/2013**
Year:	2014-17
Location:	India
Client:	SERB-DST
Main Project Features:	The main objective of this research is to study the arsenic concentration in coal, fly-ash and soil samples with respect to global averages. The effect of pollution best visualized in hydrosphere will also be studied where water pollution for Arsenic & Heavy metal contamination and its relation to mode of occurrence using chemical techniques and field checks will be carried out. Therefore, work is focused on mapping of arsenic contamination in this area followed by its source identification (coal).
Position held:	**Principal Investigator**
Activity	• In this project field samples of coal, fly-ash and soil were collected for arsenic concentration • Arsenic and Heavy metal contamination were mapped in this area using geospatial technology
Name of project:	**Detailed Geophysical –GPR Investigation Required for Structural Design of Imja Lake Lowering" in Nepal Sanction No : UNDP/RFP/16/2014**
Year:	2014
Location:	India
Client:	UNDP
Main project features:	The Community Based Flood and Glacial Lake Outburst Risk Reduction Project (CFGORRP) intendeds to reduce human and material losses from probable GLOF at Imja Lake, Solukhumbu District (5010 m) and 27 settlements in downstream in the valley. Based on the previous studies it is proposed that 3m reduction of water level in Imja Lake will reduce GLOF risk through construction of an open channel. To design such a structure, a detailed survey is required and as a part of the project the task of "Detailed Geophysical-GPR Investigation for Structural Design of Imja Lake Lowering" was awarded to the MEH Consultants Pvt. Ltd. Kathmandu.
Position held:	**Co-Principal Investigator**
Activity	• Field investigation was performed for GPR survey at Imja lake

Name of project:	Map the Neighbourhood in Uttarakhand (MANU) Sanction No : NRDMS/11/3010/013 (G
Year:	2013-14
Location:	
Client:	NRDMS-DST
Main project features:	The programme is to be named 'Map the Neighbourhood in Uttarakhand' (MANU). It involved local student/teacher community in data collection. The area to be covered was 'Char Dham' and Pindar Valley around 8,000 sq. km. Exact area were indicated on topographical maps which was provided by Survey of India (SOI) immediately after quick updating using Cartosat images. The observational activity was completed in 4 months and number of interns were trained keeping the quantum of work. Hence in this work detailed investigation of landslides were carried out by us and also work for rehabilitation of the area were also be suggested by us.
Position held:	**Co-Principal Investigator**
Activity	• Here data collection was performed in the areas of Pindar Valley for landslide mapping • Rehabilitation of the areas was suggested based upon the landslide data

CONSULTANCY PROJECTS	Details given in below mentioned table

Sr No	IT Mandi Reference/ Project No.	Project Title	PI/ Co-PI	Sponsoring Agency	From	To
1	IITM/CONS/HPPWD/RS/22	Channelization of skodi khad between the new bridge to suhara Muhalla bridge	Co-PI	Ex. Engineer, Mandi Divi.-2 HPPWD-Mandi	01.05.18	01.10.18
2	IITM/CONS/FCI/RS/24	Structure design of retaining walls at proposed sites of warehouses at Palampur, Mandi & Reckong Peo (H.P.)	Co-PI	AGM (CVIL) FCI Shimla	05.09.18	04.12.18
3	IITM/CONS/ACC/KVU/30	Site visit to dump site of Gagal limestone mine, ACC ltd.	Co-PI	Chief Manager, ACC Ltd., Barmana, Bilaspur, H.P.	29.03.19	28.04.19
4	IITM/CONS/UNDP/DPS/42	Preparation of report on landslide hazard zonation for Himachal Pradesh	PI	Mr. Manish Mohandas UNDP, 55 Lodhi Estates, New Delhi	16.10.20	21.10.20
5	IITM/CONS/HPSAMB/KVU/54	Site geological report of Bhattakufar market yard at Shimla	PI	"Executive Engineer HP State APMC Shimla, H.P."	04.06.21	04.06.21
6	IITM/CONS/HPPWD/KVU/55	Site visit to Nigulsari landslide	PI	Chief Engineer (NH) HPPWD, Shimla	14.09.21	21.09.21
7	IITM/CONS/HPPWD/KVU/59	Mitigation of shooting stones problem	PI	HPPWD Shimla	20.11.21	27.11.21

8	IITM/CONS/HPPWD/KVU/60	Preparation of DPR under landslide mitigation of Ganpati Kun-Ka-Tar at RD 1/995	PI	HPPWD Shimla	14.12.21	13.03.22
9	IITM/CONS/APMC/KVU/68	Site geological report of Bhattakufar market yard at Shimla	PI	APMC, Shimla & Kinnaur	19.05.22	26.05.22
10	IITM/CONS/HPPWD/KVU/75	Consultancy services for the feasibility of double lane bypass at ReckongPeo	PI	NH division, HPPWD, Rampur Bushahr, H.P.	15.09.22	29.08.22

	List of publications	Given Below

Peer Reviewed Journals (In Reverse Chronological Order):

1. Niraj, K.C., Gupta, S.K. & **Shukla, D.P.** (2022) A Comparison of Image-Based and Physics-Based Atmospheric Correction Methods for Extracting Snow and Vegetation Cover in Nepal Himalayas Using Landsat 8 OLI Images. J Indian Soc Remote Sens (2022). https://doi.org/10.1007/s12524-022-01616-6
2. Romana, H.K.; Singh, R.P.; Dubey, C.S.; **Shukla, D.P.** (2022) Analysis of Air and Soil Quality around Thermal Power Plants and Coal Mines of Singrauli Region, India. *Int. J. Environ. Res. Public Health* 2022, *19*, 11560. https://doi.org/10.3390/ijerph191811560
3. Niraj, K.C, Thapa, L. & **Shukla, D.P.** (2022) Processing CORONA image for generation of Digital Elevation Model (DEM) and orthophoto of Bilaspur district, Himachal Pradesh. Appl Geomat (2022). https://doi.org/10.1007/s12518-022-00453-z
4. Gupta, S.K., **Shukla, D.P.** (2022) Effect of scale and mapping unit on landslide susceptibility mapping of Mandakini River Basin, Uttarakhand, India. Environ Earth Sci 81, 373 (2022). https://doi.org/10.1007/s12665-022-10487-6
5. Baisantry, M., Sao A.K., & **Shukla, D.P.** (2022) Selection of shape-preserving, discriminative bands using supervised functional principal component analysis, International Journal of Remote Sensing, 43:10, 3868-3889, DOI: 10.1080/01431161.2022.2105174
6. Baisantry, M., Sao, A. K., & **Shukla, D. P.** (2022). Discriminative Spectral-Spatial Feature Extraction-based Band Selection for Hyperspectral Image Classification. *IEEE Transactions on Geoscience and Remote Sensing.* vol. 60, pp. 1-14, Art no. 5518014, doi: 10.1109/TGRS.2021.3129841.
7. Mali, N., **Shukla, D. P.,** & Kala, V. U. (2022). Identifying Geotechnical Characteristics for Landslide Hazard Indication: A Case Study in Mandi, Himachal Pradesh, India. Arabian Journal of Geosciences, 15(2), 1-13.
8. Niraj, K. C., & **Shukla, D. P**. (2021). Kotrupi landslide deformation study in non-urban areas using DInSAR and MTInSAR Techniques on Sentinel-1 SAR Data. Advances in Space Research. https://doi.org/10.1016/j.asr.2021.11.042
9. Kumar, P., Dubey, C. S., Kumar, O., Shekhar, S., **Shukla, D. P.,** & Ramanathan, A. L. (2021). Deciphering the role of meteorological parameters controlling the sediment load and water discharge in the Sutlej basin, Western Himalaya. *Journal of Environmental Management*, *298*, 113413.
10. Pandey, A., Rai, A., Gupta, S. K., **Shukla, D. P.,** & Dimri, A. P. (2021). Integrated approach for effective debris mapping in glacierized regions of Chandra River Basin, Western Himalayas, India. *Science of The Total Environment*, *779*, 146492.
11. Dubey, C. S., Usham, A. L., Mishra, B. K., **Shukla, D. P**., Singh, P. K., & Singh, A. K. (2021). Anthropogenic arsenic menace in contaminated water near thermal power plants and coal mining areas of India. *Environmental Geochemistry and Health*, 1-29.
12. Baisantry, M., Sao, A. K., & **Shukla, D. P.** (2021). Two-Level Band Selection Framework for Hyperspectral Image Classification. *Journal of the Indian Society of Remote Sensing*, *49*(4), 843-856.

13. Singh, N. S., Gupta, S. K., Dubey, C. S., & **Shukla, D. P.** (2020, November). An Ordinal Scale Weighting Approach for Susceptibility Mapping Around Tehri Dam, Uttarakhand, India. In *Workshop on World Landslide Forum* (pp. 163-172). Springer.
14. Baisantry, M., Sao. A K., **Shukla, D. P**. (2020). Band Selection Using Combined Divergence–Correlation Index and Sparse Loadings Representation for Hyperspectral Image Classification. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, 13*, 5011-5026
15. Niraj. KC.., Thapa. L., **Shukla, D. P**. (2020). Fate of agricultural areas of Kailali district of Nepal: a temporal land use land cover change (LUCC) analysis. *The International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, 43*, 1601-1606
16. Bhardwaj, S., Soni, R., Gupta, S. K., & **Shukla, D. P.** (2020). Mercury, arsenic, lead and cadmium in waters of the Singrauli coal mining and power plants industrial zone, Central East India. *Environmental Monitoring and Assessment, 192(4)*, 1-20.
17. Gupta, S. K., & **Shukla, D. P.** (2020). Evaluation of topographic correction methods for LULC preparation based on multi-source DEMs and Landsat-8 imagery. *Spatial Information Research*, *28*(1), 113-127.
18. HK Romana, RP Singh, **Shukla, D. P.** (2020) Long Term Air Quality Analysis in Reference to Thermal Power Plants Using Satellite Data in Singrauli Region, India. *The International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, 43,* 829-834.
19. Bhardwaj, S., **Shukla, D. P.**, & Halder, A. (2020). Spatial distribution of uranium and chemo-radiological assessment in Hamirpur district, Himachal Pradesh, India. *Journal of Radioanalytical and Nuclear Chemistry*, *324*, 467-480.
20. Gupta, S. K., Jhunjhunwalla, M., Bhardwaj, A., & **Shukla, D. P.** (2020). Data Imbalance in Landslide Susceptibility Zonation: Under-Sampling for Class-Imbalance Learning. *The International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences*, *42*, 51-57.
21. Singh, N., Gupta, S. K., & **Shukla, D. P.** (2020). Analysis of Landslide Reactivation Using Satellite Data: a Case Study of Kotrupi Landslide, Mandi, Himachal Pradesh, India. *The International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences*, *42*, 137-142.
22. Guleria, A., Gupta, S. K., Gupta, I., Swami, D., & **Shukla, D. P.** (2019). Understanding the spatial and temporal dependence of the migration of conservative contaminant plume in urban groundwater environment in Panchkula region, Haryana, India. *Groundwater for Sustainable Development*, *8*, 93-103.
23. Soni, R., & **Shukla, D. P.** (2019). Synthesis of fly ash based zeolite-reduced graphene oxide composite and its evaluation as an adsorbent for arsenic removal. *Chemosphere*, *219*, 504-509.
24. Soni, R., & **Shukla, D. P.** (2019). Data on Arsenic (III) removal using zeolite-reduced graphene oxide composite. *Data in brief*, *22*, 871-877.
25. Gupta, S. K., & **Shukla, D. P.** (2018). Application of drone for landslide mapping, dimension estimation, and its 3D reconstruction. *Journal of the Indian Society of Remote Sensing*, *46*(6), 903-914.
26. Usham, A. L., Dubey, C. S., **Shukla, D. P.**, Mishra, B. K., & Bhartiya, G. P. (2018). Sources of fluoride contamination in Singrauli with special reference to Rihand reservoir and its surrounding. *Journal of the Geological Society of India*, *91*(4), 441-448.
27. Gupta, S. K., **Shukla, D. P.**, & Thakur, M. (2018). Selection of weightages for causative factors used in preparation of landslide susceptibility zonation (LSZ). *Geomatics, Natural Hazards, and Risk*, *9*(1), 471-487.
28. Kumar, D., Thakur, M., Dubey, C. S., & **Shukla, D. P.** (2017). Landslide susceptibility mapping & prediction using support vector machine for Mandakini River Basin, Garhwal Himalaya, India. *Geomorphology*, *295*, 115-125.
29. Gupta, S. K., & **Shukla, D. P.** (2016). Assessment of land use/land cover dynamics of Tso Moriri Lake, a Ramsar site in India. *Environmental monitoring and assessment*, *188*(12), 700.
30. Swami, D., Sharma, A., Sharma, P. K., & **Shukla, D. P.** (2016). Predicting suitability of different scale-dependent dispersivities for reactive solute transport through stratified porous media. *Journal of Rock Mechanics and Geotechnical Engineering*, *8*(6), 921-927.
31. Thoithoi, L., Dubey, C. S., Ningthoujam, P. S., **Shukla, D. P.,** Singh, R. P., & Naorem, S. S. (2016). Liquefaction potential evaluation for subsurface soil layers of Delhi region. *Journal of the Geological Society of India*, *88*(2), 147-150.
32. Ningthoujam, P. S., Dubey, C. S., Lolee, L. K., **Shukla, D. P.**, Naorem, S. S., & Singh, S. K. (2015). Tectonic studies and crustal shortening across Easternmost Arunachal Himalaya. *Journal of Asian Earth Sciences*, *111*, 339-349.

33. Mishra, B. K., Dubey, C. S., **Shukla, D. P.**, Bhattacharya, P., & Usham, A. L. (2014). Concentration of arsenic by selected vegetables cultivated in the Yamuna flood plains (YFP) of Delhi, India. *Environmental Earth Sciences*, *72*(9), 3281-3291.
34. Dubey, C. S., **Shukla, D. P.**, Ningreichon, A. S., & Usham, A. L. (2013). Orographic control of the Kedarnath disaster. *Current Science*, *105*(11), 1474-1476.
35. **Shukla, D. P.**, Dubey, C. S., Ningreichon, A. S., Singh, R. P., Mishra, B. K., & Singh, S. K. (2014). GIS-based morpho-tectonic studies of Alaknanda river basin: a precursor for hazard zonation. *Natural hazards*, *71*(3), 1433-1452.
36. Singh, R. P., Dubey, C. S., Singh, S. K., **Shukla, D. P.,** Mishra, B. K., Tajbakhsh, M., ... & Singh, N. (2013). A new slope mass rating in mountainous terrain, Jammu and Kashmir Himalayas: application of geophysical technique in slope stability studies. *Landslides*, *10*(3), 255-265.
37. Banerjee, D. M., Mukherjee, A., Acharyya, S. K., Chatterjee, D., Mahanta, C., Saha, **D., ...** & Dubey, C. S. (2012, September). Contemporary groundwater pollution studies in India. In *Proc Indian natn Sci Acad* (Vol. 78, No. 3, pp. 333-342).
38. **Shukla, D. P.**, Dubey, C. S., & Singh, N. (2012). Neotectonic activity and the origin of Tso Morari Lake using remote sensing and digital elevation model (DEM) derivative techniques. *Geocarto International*, *27*(3), 249-262.
39. Ningthoujam, P. S., Dubey, C. S., Guillot, S., Fagion, A. S., & **Shukla, D. P.** (2012). Origin and serpentinization of ultramafic rocks of Manipur Ophiolite Complex in the Indo-Myanmar subduction zone, Northeast India. *Journal of Asian Earth Sciences*, *50*, 128-140.
40. Dubey, C. S., **Shukla, D. P.**, Singh, R. P., Sharma, M., Ningthoujam, P. S., & Bhola, A. M. (2012). Present activity and seismogenic potential of Himalayan sub-parallel thrust faults in Delhi: inferences from remote sensing, GPR, gravity data and seismicity. *Near Surface Geophysics*, *10*(5), 369-380.
41. Dubey, C. S., Mishra, B. K., **Shukla, D. P.,** Singh, R. P., Tajbakhsh, M., & Sakhare, P. (2012). Anthropogenic arsenic menace in Delhi Yamuna flood plains. *Environmental Earth Sciences*, *65*(1), 131-139.
42. **Shukla, D. P.,** Dubey, C. S., Singh, N. P., Tajbakhsh, M., & Chaudhry, M. (2010). Sources and controls of Arsenic contamination in groundwater of Rajnandgaon and Kanker District, Chattisgarh Central India. *Journal of Hydrology*, *395*(1-2), 49-66.
43. Cina, S. E., Yin, A., Grove, M., Dubey, C. S., **Shukla, D. P.**, Lovera, O. M., ... & Foster, D. A. (2009). Gangdese arc detritus within the eastern Himalayan Neogene foreland basin: implications for the Neogene evolution of the Yalu–Brahmaputra River system. *Earth and Planetary Science Letters*, *285*(1-2), 150-162.
44. Dubey, C. S., & **Shukla, D. P.** (2008). Active tectonics and origin of Tso Morari Lake observed by Remote sensing and GIS techniques. *Himalayan Journal of Sciences*, *5*(7), 47-48.

Full papers in Books, Book Chapters, Conference Proceedings

1. Pradhan, I. P., & **Shukla, D. P.** (2022). Mapping Permafrost Distribution In The Parvati Valley, Kullu Using Landsat 8 Derived Land Surface Temperature. Gottingen: Copernicus GmbH. doi:https://doi.org/10.5194/isprs-archives-XLIII-B3-2022-779-2022
2. Gupta, P., & **Shukla, D. P.** (2022). Google Earth Engine Based Temporal Analysis Of Indices Used For Forest Fire Study In Mizoram, India. Gottingen: Copernicus GmbH. doi:https://doi.org/10.5194/isprs-archives-XLIII-B3-2022-493-2022
3. Romana, H. K., & Shukla, D. P. (2022). The past, present and future of CO2, NO2, SO2 & CH4. Gottingen: Copernicus GmbH. doi:https://doi.org/10.5194/isprs-archives-XLIII-B3-2022-743-2022
4. Singh A., Gupta, S.K., Nitesh and **Shukla, D.P.,** (2022) Estimating Suitable Categorization Method for Landslide Susceptibility Mapping of Mandi District. *IGARSS 2022 - 2022 IEEE International Geoscience and Remote Sensing Symposium*, 2022, pp. 5481-5484, doi: 10.1109/IGARSS46834.2022.9884424.
5. Chauhan, A., Singh R.P., Matsumi, Y., Hayashida, S., Nakayama, T., Gupta, S.K., and **Shukla, D.P.** (2022). Variability of the Particulate Matter Concentration in the Northern Parts of India Using Low-Cost Sensors. IGARSS 2022 - 2022 IEEE International Geoscience and Remote Sensing Symposium, 2022, pp. 6686-6689, doi: 10.1109/IGARSS46834.2022.9884246.
6. Pradhan, I. P., & **Shukla, D. P.** (2022). Assessment of the Accuracy of Satellite-Derived Land Surface Temperature with IMD In-Situ Air Temperature: A Case Study for Kullu Region, Himachal

Pradesh, India. IGARSS 2022 - 2022 IEEE International Geoscience and Remote Sensing Symposium, 2022, pp. 40-43, doi: 10.1109/IGARSS46834.2022.9884649.
7. Soni, R., Aggrawal, S., & **Shukla, D. P.** (2022). Water scarcity in megacities of the Asian continent. In *Current Directions in Water Scarcity Research* (Vol. 6, pp. 299-317). Elsevier.
8. **Shukla, D. P.**, & Bhardwaj, S. (2020). Policy and regulatory framework for inorganic contaminants. In *Inorganic Pollutants in Water* (pp. 51-71). Elsevier.
9. Soni, R., Bhardwaj, S., & **Shukla, D. P.** (2020). Various water-treatment technologies for inorganic contaminants: current status and future aspects. In *Inorganic Pollutants in Water* (pp. 273-295). Elsevier.
10. Soni, R., Soni, M., & **Shukla, D. P.** (2020). Emerging Techniques and Materials for Water Pollutants Detection. In *Sensors in Water Pollutants Monitoring: Role of Material* (pp. 277-297). Springer, Singapore.
11. Gupta, V., Gupta, S. K., & **Shukla, D. P.** (2018, December). Optimal Selection of Bands for Hyperspectral Images Using Spectral Clustering. In *International Conference on Recent Trends in Image Processing and Pattern Recognition* (pp. 288-304). Springer, Singapore.
12. Jhunjhunwalla, M., Gupta, S. K., & **Shukla, D. P.** (2018, December). Landslide Susceptibility Zonation (LSZ) Using Machine Learning Approach for DEM Derived Continuous Dataset. In *International Conference on Recent Trends in Image Processing and Pattern Recognition* (pp. 505-519). Springer, Singapore.
13. **Shukla, D.P.,** 2017; Hydro – Geomorphology : Models and Trends, Intech Open, Rijeka, Croatia
14. **Shukla, D. P.** (2017). Introductory Chapter: Geomorphology. In *Hydro-Geomorphology-Models and Trends*. IntechOpen.
15. **Shukla, D. P.**, Gupta, S., Dubey, C. S., & Thakur, M. (2016). Geo-spatial technology for landslide hazard zonation and prediction. *Environmental applications of remote sensing*, 281-308. DOI: 10.5772/62667

Expert's contact information	**Email:** dericks@iitmandi.ac.in	**Phone**: +91 9418906989

Certification:
I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and I am available, as and when necessary, to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my disqualification or dismissal by the Client, and/or sanctions by the Bank.

Dericks Praise Shukla		15/01/2023
Name of Expert	*Signature*	*Day/Month/Year*