

Chander Kumar Singh

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Research Interests:

Groundwater contamination/chemical contamination, Water Pollution, Hydrogeochemistry, Arsenic, Fluoride and Uranium contamination; Geoinformatics applications in water resources/geological applications, Public health, Community based interventions for mitigation

Educational Qualifications:

- Doctor of Philosophy (PhD) (2007-2011). Thesis awarded on the topic “*Groundwater Exploration and Its Geochemical Assessment in Western Rajasthan: Computational Intelligence Approach for Remote Sensing, GIS & Geophysical Application*” from School of Environmental Sciences, Jawaharlal Nehru University, New Delhi.
- 2005- 2007: Master of Philosophy (M.Phil) in Remote Sensing and GIS applications in hydrology with CGPA of 7.2. Dissertation Submitted (*Integrated water resource management in a part of Punjab by using satellite data*) from Jawaharlal Nehru University, New Delhi.
- 2001-2003: Master of Science (M.Sc) in Analytical Chemistry, Banaras Hindu University
- 1998-2001: Bachelor of Science (B.Sc Hons.) in Chemistry, Banaras Hindu University

Awards and Distinctions:

- **Research Cited as one of the top 15 scientific achievements by Indian Scientists in the year 2018.**
- Interviewed by **Scientific American** for our study on Arsenic mitigation in Bihar.
- **Technical Expert Member Arsenic Task Force, Punjab.**
- **Young Scientist Award by International Union of Geological Sciences for poster presentation in Euro Conference 2009, Switzerland.**
- Awarded “**Sat Pal Mittal Fellow**” for the year 2006-2010 in Jawaharlal Nehru University
- Recipient of Senior Research Fellowship, New Delhi, India (July 2008 to July 2010)
- Recipient of Junior Research Fellowship, New Delhi India (July 2006–July 2008).

Member: Indian Society of Remote Sensing, Technical Expert Member Arsenic Task Force, Punjab Govt., Indian Association of Hydrogeologist (INC-IAH)

Trainings:

1. CODATA International Training Workshop for Developing Countries on Big Data Science, CNIC, Beijing, 4-20 June 2014
2. HYPERSPECTRA 2013, held at Indian Institute of Technology, Bombay from 21st January 2013 to 25th January 2013
3. Training program on “Design, Implementation, Operation, Monitoring and Maintenance of Rainwater Harvesting Systems in Urban Areas” organized by Central Ground Water Board, Ministry of Water Resources.
4. Training program on “Water Management” organized by Central Ground Water Board, Ministry of Water Resources.

Academic Collaborations:

USA: Massachusetts Institute of Technology, Columbia University, Michigan State University,

Japan: United Nations University, Institute for Global Environmental Strategies

Pakistan: Quad-i-Azam University

Fiji: Fiji National University

India: Jawaharlal Nehru University, IIT Guwahati, IIT Kharagpur, Central Universities of Bihar, Himanchal, Rajasthan, Allahabad, NIT Manipur, Mahavir Cancer Institute

Research Guidance:

PhD Awarded

1. Soumendu Shekhar Roy (2022). Defining the nature of metamorphism of the litho-units of Lesser Himalaya (Kumaun) using sensor based spectroscopic techniques (Submitted)
2. Akanksha Balha (2021). Runoff modelling for the present and future scenario: A case study of Delhi (Co-supervisor: Dr. Suneel Pandey, TERI)
3. Sonal Bindal (2020). Arsenic Vulnerability in Middle Gangetic Plains (Sole Supervision)
4. Anand Kumar (2019). Arsenic Release Mechanism in Indus River Basin, Punjab, India (Co-supervisor: Dr. Alexander van Geen Columbia University, New York, USA)
5. Mamta Mehra (2017). Conceptualizing resource management domain framework for addressing differential agricultural needs of Mewat District, Haryana, India (Co-supervisor: Dr. Bakimchandra Oinam, NIT, Manipur)
6. Madhuri Kumari (2017). Geostatistical modeling to predict rainfall in Indian Himalayas of Uttarakhand (Co-supervisor: Dr. Ashoke Basistha)

Ongoing PhD-1

M.Sc/M.Tech Dissertation-56

Projects (A total funding of approx. 5.8 crore from the 4 internationally and 4 nationally funded projects):

1. Co-PI in the consortium project “A Proposal for demonstration of sustainable mitigation for groundwater arsenic in arsenic-polluted Gangetic River aquifers of Bihar, Uttar Pradesh and West Bengal, India” Dept. of Science and Technology, GOI (Total Project Cost: 2.47 Crore) – Ongoing.
2. PI in ongoing project “Quantification of Natural Uranium in Groundwater in Uttar Pradesh, India” funded by Board of Research in Nuclear Sciences, Mumbai, India. 27.7 Lakh) – Ongoing.
3. PI in completed project “Water and Urban Initiatives for Gomti River Basin, Lucknow City, Uttar Pradesh” funded by UNU-IAS, Tokyo, Japan (\$24000 USD) – Completed.
4. PI in completed project “Targeting low-arsenic and low-fluoride groundwater to reduce exposure in rural Punjab, India” PEER Science program funded by National Science Foundation, USA and USAID (\$180,000 USD)- Completed.
5. PI in completed project on “Household Responses in 26 Bihar Villages One Year after Tubewells were Tested for Arsenic for a Fee”. International Growth Centre (IGC) funded project by UKAID (\$40000 USD)- Completed.
6. Co-PI in completed project “Vegetation change due to climate change in Western Himalayan Region” funded by Ministry of Environment and Forest, GOI (37.80 Lakhs) - Completed.
7. Co-PI in completed project “Assessment of tectonic implications on groundwater in vicinity of Faridabad and Ghaziabad fault across River Yamuna” funded by Dept. of Science and Technology, GOI (12.5 Lakhs) - Completed.
8. PI in completed project on “Piloting a novel delivery mechanism of a critical public health service in India: arsenic testing of tubewell water in the field for a fee”. International Growth Centre (IGC) funded project by UKAID (\$25000 USD) - Completed.

Publications (A total of 80 papers have been published out of which 73 papers have been published in international journals whereas 7 papers have been published in National journals. The cumulative impact factor gathered with all the papers published in 168.21 with a total citation of 1882 and a H-index of 24. Out of the 80 papers published, **40 of them have been published in Q1 journals, and 28 of them have been published in Q2 journals. 1 paper in a Q3 journal and 3 of the papers in Q4 journals): Total Impact Factor: >255**

81. Dashora M, Kumar A, **Singh CK**, Kumar S, Kumar P, Kumar A. 2022 Geochemical assessment of groundwater in semi-arid region of India using chemometric analysis and entropy water quality index (EWQI). *Natural Hazards* (Springer) (Q1 Journal, SJR:0.76, Springer, IF-3.102)

80. Khattak JA, Farooqi A, Hussain I, Kumar A, **Singh CK**, Mailloux BJ, Bostick B, Ellis T, van Geen A. 2022. Groundwater fluoride across the Punjab plains of Pakistan and India: Distribution and underlying mechanisms. *Science of The Total Environment*, 806, p.151353. (Q1 Journal, SJR:1.66, Elsevier, IF:7.936).
79. Mallick J, Shivhare V, **Singh CK** and Al Subih M. 2022. Prioritizing Watershed Restoration, Management, and Development Based on Geo-Morphometric Analysis in Asir Region of Saudi Arabia Using Geospatial Technology. *Polish Journal of Environmental Studies*. Vol. 31, No. 1-22
78. Mishra AK, Rajput P, Singh A, **Singh CK**, Mall RK. 2021. Effect of Lockdown Amid COVID-19 on Ambient Air Quality in 16 Indian Cities. *Frontiers in Sustainable Cities*, 3, pp705051
77. Bindajam AA, Mallick J, Balha A, AlQadhi S, Sohan A, **Singh CK**, Rehman A. 2021. Characterizing the urban decadal expansion and its morphology using integrated spatial approaches in semi-arid mountainous environment, Saudi Arabia. *Polish Journal of Environmental Studies* (SJR:0.51, IF-1.699) DOI/10.15244/pjoes/133033
76. Balha A, Mallick J, Pandey S, Gupta S, **Singh CK**. 2021. A comparative analysis of different pixel and object-based classification algorithms using multi-source high spatial resolution satellite data for LULC mapping. *Earth Science Informatics* 14(4), pp.2231-2247. (Q2 Journal, SJR:0.51, Springer, IF-2.878)
75. Shivhare V, Gupta C, Mallick J, Singh CK. 2021. Geospatial modelling for sub-watershed prioritization in Western Himalayan Basin using morphometric parameters. *Natural Hazards*. <https://doi.org/10.1007/s11069-021-04957-6> (Q1 Journal, SJR:0.76, Springer, IF-3.102)
74. Alqadhi S, Mallick J, Balha A, Bindajam A, Singh CK, Hoa PV. 2021. Spatial and decadal prediction of land use/land cover using multi-layer perceptron-neural network (MLP-NN) algorithm for a semi-arid region of Asir, Saudi Arabia. *Earth Science Informatics*, 14(3), pp.1547-1562. (Q2 Journal, SJR:0.51, Springer, IF-2.878)
73. Mallick J, **Singh CK**, AlMesfer MK, Singh VP, Alsubih M. 2021. Groundwater Quality Studies in the Kingdom of Saudi Arabia: Prevalent Research and Management Dimensions. *Water*, 13(9), p.1266. (Q1 Journal, SJR:0.66, MDPI, IF-3.103)
72. Mallick J, AlMesfer MK, Singh VP, Falqi II, **Singh CK**, Alsubih M, Kahla NB. 2021. Evaluating the NDVI–Rainfall Relationship in Bisha Watershed, Saudi Arabia Using Non-Stationary Modeling Technique. *Atmosphere*, 12(5), p.593. (Q2 Journal, SJR:0.7, MDPI, IF: 2.686)
71. **Singh CK**, Kumar A, Shashtri S, Kumar A, Mallick J, Singh A, Avtar R, Singh RP, Kumar P, Ranjan S. 2021. Geochemical modeling to infer genetic origin of groundwater and associated health risks in desertic aquifers. *Groundwater for Sustainable Development*, 13; p.100569. (Q1 Journal, SJR:0.867, Elsevier)

70. AlSubih M, Kumari M, Mallick J, Ramakrishnan R, Islam S, **Singh CK**. 2021. Time series trend analysis of rainfall in last five decades and its quantification in Aseer Region of Saudi Arabia. *Arabian Journal of Geosciences*, 14(6), 1-15. (Q2 Journal, SJR:0.4, Springer, IF-1.827)
69. Mallick J, Kumar A, Almesfer MK, Alsubih M, **Singh CK**, Ahmed M, Khan RA. 2021. An index-based approach to assess groundwater quality for drinking and irrigation in Asir region of Saudi Arabia. *Arabian Journal of Geosciences*, 14(3), 1-17 (Q2 Journal, SJR:0.4, Springer, IF-1.827)
68. Bindal S, Kumar A, Mallick J, Shashtri S, Kumar P, **Singh CK**. 2020. Geochemical, Topographical, and Meteorological Controls on Groundwater Arsenic Contamination in Sharda River Basin of Uttar Pradesh, India. *Journal of Climate Change*, 6(2), 71-87.
67. Balha A, **Singh CK**, Pandey S. 2020. Assessment of urban area dynamics in world's second largest megacity at sub-city (district) level during 1973–2016 along with regional planning. *Remote Sensing Applications: Society and Environment*, 20, 100383. (Q1 Journal, SJR:0.4, Elsevier-Cite score 3.1)
66. Balha A, Vishwakarma BD, Pandey S, **Singh CK**. 2020. Predicting impact of urbanization on water resources in megacity Delhi. *Remote Sensing Applications: Society and Environment*, 20, 100361. (Q1 Journal, SJR:0.4, Elsevier- Cite score 3.1)
65. Bindajam AA, Mallick J, AlQadhi S, **Singh CK**, Hang HT. 2020. Impacts of Vegetation and Topography on Land Surface Temperature Variability over the Semi-Arid Mountain Cities of Saudi Arabia. *Atmosphere*, 11(7), 762. (Q2 Journal, SJR:0.7, MDPI, IF: 2.686)
64. Supe H, Avtar R, Singh D, Gupta A, Yunus AP, Dou J, A. Ravankar A, Mohan G, Chapagain SK, Sharma V, **Singh CK**, Tutubalina O, Kharrazi A. 2020. Google Earth Engine for the Detection of Soiling on Photovoltaic Solar Panels in Arid Environments. *Remote Sensing*, 12(9), 1466. (Q1 Journal, SJR:1.42, MDPI, IF: 4.848)
63. Roy SS, Sinha LK, **Singh CK**. 2020. Reflectance based semi-empirical model to determine nature and metamorphic grade of Almora Group of Rocks, Kumaon (Lesser) Himalaya. *Geocarto International*, DOI: 10.1080/10106049.2020.1762765 (Q1 Journal, SJR:0.77, Taylor and Francis, IF: 4.889)
62. Kumar A, **Singh CK**, Bostick B, Nghiem A, Mailloux B, van Geen A. 2020. Regulation of groundwater arsenic concentrations in the Ravi, Beas, and Sutlej floodplains of Punjab, India. *Geochimica Cosmochimica Acta*, 276, 384-403. (Q1 Journal, SJR:2.3, Elsevier, IF- 5.010)
61. Mallick J, Ahmed M, Alqadhi SD, Falqi II, Parayangat M, **Singh CK**, Rahman A, Ijyas T. 2020. Spatial stochastic model for predicting soil organic matter using remote sensing data. *Geocarto International*, (DOI: 10.1080/10106049.2020.1720314). (Q1 journal, SJR:0.77, Taylor and Francis, IF: 4.889)
60. Kumar A, Roy SS, **Singh CK**. 2020. Geochemistry and associated human health risk through potential harmful elements (PHEs) in groundwater of the Indus basin, India. *Environmental Earth Sciences*, 79, 86. (Q2 journal, SJR:0.6, Springer, IF- 2.784)

59. Kumar A, **Singh CK**. 2019. Arsenic enrichment in groundwater and associated health risk in Bari doab region of Indus basin, Punjab, India. 256, 113324. *Environmental Pollution*, (Q1 Journal, SJR:1.97, Elsevier, IF- 8.071)
58. Bindal S, **Singh CK**. 2019. Predicting groundwater arsenic contamination: Regions at risk in highest populated state of India. *Water Research*, 159, 65-76. (Q1 Journal, SJR:2.93, Elsevier, IF: 11.236).
57. Mallick J, **Singh C**, AlMesfer M, Kumar A, Khan R, Islam S, Rahman A. 2018. Hydro-Geochemical Assessment of Groundwater Quality in Aseer Region, Saudi Arabia. *Water*, 10(12), 1847. (Q1 Journal, SJR:0.66, MDPI, IF-3.103)
56. van Geen A, Farooqi A, Kumar A, Khattak JA, Mushtaq N, Hussain I, Ellis T, **Singh CK**. 2018. Field testing of over 30,000 wells for arsenic across 400 villages of the Punjab plains of Pakistan and India: Implications for prioritizing mitigation. *Science of The Total Environment*, 654, 1358-1363 (Q1 Journal, SJR:1.66, Elsevier, IF:7.936).
55. **Singh CK**, Kumar A, Bindal S. 2018. Arsenic contamination in Rapti River Basin, Terai region of India. *Journal of Geochemical Exploration*, 192, 120-131. (Q1 Journal, SJR:0.84, Elsevier, IF:3.746).
54. Mallick J, Singh RK, Khan RA, Singh CK, Kahla NB, Warrag EI, Islam S, Rahman A. 2018. Examining the rainfall–topography relationship using non-stationary modelling technique in semi-arid Aseer region, Saudi Arabia. *Arabian Journal of Geosciences*, 11(9), 1-16. (Q2 Journal, SJR:0.4, Springer, IF-1.827)
53. Mehra M, **Singh CK**. 2018. Identification of resource management domain-specific best practices in the agriculture sector for the Mewat region of Haryana, India. *Environment, Development and Sustainability* 21(5), pp.2277-2296. (Q2 Journal, SJR:0.55, Springer, IF-3.219)
52. **Singh CK**, Kumar A, Roy SS. 2018. Quantitative analysis of the methane gas emissions from municipal solid waste in India. *Scientific Reports*, 8(1), p.2913 (Q1 Journal, SJR:1.34, Nature, IF: 4.379).
51. Kumari M, **Singh CK**. 2018. GaRiRO: Gradient and residual integrated rank ordering of stations in rainfall monitoring network. *Earth Science Informatics*, 11(2), 273-286. (Q2 Journal, SJR:0.39, Springer, IF: 2.878).
50. **Singh CK**, Kumar A. 2017. Vermicomposting of terrestrial weeds *Lantana camara* L. and *Parthenium hysterophorus* L.: agriculture solid waste. *Ecological Questions*, 28(4); 63-69 (Q4 Journal, SJR:0.16)
49. **Singh CK**, Kumar A, Roy SS. 2017. Estimating Potential Methane Emission from Municipal Solid Waste and a Site Suitability Analysis of Existing Landfills in Delhi, India. *Technologies*. 25, 5(4):62.

48. Barnwal P, van Geen A, von der Goltz J, **Singh CK**. 2017. Demand for environmental quality information and household response: Evidence from well-water arsenic testing. *Journal of Environmental Economics and Management*. 86, 160-192. (Q1 Journal, SJR:2.39, Elsevier, IF: 4.624)
47. Kumar P, **Singh CK**, Saraswat C, Mishra B, Sharma T. 2017. Evaluation of aqueous geochemistry of fluoride enriched groundwater: A case study of the Patan district, Gujarat, Western India. *Water Science*, 31(2), 215-229 (Elsevier)
46. **Singh CK**, Kumar A, Shashtri S, Kumar A, Kumar P, Mallick J. 2017. Multivariate statistical analysis and geochemical modeling for geochemical assessment of groundwater of Delhi, India. *Journal of Geochemical Exploration* 175, 59-71 (Q1 Journal, SJR:0.84, Elsevier, IF:3.746).
45. Mehra M, **Singh CK**. 2017. Spatial analysis of soil resources in the Mewat district in the semiarid regions of Haryana, India. *Environment, Development and Sustainability*, 20(2), 661–680 (Q2 Journal, SJR:0.55, Springer, IF-3.219)
44. Kumari M, **Singh CK**, Basistha A, Dorjie S, Tamange TB. 2017. Non-stationary modelling framework for rainfall interpolation in complex terrain. *International Journal of Climatology*, 37 (11), 4171-4185. (Q1 Journal, SJR:1.69, Wiley, IF: 4.069)
43. Mehra M, **Singh CK**, Abrol IP, Oinam B. 2016. A GIS-based methodological framework to characterize the Resource Management Domain (RMD): A case study of Mewat district, Haryana, India. *Land Use Policy*, 60, 90-100 (Q1 Journal, SJR:1.48, Elsevier, IF: 5.398)
42. Kumari M, **Singh CK**, Basistha A. 2016. Clustering Data and Incorporating Topographical Variables for Improving Spatial Interpolation of Rainfall in Mountainous Region. *Water Resources Management*, 31 (1), 425–442. (Q1 Journal, SJR:1.01, Springer, IF: 3.517)
41. Kumari M, **Singh, CK**, Oinam B, Basistha, A. 2016. DEM-based delineation for improving geostatistical interpolation of rainfall in mountainous region of Central Himalayas, India. *Theoretical and Applied Climatology*, 130 (1–2), 51–58. (Q2 Journal, SJR:0.97, Springer, IF: 3.179)
40. Kumari M, **Singh CK**, Oinam B, Basisthae A. 2015. Geographically weighted regression-based quantification of rainfall– topography relationship and rainfall gradient in Central Himalayas. *International Journal of Climatology*, 37 (3); 1299-1309 (Q1 Journal, SJR:1.69, Wiley, IF: 4.069)
39. Mehra M, Oinam B, **Singh CK**. 2015. Integrated Assessment of groundwater for agriculture use in Mewat District of Haryana, India using Geographical Information System (GIS). *Journal of the Indian Society of Remote Sensing*, 44(5), 747-758. (Q2 Journal, SJR:0.34, Springer, IF: 1.563)
38. Kumar P, Kumar A, **Singh CK**, Avtar R, Ramanathan AL, Herath S. 2015. Hydrogeochemical evolution and appraisal of groundwater quality in Panna District, Central India. *Exposure and Health*, 8(1), 19-30. (Q1 Journal, SJR:1.25, Springer, IF: 11.422)

37. **Singh CK**, Kumar P, Kumar A, Mukherjee S. 2015. Depositional environment in Great Indian Desert using grain size parameters and its chemical characterization. *Journal of the Geological Society of India*, 86 (4), 412–420 (Q3 Journal, SJR:0.33, Springer, IF: 1.459)
36. Ramesh P, **Singh CK**. 2015. Evaluation of LiDAR and image segmentation-based classification techniques for automatic building footprint extraction for a segment of Atlantic County, New Jersey. *Geocarto International*, 31(6), 694-713. (Q1 Journal, SJR:0.77, Taylor and Francis, IF: 4.889)
35. Kumar A, **Singh CK**. 2015. Characterization of hydro-geochemical processes and Fluoride Enrichment in Groundwater of South-Western Punjab. *Exposure and Health*, 7(3), 373-387. (Q1 Journal, SJR:1.25, Springer, IF: 11.422)
34. Mallick J, **Singh CK**, Al-Wadi H, Ahmed M, Rahman A, Shashtri S, Mukherjee S. 2015. Geospatial and geostatistical approach for groundwater potential zone delineation. *Hydrological Processes*, 29(3), 395-418. (Q1 Journal, SJR:1.43, Wiley-Blackwell, IF-3.565)
33. **Singh CK**, Mukherjee S. 2014. Aqueous geochemistry of fluoride enriched groundwater in arid part of Western India. *Environmental Science and Pollution Research*, 22(4), 2668-2678. (Q2 Journal, SJR:0.79, Springer, IF: 4.223)
32. Maan GS, **Singh CK**, Singh MK, Nagarajan B. 2014. Tree species biomass and carbon stock measurement using ground based-LiDAR. *Geocarto International*, 30(3), 293-310. (Q1 Journal, SJR:0.77, Taylor and Francis, IF: 4.889)
31. **Singh CK**. 2014. Land Surface Temperature Estimation using Landsat ETM+ Data. *Journal of Water Resource Engineering and Management*, 1(1).
30. Kumar P, Avtar R, Kumar A, **Singh CK**, Tripathi P, Kumar G S, Ramanathan AL. 2014. Geophysical approach to delineate arsenic hot spots in the alluvial aquifers of Bhagalpur district, Bihar (India) in the central Gangetic plains. *Applied Water Science*, 4(2), 89-97. (Springer, IF-3.874)
29. van Geen A, **Singh CK**. 2013. Piloting a novel delivery mechanism of a critical public health service in India: arsenic testing of tubewell water in the field for a fee. *Policy Note 13/0238 International Growth Centre*, London School of Economics and Political Science
28. Mallick J, Rahman A, **Singh CK**. 2013 Urban Heat Islands in Delhi. *Nature India*, DOI:10.1038/nindia.2013.111
27. Avtar R, Kumar P, **Singh CK**, Sahu N, Verma RL, Thakur JK, Mukherjee S. 2013. Hydrogeochemical Assessment of Groundwater Quality of Bundelkhand, India Using Statistical Approach. *Exposure and Health*, 5(3), 105–115. (Q1 Journal, SJR:1.25, Springer, IF: 11.422)

26. Rina, K, Datta PS, **Singh CK**, Mukherjee S. 2013. Determining the genetic origin of nitrate contamination in aquifers of Northern Gujarat, India. *Environmental Earth Sciences*, 71(4), 1711-1719 (Q2 Journal, SJR:0.6, Springer, IF-2.784)
25. Mallick J, Rahman A, **Singh CK**. 2013. Modeling urban heat islands in heterogeneous land surface and its correlation with impervious surface area by using night-time ASTER satellite data in highly urbanizing city, Delhi-India. *Advances in Space Research*, 52(4), 639-655 (Q2 Journal, SJR:0.66, Elsevier- 2.152)
24. **Singh CK**, Rina K, Singh RP, Mukherjee S. 2013. Geochemical characterization and heavy metal contamination of groundwater in Satluj River Basin. *Environmental Earth Sciences*, 71(1), 201-216. (Q2 Journal, SJR:0.6, Springer, IF-2.784)
23. Kumari Rina, Datta PS, **Singh CK**, Mukherjee S. 2013. Isotopes and ion chemistry to identify salinization of coastal aquifers of Sabarmati River Basin. *Current Science*, 104(3), 335-344. (Q2 Journal, SJR:0.24, IF-1.102)
22. Rina K, **Singh CK**, Datta PS, Singh N, Mukherjee S. 2013. Geochemical modelling, ionic ratio and GIS based mapping of groundwater salinity and assessment of governing processes in Northern Gujarat, India. *Environmental Earth Sciences*, 69(7), 2377-2391 (Q2 Journal, SJR:0.6, Springer, IF-2.784)
21. Mallick J, **Singh CK**, Shashtri S, Rahman A, Mukherjee S. 2012. Land surface emissivity retrieval based on moisture index from LANDSAT TM Satellite Data over Heterogeneous Surfaces of Delhi City. *International Journal of Applied Earth Observation and Geoinformation*, 19, 348-358 (Q1 Journal, SJR:1.62, Elsevier, IF-5.993)
20. **Singh CK**, Shashtri S, Rina K, Mukherjee S. 2012. Chemometric analysis to infer hydro-geochemical processes in a semi-arid region of India. *Arabian Journal of Geosciences*, 6(8), 2915-2932. (Q2 Journal, SJR:0.4, Springer, IF-1.827)
19. **Singh CK**, Kumari R, Singh N, Mallick J, Mukherjee S. 2012. Fluoride enrichment in aquifers of Thar Desert: Controlling Factors and its Geochemical Modeling. *Hydrological Processes*, 27 (17), 2462-2474, (Q1 Journal, SJR:1.43, Wiley-Blackwell, IF-3.565)
18. Mukherjee P, Singh CK, Mukherjee S. 2012. Delineation of groundwater potential zones in arid region of India—a remote sensing and GIS approach. *Water Resources Management*, 26(9), 2643-2672. (Q1 Journal, SJR:1.01, Springer, IF-3.517)
17. Rina K, Datta PS, **Singh CK**, Mukherjee, S. 2012. Characterization and evaluation of processes governing the groundwater quality in parts of the Sabarmati basin, Gujarat using hydrochemistry integrated with GIS. *Hydrological Processes*, 26(10), 1538-1551. (Q1 Journal, SJR:1.43, Wiley-Blackwell, IF-3.565)
16. Shashtri S, **Singh CK**, Singh A, Mukherjee S. 2011. An Integrated Approach through Remote Sensing, GIS and Geophysical Tools to Assess Groundwater Resources in a part of National Capital Region. *Bhujal News, Journal of Central Ground Water Board, Govt. of India*.

15. **Singh CK**, Shashtri S, Mukherjee S, Kumari R, Avatar R, Singh A, Singh RP. 2011. Application of GWQI to assess effect of land use change on groundwater quality in lower Shiwaliks of Punjab: remote sensing & GIS based approach. *Water Resources Management*, 25 (7), 1881-1898. (Q1 Journal, SJR:1.01, Springer, IF-3.517)
14. Avtar R, **Singh CK**, Mukherjee S, Sawada H. 2011. Landslide susceptibility zonation study using remote sensing and GIS technology in the Ken-Betwa River Link area, India. *Bulletin of Engineering Geology and Environment*, 70(4), 595-606. (Q1 Journal, SJR:0.77, Springer, IF-4.298)
13. Avtar R, **Singh CK**, Shashtri S, Mukherjee S. 2011. Identification of Erosional and Inundation Hazard Zones in Ken-Betwa River Linking Area, India Using Remote Sensing and GIS. *Environmental Monitoring and Assessment*, 182(1-4), 341-360. (Q2 Journal, SJR:0.55, Springer, IF-2.513)
12. **Singh CK**, Kumari R, Singh RP, Shashtri S, Kamal V, Mukherjee S. 2011. Geochemical modeling of high fluoride concentration in groundwater of Pokhran area of Rajasthan, India. *Bulletin of Environment and Contaminant Toxicology*, 86(2), 152-158. (Q2 journal, SJR:0.55, Springer, IF-2.151)
11. **Singh CK**, Shashtri S, Mukherjee S. 2011. Integrating multivariate statistical analysis with remote sensing and GIS for geochemical assessment of groundwater quality: A case study of Rupnagar District in Shiwaliks of Punjab, India. *Earth Environmental Sciences*, 62(7), 1387-1405. (Q2 Journal, SJR:0.6, Springer, IF-2.784)
10. **Singh CK**, Shashtri S, Avtar R, Mukherjee S, Singh SK. 2010. Monitoring change in land use and land cover in Rupnagar district of Punjab using Landsat and IRS LISS III satellite data. *Ecological Questions*, 13, 73-79. (Q4 Journal, SJR:0.16, Versita)
09. Avtar R, Kumar P, **Singh CK**, Mukherjee S. 2010, A comparative study on hydrogeochemistry of Ken and Betwa River of Bundelkhand using statistical approach. *Exposure and Health*, 2(3-4), 169-179. (Q1 Journal, SJR:1.25, Springer, IF-11.442)
08. **Singh CK**, Shashtri S, Singh A, Mukherjee S. 2010. Quantitative modeling of groundwater in Shiwaliks of Rupnagar district of Punjab using remote sensing and geographic information systems. *Earth Environmental Sciences* 62 (4), 871-881. (Q2 Journal, SJR:0.6, Springer, IF-2.784)
07. Avtar R, **Singh CK**, Shashtri S, Singh A, Mukherjee S. 2010. Identification and Analysis of Groundwater Potential Zones in Ken-Betwa River Linking Area Using Remote Sensing and GIS. *Geocarto International*, 25(5), 379-396. (Q1 Journal, SJR:0.77, Taylor and Francis, IF-4.889)
06. Singh SK, **Singh CK**, Mukherjee S. 2010. Impact of change in land use/land cover on groundwater quality and quantity in Lower Shiwalik: Remote Sensing and GIS based approach. *Central European Journal of Geosciences*, 2(2), 124-131. (Springer, IF-0.663)

05. Mukherjee S, Shashtri S, **Singh CK**, Singh A. 2009. Hydromorphogeological Microzonation to Infer Groundwater Potential and Quality. *Bhujal News, Journal of Central Ground Water Board*, 24(4), 93-107.
04. Mukherjee S, Shashtri S, **Singh CK**, Srivastava PK, Gupta M. 2009. Effect of Canal on Land Use/Land Cover using Remote Sensing and GIS. *Journal of the Indian Society of Remote Sensing*, 37(3), 527-537. (Q2 Journal, SJR:0.34, Springer, IF-1.563)
03. Mukherjee S, Shashtri S, **Singh CK**, Kumari B, Kumari R, Avatar R, Mukherjee A, Singh B. 2009. Remote sensing techniques to infer Bt Cotton in a part of Bhatinda, Punjab, India. *Gene Conserve*, 8(31).
02. Singh SK, **Singh CK**, Kewat SK, Gupta R, Mukherjee S. 2009. Assessment and monitoring of groundwater status using multivariate statistical techniques in Bareilly District of Uttar Pradesh, India. *Journal of Hydrology and Hydromechanics*, 1(57), 45-54, (Q1 Journal, SJR:0.34, Versita-2.512).
01. Mukherjee S, Shashtri S, Gupta M, Pant M, **Singh CK**, Singh SK, Srivastava PK, Sharma KK. 2007. Integrated Water Resource Management in Aravali Quartzite of Delhi India by Remote Sensing and Geo-physical techniques. *Journal of Environmental Hydrology*, 15 (Q4 journal, SJR:0.11, Paper 10).

Editorial Member:

- Associated Editor for “**Journal of Development Engineering**” an open access journal by Elsevier.

Books

1. Water Resource Management “Integrated water resource management in a part of Punjab” (2011-02-01) ISBN-10: 3844303073
2. Singh CK ed., 2018. *Geospatial Applications for Natural Resources Management*. CRC Press.

Book Chapters

1. **Singh CK**, Kumari M, Kikon N, Tomar RK. 2018. Spatiotemporal Analysis of Urban Expansion and Its Impact on Surface Temperature and Water Bodies. In *Geospatial Applications for Natural Resources Management* (pp. 1-9). CRC Press.
2. Balha A, **Singh CK**. 2018. Urban Growth and Management in Lucknow City, the Capital of Uttar Pradesh. In *Geospatial Applications for Natural Resources Management* (pp. 109-122). CRC Press.
3. Kumar P, **Singh CK**. 2018. Use of Hydrological modelling coupled with geographical information system for plotting sustainable management framework. *Geospatial Applications for Natural Resources Management*, p.191.

Detailed Curriculum Vitae

4. Roy SS, **Singh CK**. 2018. Evaluation of Spectral Mapping Methods of Mineral Aggregates and Rocks along the Thrust Zones of Uttarakhand Using Hyperion Data. In *Geospatial Applications for Natural Resources Management* (pp. 1-9). CRC Press.
5. Balha A, **Singh CK**. 2018. Predictive Modeling of Metropolitan City in India Using Modeling Approach. In *Geospatial Applications for Natural Resources Management* (pp. 1-9). CRC Press.
6. Shubhangi, Kumar A, Balha A, Bindal S, **Singh CK**. 2018. A Comparative Analysis of Fluoride Contamination in a Part of Western India and Indus River Basin. In *Groundwater of South Asia*. DOI: 10.1007/978-981-10-3889-1_16.
7. Basu R, **Singh CK**, Eslamian S. 2017. Cause and Occurrence of Drought. Handbook of Drought and Water Scarcity: Principles of Drought and Water Scarcity. Taylor and Francis
8. Kumari M, Basistha A, Bakimchandra O, **Singh CK**. 2016. Comparison of Spatial Interpolation Methods for Mapping Rainfall in Indian Himalayas of Uttarakhand Region. In *Geostatistical and Geospatial Approaches for the Characterization of Natural Resources in the Environment* (pp. 159-168). Springer International Publishing.
9. **Singh CK**, Jha N, Eslamian S. 2015. Reuse, Potable Water and Possibilities. Urban Water Reuse Handbook, 113-125, Taylor and Francis
10. Kumar P, Avtar R, Kumar A, **Singh CK**, Ramanathan AL. 2015. Assessment of Subsurface Lithology by Resistivity Survey Coupled with Hydrochemical Study to Identify Arsenic Distribution Pattern in Central Gangetic Plain: A Case Study of Bhagalpur District, Bihar, India. In *Safe and Sustainable Use of Arsenic-Contaminated Aquifers in the Gangetic Plain* (pp. 17-31). Springer International Publishing.
11. Sen S, Areendran G, **Singh CK**. 2015. Snow leopard habitat modeling using neuro-fuzzy technique & a comparative analysis between traditional overlay and neuro-fuzzy technique- a case study of Chamoli, and Pithorgarh District of Uttarakhand
12. Shashtri S, Singh A, Mukherjee S, Eslamian S, **Singh CK**. 2013. Groundwater exploration and subsurface visualization of aquifer in Aravalli quartzite using Geophysical, Remote Sensing and GIS techniques (accepted). Handbook of Engineering Hydrology. Taylor and Francis
13. Mukherjee S, JBDP Kumara and **Singh CK**. 2012. Remote sensing applications to infer yield of tea in a part of Sri Lanka. Crop Improvement Under Adverse Conditions: Springer Science Business Media, LLC 233 Spring Street, New York, NY 10013, USA ISBN 978-1-4614-4632-3

Conferences (Oral/Poster):

1. Knowledge, behavior and practices (KBP) for arsenic contaminated drinking water in Bhojpur District, Bihar, India by Sonal Bindal and C. K. Singh. 6th Edition of International Conference on Water Pollution & Sewage Management 2018 at Rome, Italy, July 26-27th, 2018

Detailed Curriculum Vitae

2. Drinking water contamination in Indo-Gangetic plains by Bindal S and Singh CK, 13-26 Jul 2018 ICGS Summer School on Coastal and River Hazards & Management Strategies at RWTH Aachen University
3. People drink water or poison: A mystery by Sonal Bindal and C. K. Singh, 6-15 Mar 2017 ProSPER.Net Young Researcher's School on Water Security for Sustainable Development in a Changing Climate Three-minute PhD thesis presentation.
4. Geogenic contamination in groundwater of Indus basin" Kumar A, Singh CK at National Conference on Water: Technological innovation and solutions organized by Manav Rachna University and Indian association of hydrologist on 23rd March 2018 at Faridabad, India
5. Geospatial techniques to delineate groundwater potential zones in Delhi. National Conference on Aquatic Ecosystem and their Management: Recent Trends and Future Perspectives by Kumar, A., Bindal, S., Singh, C.K. organized by Centre for Environmental Sciences, CUSB, Patna on 21st-23rd March 2014.
6. Targeting low-arsenic and low-fluoride groundwater to reduce exposure in rural Punjab, India. Singh CK, PEER Science Participants' Conference, Bangkok, Thailand, September 30-October 4, 2013
7. Arsenic testing of tubewell water in Bihar for a fee by Singh CK, Barnwal P, van Geen A 18-19 July 2013, IGC South Asia Growth Conference
8. Distribution of fluoride in groundwater from arid areas of Western India by Chander Kumar Singh, Brian Mailloux, Saumitra Mukherjee, Alexander van Geen in GeoGen 2013-Towards sustainable drinking water supply in developing countries, 5-7th Feb 2013
9. Towards for-profit testing of groundwater for arsenic in South Asia by Alexander van Geen, Kazi Matin Ahmed, Ershad Bin Ahmed Sumon, Chander Kumar Singh, in GeoGen 2013-Towards sustainable drinking water supply in developing countries, 5-7th Feb 2013
10. Monitoring agricultural drought in Jharkhand using vegetation indices: A remote sensing approach. Rumia Basu, C. Jeganathan, Chander Kumar Singh in National symposium on space technology for food and environmental security (ISRS and ISG conference), 5-7th Dec 2012
11. Assessment of salinization in coastal aquifers of Sabarmati Basin using isotopic composition and ionic ratio by Kumari Rina, PS Datta, Chander Kumar Singh, S Mukherjee in National symposium on space technology for food and environmental security (ISRS and ISG conference), 5-7th Dec 2012
12. Paper Presented in India Water Week 2012, 10-16th April 2012 "*Remote sensing and GIS application for Sustainable Hydrogeosciences*" Saumitra Mukherjee, Chander Kumar Singh, Kumari Rina.
13. National Seminar on Environmental Concerns and Sustainable Development: Issues and Challenges for India 2-4th March 2012 "*Defluoridation of Groundwater Using Natural Adsorbent*

Detailed Curriculum Vitae

- (*Rice Husk*)” Neha Singh, Sujeet Kumar, C.K. Singh, P. K. Mishra, Nandlal Singh, Saumitra Mukherjee
14. Paper presented on the topic “*GIS based modeling of time critical and cost-effective logistics for traffic congestion in a part of Delhi*” National Conference on Sustainable Transportation Using ITS. 15-17th Feb 2012 Chennai. Gurveek Singh Maan, Chander Kumar Singh
 15. Paper presented on the topic “*Hydrogeochemical Processes Governing Groundwater Quality in the Sabarmati Basin, Gujarat*” The 32nd Asian Conference on Remote Sensing. 3-7 October 2011, Taipei, Taiwan. Kumari Rina, Chander Kumar Singh, Saumitra Mukherjee
 16. Paper presented in 3rd International Conference on Climate Change & Sustainable Management of Natural Resources on the topic “*Geochemical modeling and Ionic ratio in integration with GIS to infer Groundwater salinity in parts of Sabarmati Basin, Gujarat*” Kumari Rina, C. K. Singh, S. Mukherjee
 17. Paper presented in IGCP Conference 582 on the topic “*Qualitative assessment of parameters controlling groundwater quality in Sabarmati River Basin*” Kumari Rina, C.K. Singh, R.P. Singh, V. Kamal, N. Singh, S. Mukherjee
 18. Poster presented National Seminar on Modern and Palaeo Sediments: Implication to Climate, Water Resources and Environmental Changes & XXVIII Convention of Indian Association of Sedimentologists 2011, SES, Jawaharlal Nehru University on “*Grain size parameters to characterize sedimentary environment of Thar Desert, Rajasthan*”. Chander Kumar Singh, SN Shashtri, Saumitra Mukherjee
 19. Paper presented in National Seminar on Environmental Pollution and Bioremediation, SES, Jawaharlal Nehru University on GIS based multi-criteria analysis and geochemical modeling to assess the groundwater quality in a part of Punjab. Chander Kumar Singh, S. Shashtri, Kumari Rina, RP Singh, BC Oinam and S Mukherjee
 20. Paper presented in “31st ACRS conference 2010” 1-5th November 2010, Hanoi, Vietnam on “*Geochemical assessment of groundwater quality integrating multivariate statistical analysis with GIS in Shiwaliks of Punjab, India*” CK Singh, S Mukherjee
 21. Poster presented in Euro Conference 2009 “8th Euro Conference of Rock Physics & Geomechanics” 13th - 18th September 2009, Ascona, Switzerland on “*Rock geophysics infers groundwater in hard rock areas of India*” S Mukherjee, S Shashtri, CK Singh
 22. Geological Information System in Rainwater Harvesting. International Conference of Rainwater Harvesting. Kanpur IIT, India, (23-25th November 2009). S Mukherjee, S Shashtri, CK Singh, Amit Singh
 23. Technical Paper on Hydromorphogeological Microzonation to Infer Groundwater Potential and Quality. S Mukherjee, S Shashtri, CK Singh and A. Singh in the special session on Ground water in the 5th Asian Regional Conference of ICID, December 9-11, 2009 held at New Delhi.

Detailed Curriculum Vitae

24. Technical Paper on “Impact of LULC on spatio-temporal variation of groundwater quality in hard rock area of Ranchi district, Jharkhand using landsat satellite data” in Regional Workshop on exploration, development and management on groundwater in hard rocks with special reference to Jharkhand State (25-26th March 2010) S. Mukherjee, B. Kumari, CK Singh
25. Poster presented in MYRES 2008 held in New Orleans, USA. “Landscape interpretation to assess groundwater resources through remote sensing, GIS and Geophysical investigations” S Mukherjee, S Shashtri, CK Singh

Invited/Guest Lecture:

1. Invited talk on Arsenic in Groundwater on 22nd March, SGT University, Grugram
2. Invited talk on Remote Sensing of Groundwater in five-day FDP program organized by NIT, Manipur, 14th-18th December, 2020.
3. Invited talk on Safe and Sustainable Aquifers: Role of Space Technology in Dept. of Civil Engineering, Babu Banarasi Das National Institute of Technology, Lucknow, 17th May 2020.
4. Invited talk on *Information Driven Socio-Behavioral Change to Mitigate Arsenic Crisis*, **UNESCO Chair in Technologies for Development: From Innovation to Social Impact** 2-4 May 2016 | SwissTech Convention Centre | EPFL, Lausanne, Switzerland
5. Invited talk on *Arsenic Testing for a Fee*, **Indo-German IGSTC-Workshop** titled “New Generation Sensors for Unsaturated Soils and Water Technology
6. Invited talk **Columbia University- Superfund Research Program** on “**Are aquifers in Indus Basin safe: Role of Geogenic contaminants**” 20th Oct 2014.

(http://superfund.ciesin.columbia.edu/sfund_files/documents/events/CU%20SRP%20Oct2014%20Seminar_CKSingh_0_0.pdf)
7. Invited talk **Massachusetts Institute of Technology, USA-** on “**Water Testing Kits to reduce poisoning due to geogenic contaminants**” 27th Oct 2014.
8. Invited talk on “*Modeling future scenario for Land use and Land cover (LULC) using geospatial approach: Dehradun in 2050*” in 1st **Biennial International Congress on Urban Green Spaces (CUGS2012)** held at New Delhi from March 5-7, 2012 on "*Urban Green Spaces Assessment: Role of Remote Sensing Technologies*".
9. “Applications of Neural Networks in Hydrology” in National Training workshop of Remote Sensing, GIS in natural resource management in Mizoram University, 9-10 March 2010

Media Coverage:

1. Interviewed by All India Radio on “Heavy metal toxicity”.

2. Interviewed by Scientific American for the article **Death in the Water**, Katy Daigle, Scientific American, 314, 42-51 (2016) Published online: 15 December 2015, doi:10.1038/scientificamerican0116-42
3. <https://www.jagran.com/news/national-fuels-can-be-made-from-garbage-gases-17785058.html>
4. <https://hindi.firstpost.com/technology/methane-dump-can-create-gas-used-as-cooking-fuel-india-science-wire-am-102100.html>
5. <https://www.prabhasakshi.com/news/proventhings/methane-extracted-with-economic-prosperity/125419.html>
6. http://hindi.webdunia.com/current-affairs/methane-gas-emissions-118040500085_1.html
7. <http://www.spandanfeatures.com/methane-extracted-with-economic-prosperity/>
8. <http://www.natureasia.com/en/nindia/article/10.1038/nindia.2013.111>
9. <https://www.theigc.org/blog/reducing-poisoning-by-arsenic-in-tubewell-water/>
10. <https://www.theigc.org/project/household-responses-in-26-bihar-villages-one-year-after-tubewells-were-tested-for-arsenic-for-a-fee/#outputs>
11. <http://www.globalissues.org/news/2016/04/20/22040>
12. <https://www.youtube.com/watch?v=GGa7-UhrfmU>
13. <https://www.ndtv.com/india-news/high-arsenic-levels-in-punjab-wells-raising-major-public-health-concern-study-1961180>
14. <https://www.thehindubusinessline.com/news/science/indo-pak-study-reveals-extensive-arsenic-problem-in-punjab-groundwater/article25772782.ece>
15. <https://www.downtoearth.org.in/news/water/indo-pak-study-reveals-extensive-arsenic-problem-in-punjab-groundwater-62534>
16. <https://thewire.in/environment/indo-pak-study-reveals-extensive-arsenic-problem-in-punjab-groundwater>
17. <https://blogs.ei.columbia.edu/2018/12/12/arsenic-contamination-punjabi-wells/>
18. <http://vigyanprasar.gov.in/isw/indo-pak-study-reveals-extensive-arsenic-problem-punjab-groundwater.html>
19. <https://www.businesstoday.in/pti-feed/high-arsenic-levels-found-in-25-pc-of-13000-wells-in-punjab-study/story/299614.html>
20. <https://weather.com/en-IN/india/pollution/news/2018-12-18-arsenic-contamination-punjab-groundwater-study>
21. <https://www.vikatan.com/news/miscellaneous/145198-punjab-groundwater-contaminated-with-arsenic.html>
22. <https://www.prabhasakshi.com/proventhings/dangerous-level-of-arsenic-found-in-ground-water-in-punjab>
23. <https://www.gaonconnection.com/desh/dangerous-level-of-arsenic-found-in-ground-water-in-punjab-42936>
24. https://www.business-standard.com/article/pti-stories/high-arsenic-levels-found-in-25-pc-of-13-000-wells-in-punjab-study-118121101038_1.html

25. <http://www.gstimes.in/national-indo-pak-study-reveals-extensive-arsenic-problem-in-punjab-groundwater/>
26. <http://www.sikhnewsexpress.com/high-arsenic-levels-in-punjab-wells-raising-major-public-health-concern-study-sne/>
27. <https://phys.org/news/2018-12-arsenic-contamination-common-punjabi-wells.html>
28. <https://www.deccanchronicle.com/lifestyle/health-and-wellbeing/111218/25-per-cent-of-wells-in-punjab-have-high-arsenic-levels-study.html>
29. <https://www.outlookindia.com/newsscroll/high-arsenic-levels-found-in-25-pc-of-13000-wells-in-punjab-study/1437977>
30. http://infosurhoy.com/cocoon/saii/xhtml/en_GB/science/science-arsenic-contamination-is-frequent-in-punjabi-wells-examine-finds-report/
31. <https://www.firstpost.com/tech/science/year-in-review-indias-biggest-achievements-in-the-fields-of-science-and-medicine-5784081.html>
32. <https://www.thehindubusinessline.com/news/science/here-is-what-indian-scientists-achieved-in-2018-beyond-rocket-launches-and-nuclear-capable-missiles/article25819024.ece>
33. <https://www.theweek.in/news/sci-tech/2018/12/12/why-should-we-worry-about-arsenic-levels-in-water-across-borders.html?fbclid=IwAR0cLBiJzhnepIu0rhIVGl2OycOGizrgHncaWoQZhdtd8nYoE4Q9QH4GmQ>
34. <https://www.theweek.in/wire-updates/national/2018/12/11/des12-env-arsenic-punjab-study.html>
35. https://m.dailyhunt.in/news/india/english/deccan+chronicle-epaper-deccanch/25+per+cent+of+wells+in+punjab+have+high+arsenic+levels+study-newsid-103680972?fbclid=IwAR1cA8GAXEXbTXIsbJOdBtYIs3pT_ToQo_Q-WmLHsC9gBBzWcKpEdVZoGzo
36. <https://arunachaltimes.in/index.php/2018/12/12/high-arsenic-levels-in-punjab-wells-raising-major-public-health-concern-study/?fbclid=IwAR2tzVB-X1AUHqE7PvCc4UwT2ufoEKdEJ3-6AmZPAIbQt9PkoN565wVMjOE>
37. <http://www.asianage.com/life/health/111218/research-finds-high-arsenic-levels-in-25-per-cent-wells-of-punjab.html?fbclid=IwAR2YB9T7hsPOR0N-dwfcXKWZabXzyLhZ7S1BEDKjEYxAbRFSuzDtjSqM22Y>
38. <https://www.india.com/news/agencies/high-arsenic-levels-found-in-25-pc-of-13000-wells-in-punjab-study-3474452/>
39. <https://www.devdiscourse.com/article/health/285219-study-raises-health-concerns-after-reporting-arsenic-in-groundwater-in-indus-basin>
40. <http://vigyanprasar.gov.in/isw/here-is-what-indian-scientists-achieved-in-2018.html>
41. <http://vigyanprasar.gov.in/isw/here-is-what-indian-scientists-achieved-in-2018-hindi.html>
42. <https://www.prabhasakshi.com/proventhings/indias-key-achievements-in-the-field-of-science-in-2018>

43. <https://www.prabhasakshi.com/proventhings/indias-key-achievements-in-the-field-of-science-in-2018>
44. <https://www.downtoearth.org.in/news/science-technology/here-is-what-indian-scientists-achieved-in-2018-62588>
45. <https://biotechtimes.org/2018/12/18/indo-pak-study-reveals-extensive-arsenic-problem-in-punjab-groundwater/>
46. <https://www.thehindu.com/sci-tech/here-is-what-indian-scientists-achieved-in-2018-beyond-rocket-launches-and-nuclear-capable-missiles/article25858413.ece>
47. <https://www.hindustantimes.com/india-news/high-level-of-arsenic-found-in-punjab-groundwater/story-lgk8hnOPt112zPTBEF2cON.html>
48. <https://sikhsiyasat.net/2018/12/28/international-study-finds-high-level-of-arsenic-in-east-and-west-punjab-groundwater/>
49. <http://www.indiansciencejournal.in/science-2/fifteen-scientific-achievements-in-india-in-2018-beyond-rockets-and-missiles-532338>