

Application Status: Uploaded By PI After Final Submission

Project Proposal Document

Proposal Title: Structural control of landslides between Lonavala and Pune along Mumbai Pune expressway Implication to Neotectonic Deformation

Category: Earth and Atmospheric Sciences

File No.: DST/WISE-PDF/EA-16/2023

Time Duration: 3 (in years)

Personal Details

Name: Dr. Suman Karanpal Rawat

Date of Birth: 01-07-1977

Father Name: Mohan Chandra Joshi

Mother Name: Munni Joshi

Employment Status: Temporary

Department:: Geology

Marital Status: Widow

Husband Name:

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Host Institute Details

Institute Name: Bharatiya Vidya Bhavans Sardar Patel College of Engineering Department of Civil Engineering Munshi Nagar Andheri West Mumbai 400 058

City: State: Pincode:

Career break details

From Date: 19-08-2019

To Date: 20-12-2021

Description in break: covid recession

Highest Educational Qualification Details

Highest Educational Qualification: Ph.D Awarded

Subject: Geology

Passing Year: 12-07-2005

Thesis/Dissertation: Structural and tectonic evolution of a part of Ramgaeh shear zone in Kosi and Ramgarh valley District Nainital Kumaun Himalaya implication to thrust tectonics

Guide Name, Designation & Address: Dr P D Pant Associate Professor Department of Geology Centre of Advanced Study Kumaun University Nainital 263 002

Educational Qualification

Degree	Year	University	Specialization	Marks
Ph D	2005	Kumaun University Nainital	Structural geology	NA
Post Graduation	2000	Kumaun University Nainital	Geology	68
Graduation	1998	Kumaun University Nainital	Geology Zoology Botany	54
Intermediate	1995	U P Board	Physics Chemistry Biology Hindi English	56
High school	1993	U P Board	Physics Chemistry Biology Hindi English	64

Work Experience

Designation	Employer	From Date	To Date	Nature of employment
Associate Professor	Vishwaniketan Institute of Entrepreneurship Management and Engineering Technology Khalapur Raigad	20-12-2021	14-04-2023	Temporary
Associate Professor	Vishwaniketan Institute of Entrepreneurship Management and Engineering Technology Khalapur Raigad	15-06-2018	21-08-2019	Temporary
Assistant Professor	Saraswati College of Engineering Kharghar Navi mumbai	09-07-2012	07-05-2018	Temporary

Research Experience

Designation	Institution	From Date	To Date	Project Title	Funding Agency	No. of Publications
Research Associate	Govind Ballabh Pant National Institute of Himalayan Environment NIHE	08-08-2005	08-05-2007	Installation and operation of permanent GPS to measure crustal deformation	DST	0

Institution Facilities Details

Bharatiya Vidya Bhavans Sardar Patel College of Engineering SPCE was established in 1962 as a Government Aided Engineering College It was started with three conventional courses Civil Electrical and Mechanical with an intake of 40 in each branch which was subsequently increased to 60 The institute is permanently affiliated to University of Mumbai Over the last fifty years the college has gained an excellent reputation in the field of Technical Education SPCE Grade A rating engineering college from Govt of Maharashtra has maintained a proud tradition of excellent academic records by securing high ranks gold medals and other awards in the University Exams The college has produced many graduates and Post graduate Engineers The institute is a recognized PhD and QIP center It has become autonomous since 2010 and is one of the TEQIP II institutes The fully computerized Central Library of Sardar Patel College of Engineering is a treasure house of knowledge comprises ever growing collection of around 45000 books more than thousand e books Elsevier IET Mc GrawHill Pearson Proquest and Springer and 3500 bound volumes of journals both national and international subscribed by the college over the years Library also has developed collection of Dissertations submitted by post graduate students MTech and PhD of this Institution These design oriented and case study thesis are kept for reference for the next generation in both forms print and Eversion of the same is made available through digital library All these valuable resources are well organized in the 6000 Sq Ft area where more than 150 users can sit at a time and they are monitored by CCTV Cameras Institute has provided state of the art and well maintained IT Infrastructure to students and faculty members This includes an advanced server with SAN storage computer labs with efficient computing infrastructure on different platforms gigabyte LAN Wi Fi facilities all required and advanced legal system and application softwares CCTV surveillance facilities biometric attendance system etc Due to this state of the art IT Infrastructure institute campus is the technologically adept campus

Paper Published

No. of Papers Published in Refereed Journals: 8

Significant Publications

Authors	Year	Title of Paper	Journal	Vol	Impact Factor
SUMAN JOSHI	2008	Evidence of Ductile Deformation along the Ramgarh Thrust in Kumaun Lesser Himalaya	Journal Geological Society of India	72	1 459
Jyoti shah DC Srivastava and SUMAN JOSHI	2012	Sinistral transpression along the Main Boundary Thrust in Amritpur area Southeastern Kumaun Himalaya India	Tectonophysics	532 535	3 933
SUMAN RAWAT and GC Kothyari	2015	Possibility of Induced Seismicity in Pancheshwar Dam Site on Kali River Uttarakhand	International Journal of Engineering and Technical Research	4	2 19
Raj Sunil Kandregula Girish Ch Kothyari KV Swamy and SUMAN RAWAT	2018	Quantitative assessment of tectonic activity in Northern Saurashtra Western India	Indian Geophysical Union Journal	23	0 313.
Pasi BN Dongare PV and RAWAT SJ	2022	Prioritization of risks associated with the implementation of projectbased learning concept in engineering institutions	Higher Education Skills and Work Based Learning	12	1 357

Proposal Technical Details

Summary of Proposal: Environmental degradation anthropogenic interferences and climate changes is leading to the severe vulnerability of the mountainous region and have wide ranging effects on the environment and on socioeconomic of nation Not only the largest mountain chain of the Himalaya is vulnerable to the natural disaster but other mountainous belt like Shayadri and Aravali are also under risk of earthquake and landslide hazards Landslides is a mass of earth or rock that falls down the slope of a mountain or a cliff The most common types of landslide are earth slides rock falls and debris flows The movement of landslide material can vary from abrupt collapses to slow gradual slides and at rates which range from almost undetectable to extremely rapid Sudden and rapid events are the most dangerous because of a lack of warning and the speed at which material can travel down the slope as well as the force of its resulting impact Landslides often occur while making roads and construction a large number of rocks has to be removed The communities inhabiting in mountainous ecosystem are particularly under high risk of extreme weather conditions and altering rainfall Mountainous belt of Maharashtra region is conducive to the landslide The state is monotonously covered by the basaltic lava flows that are called Deccan Trap Deccan traps of horizontal disposition are over a wide stretch and exhibit tableland type of topography Basaltic flows are represented by massive portion at bottom and vesicular portion at the top separated by marker claysand beds Basaltic rocks are inherently instability in form of primary jointed nature high susceptibility to weathering tectonically fractured facilitating water percolation inherent vugs and secondary pore spaces Therefore the Deccan volcanic province is susceptible to acute landslide hazards Rock failure may be due to one or more reasons such as intense rainfall blasting widening of roads levelling on rolling spurs inherent fracture zones and deforestation

Objectives: The relationship between structural elements of rocks bedding foliation fault joints etc and topographic slopes plays a major role in controlling landslide mechanisms This project aims at analyse the relationship between the spatial distribution of landslides and orientation of geological structure and lithology exposed between Lonavala and Pune along Mumbai Pune expressway which can be done as follows 1 Identification and demarcation of geological structures kinematics and paleostress analysis to interpret the landslide mechanism in Deccan traps 2 Estimation of Radar base PSInSAR crustal deformation pattern of the area

Novelty
As the proposal is confined to the important corridor in terms of business and economy the study will bring out various facets of the hazard parameters impact zonation and remedial measures This investigation will minimize prevent or avoid build up

Review of Literature(National and International Level: Aline et al 2003 worked on the polyphase tectonics and establish the chronology between local paleostress states also paleostress fields by using crosscutting striae pre or postfolding stress states stratigraphic control Clrier et al 2012 Inferring stress from faulting from early concepts to inverse methods Okonkwo Ikenna Anthony 2016 worked on application of paleostress analysis for the identification of potential instability precursors within the Benue Trough Nigeria comes into a conclusion that the paleostress analysis is useful in the production of accurate pre and post tectonic models of the area which can be used as a reference in future stress analysis and interpretation Alexander Formichi R 1993 expressed reveal a close correspondence between slumping mass movements and the directions and spatial concentrations of fracture traces Paolo et al 2010 considered that in addition to the morphology the structural condition of the source area and channel lithological contacts folds faults and shear zones is the main factor in controlling the spatial evolution of earth ows Gutirrez et al 2010 Recent advances in landslide investigation Issues and perspectives Furthermore Luzon et al 2016 discovered numerical methods for quick mapping of mountainside instability and also depict the likely path and deposition of the landslide to prevent and mitigate of natural hazards Globally the Global positioning system and InSAR studies are frequently used to monitor the slope stability Akbarimehr et al 2013 Slope Stability Assessment of the Sarcheshmeh Landslide Northeast Iran Investigated Using InSAR and GPS Observations Avar et al 2014 Investigation of the failure mechanism and stabilization of a landslide in weathered tuffite Giresun northeastern Turkey Bovenga et al 2012 Using COSMOSkyMed Xband and ENVISAT Cband SAR interferometry for landslides analysis Cascini et al 2010 Advanced low and fullresolution DInSAR map generation for slowmoving landslide analysis at different scales Colesanti and Wasowski 2006 Investigating landslides with spaceborne Synthetic Aperture Radar SAR interferometry Gili et al 2000 Using Global Positioning System techniques in landslide monitoring Hooper and Zebker 2007 Phase unwrapping in three dimensions with application to InSAR time series MizalAzzmi et al 2011

Methodology: he systemic approach for the research will be based on the Literature survey Detailed field mapping of various geological and geomorphic features especially hill slope sediments and delineate morpho stratigraphic evolution of the proposed area Geological assessment related to bedrock types tectonic features tectonically induced foldsfractures and joint patterns rock slopes weathering patterns seismic and hydrothermal anomaly Paleostress analysis based on the geological data collected from the field to obtain the kinematic axes and stress tensors that will be carryout using the WinTensor v587 FaultKin v772 and T tecto softwares to determine fault slip by analysis of attributes of fault parameter and slickenlines maximum Bott 1959 Wallace 1951 Naimi et al 2015 Evaluation of available seismic data on the recent and past earthquakes observed within the 100km radius of the study area and identification of landslides caused by massive earthquake if any Sampling of landslide prone areas for geotechnical investigation If Possible High resolution Satellite data studies for delineation of active structures and mapping of landslides Satellite data will be processed in Matlab software to analyze steepness and landslides Matlab codes for analyzing the satellite data for landslide analysis are available at <httpstopotoolboxwordpresscom> Interferometric Synthetic Aperture Radar InSAR measurements will be performed to understand regional and local deformation pattern of the area using AlosPalsar and ENVISAR and Sentinel1A data Images Roads are the arteries of societies Landslides flooding and earthquakes may frequently damage roads disrupt traffic flow and curtail the functioning of the road network Where landslides damage roads these may become impassable and drivers must detour these locations Such locations will also be identified during satellite data and later verified in the field

Work Plan: In the first year of project implementation detailed literature survey of the Deccan trap and demarcation of major rock units lineaments and persistent joint patter will be carried out on the basis of existing data Literature toposheet satellite data Field visit preference will also be based on locations those are vulnerable in terms of landslide Detailed field work is the most significant component of the proposed project Identification and orientation of faults plane and joint prominent demarcation of weak planes will help to analysis stress orientation of the area Paleostress analysis based on the geological data collected from the field High resolution satellite data studies for delineation of active structures and mapping of landslides will be carried out in second year of project duration Satellite data will be processed in Matlab software to analyze steepness and landslides Matlab codes for analyzing the satellite data for landslide analysis are available at <https topotoolboxwordpresscom> Roads are the arteries of societies Landslides flooding and earthquakes may frequently damage roads disrupt traffic flow and curtail the functioning of the road network Where landslides damage roads these may become impassable and drivers must detour these locations Such locations will also be identified during satellite data and later verified in the field On the basis of field data analysis satellite data a detailed landslide hazard zonation map will be prepared for the proposed area in the third year of project implementation Estimation of factors that are responsible for controlling and trigger for the slide will be summarize As the entire region of Maharashtra state is covered by Deccan trap rock and having similar geological and structural setting the outcome model can recommended for the other area of Deccan traps region also

Expected Deliverables: India is highly venerable to natural and manmade disaster Landslide is one of the natural widespread hazards on Earth which causes and cause thousands of deaths and injuries and damage to life and property Land utilization in terms establishment of human settlements construction of new roads and road widening and climatic changes may not only trigger a landslide but also increase its vulnerability The phenomenon is directly related to the society and lives of county A real ground mapping is urgently required to prepare and implementation of landslide hazard zonation map Therefore the study would help to prepare landslide hazard zone map of the area which will be used for civil engineering purpose

SSR Activity Plan:

Field of Experience: Geology engineering geology field geology

Proposal Financial Details (PPD-III)

Proposal Actual Cost (Rs.): 3,614,000

Summary of Total Budget

Budget	Year 1(Rs.)	Year 2(Rs.)	Year 3(Rs.)	Total
Fellowship	660,000	660,000	660,000	1,980,000
HRA	178,000	178,000	178,000	534,000
Research Grant	200,000	200,000	200,000	600,000
Institute Overhead	100,000	100,000	100,000	300,000
Equipments	200000.0	0.0	0.0	200,000
Total	1,338,000	1,138,000	1,138,000	3,614,000

Budget for Fellowship:

Designation	No. Of Persons	Year 1(Rs.)	Year 2(Rs.)	Year 3(Rs.)	Total
Principal Investigator	1	660,000	660,000	660,000	1,980,000

Budget for House Rent Allowance:

Year 1(Rs.)	Year 2(Rs.)	Year 3(Rs.)	Total
178,000	178,000	178,000	534,000

Budget for Research Grant:

Items	Year 1(Rs.)	Year 2(Rs.)	Year 3(Rs.)	Total
Research Budget	200,000	200,000	200,000	600,000

Budget for Institute Overhead

Items	Year 1(Rs.)	Year 2(Rs.)	Year 3(Rs.)	Total
Institute OverHead	100,000	100,000	100,000	300,000

Budget for Equipments:

Generic Name of Equipment	Imported/Indigenous	Year Of Procurement 1/2/3	Cost in Rs.
Laptop	Indigenous	1	140,000
Camera	Indigenous	1	50,000
Brunton and Hammer	Indigenous	1	10,000
All Total			200,000

Mentor Details

UNDERTAKING

I Dr. Suman Ramel daughter/ wife of Shri Late Dr. Karanrao Singh Parat residing at 1502, VUB Paradise Plot No. 11, Sector 35D Kharghar have been offered a project entitled Structural control of land slides during heavy monsoon in Mumbai and Pune along Mumbai Pune expressway: Interpretation of piezometric deformation under WISE Post-Doctoral Fellowship (hereinafter called WISE-PDF) for research work by the Department of Science and Technology, New Delhi (hereinafter called DST). I accept the said project as 'Principal Investigator (PI)' and undertake that:

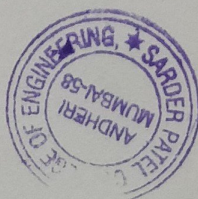
1. During the entire tenure of the WISE-PDF Project, I shall abide by the rules and regulations of the DST. Any change in rules and regulations by the DST in future will be applicable to me.
2. As a recipient of the DST's WISE-PDF Project, I shall also abide by the rules, discipline of the institution where I have been given the facility of work.
3. I shall devote full time to research during the tenure of the WISE-PDF Project and will not take any other assignment or job without prior permission of DST.
4. I shall complete the study and research work assigned to me and submit a detailed consolidated Project Completion Report of research work through the competent authorities upon completion of the WISE-PDF Project.
5. I shall not leave the WISE-PDF Project before its completion without prior written approval of the DST.
6. I also hereby declare that if the results of the research are such that can be exploited commercially by taking IPRs or otherwise commercial exploitation, the same shall be communicated to the DST.
7. I also hereby declare that I will conduct SSR activities e.g. student internship, training/workshops, individual lectures, popular articles, reports in newspapers, web articles, etc. as per WISE-PDF guidelines during the tenure of my project.
8. I have gone through DST's Terms & Conditions. I have clearly understood and have accepted all the Terms & Conditions in full effect.

Signature of PI with Date: 6/11/2023

Address: 1502, VUB Paradise Plot No. 11, Sector 35D Kharghar Mumbai

Signature with Seal

(Mentor)
Dr. A. R. Tambekar,
Associate Professor,



(Head of the Institution)
I/c. Principal
Bharatiya Vidya Bhavan's
Sardar Patel College of Engineering
(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W), Mumbai - 58.

Consent Letter from Mentor of WISE-PDF Project

This is to certify that I, Dr./ Prof. A. R. Kambekar.....

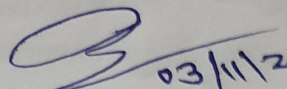
agree to act as a mentor in the WISE-PDF project entitled

"Structural control of landslide between Lonare and Pune along Mumbai Pune Expressway: Implications to Neotectonic Deformation."

I'll support and guide the PI of the project Dr.

Suman Romat..... academically as well as

administratively while implementation of her project during its whole tenure.


(Signature of Mentor)

Name and stamp of mentor

Dr. A. R. Kambekar,



SARDAR PATEL COLLEGE OF ENGINEERING
MUNSHI NAGAR, ANDHERI (WEST),
MUMBAI - 400 058.

CERTIFICATION BY THE HEAD OF THE INSTITUTE

- (i) Dr. SUMAN RAWAT.....the Principal Investigator of the project entitled Structural Control of landslides between Lonarala and Pune along Mumbai Pune Expressway. Implication of Neotectonic deformation will assume full responsibility for implementing the project.
- (ii) The date of appointment starts from the date on which the University/ Institute receives the first sanction grant from the Department of Science and Technology.
- (iii) The investigator will be governed by the rules and regulations of the University/ Institute for the duration of the project.
- (iv) The University/ Institute will provide basic infrastructure and other required facilities to the Investigator for undertaking the research project.
- (v) The University/ Institute will take into its books all assets received under this sanction and its disposal would be at the discretion of the Department of Science and Technology.
- (vi) The research grant by the Department of Science and Technology will be used to meet the expenditure on the project and for the period for which the project has been sanctioned as indicated in the sanction order.
- (vii) The audited statement of accounts, utilization certificates, and other reports and documents as required under the scheme will be submitted to the department.



A. R. Kumbekar
Mentor

Signature of the Head of the Institution with seal

Dr. Principal
Bharatiya Vidya Bhavan's
Sardar Patel College of Engineering
(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W), Mumbai - 58.