SANTOSH K. SHAH

SCIENTIST 'E'
Birbal Sahni Institute of Palaeosciences (BSIP),
53 University Road, Lucknow – 226 007,
Uttar Pradesh, India.

ASSOCIATE PROFESSOR
Academy of Scientific and
Innovative Research (AcSIR),
India, Ghaziabad, U.P, India

E-mails: santoshkumar_shah@bsip.res.in; santoshk.shah@gmail.com
Phones: +91 (522) 2742927 (*Off.*); +91 9451246758 (*Cell*)
Fax: +91 (522) 2740485 (*Off.*)
Office webpage: http://www.bsip.res.in/skshah.html
Personal webpage: http://skshah-bsip.mystrikingly.com

EDUCATION:

2007 **Ph.D in Botany**
Birbal Sahni Institute of Palaeobotany, Lucknow, India and Department of Botany, University of Lucknow, Lucknow, India
Thesis Advisor: Dr. Amalava Bhattacharyya, BSIP, Lucknow, India
Thesis Title: Analysis of climatic changes in Northeast Himalaya and its comparison with Western Himalaya during Late Quaternary

2001 **M.Sc in Botany**
University of North Bengal, Darjeeling, West Bengal, India

1998 **B.Sc in Botany** (Honours), Zoology and Chemistry
Kalimpong College, Kalimpong, West Bengal, India

2009 **Professional course in Geology** (April–July)
BSIP, Lucknow in collaboration with Palaeontological Society of India, Lucknow

2008 **Diploma in French**
University of Lucknow, Lucknow, India

2007 **Proficiency in French**
University of Lucknow, Lucknow, India

1999 **Diploma in Computer Education**
Aptech Computer Education, Kalimpong, West Bengal, India

1999 **Diploma in Environment Management and ISO 14000/14001**
National Institute of Labour and Management (NILEM) Adyar, Chennai, India

APPOINTMENTS:

01/01/2021 – Till date **Scientist 'E'**,
Birbal Sahni Institute of Palaeosciences, Lucknow, India

01/01/2017 – 31/12/2020 **Scientist 'D'**,
Birbal Sahni Institute of Palaeosciences, Lucknow, India

01/01/2013 – 31/12/2016 **Scientist 'C'**,
Birbal Sahni Institute of Palaeosciences, Lucknow, India

15/09/2008 – 31/12/2012 **Scientist 'B'**,
Birbal Sahni Institute of Palaeobotany, Lucknow, India

29/03/2007 – 14/09/2008	**Birbal Sahni Research Associate**, Birbal Sahni Institute of Palaeobotany, Lucknow, India
22/08/2003 – 28/03/2007	**Senior Research Fellow**, Birbal Sahni Institute of Palaeobotany, Lucknow, India
01/01/2003 – 30/06/2003	**Junior Research Fellow**, Birbal Sahni Institute of Palaeobotany, Lucknow, India
21/05/2002 – 31/12/2002	**Junior Research Fellow**, Birbal Sahni Institute of Palaeobotany, Lucknow, India
01/09/2001 – 28/02/2002	**Project Assistant**, University of North Bengal, Darjeeling, India

RESEARCH INTEREST:

- Dendroclimatology
- Climate reconstruction and climate variability study over the Common Era
- Past Drought, Floods, River flow reconstruction and Glacier fluctuation
- Climate Field Reconstruction
- Holocene Palynology and Modern Pollen-Climate calibration
- Instrumental climate data analysis

HONOURS, AWARDS AND RECOGNITIONS:

2019 **President**, Asian Dendrochronological Association – (2019-2021)

Treasurer, Association of Quaternary Researchers (AOQR) – (2019-2023)

Governing body Member, Association of Quaternary Researchers (AOQR)

Founder Member, Association of Quaternary Researchers (AOQR)

INSA Bilateral Exchange Fellowship: Visited Tree-ring and Environmental Change Group, Xishuangbanna Tropical Botanical Garden (XTBG), CAS, P.R. China; July-August, 2019 (1 month).

2018 **Visiting Scientist**: Tree-ring and Environmental Change Group, Xishuangbanna Tropical Botanical Garden (XTBG), CAS, P.R. China; Jan.-Feb. 2018 (15 days).

2016 **Diamond Jubilee Medal**: for publishing papers of high quality in refereed journals during the two years preceding the year of the award.

2014 **Fellow,** East Himalayan Society for Spermatophyte Taxonomy

Sharda Chandra Memorial Gold Medal: jointly with co-authors of paper entitled "*Analysis of vegetation and climate change during Late Pleistocene from Ziro Valley, Arunachal Pradesh, Eastern Himalaya Region*" published in Quaternary Science Reviewss 101, 111-123,

Paper of the Month Award: for August-September, 2014 at BSIP, Lucknow: For paper entitled "*Analysis of vegetation and climate change during Late Pleistocene from Ziro Valley, Arunachal Pradesh, Eastern Himalaya Region*" published in Quaternary Science Reviews 101, 111-123, 2014 **(co-author)**

Paper of the Month Award: for December, 2014 at BSIP, Lucknow: For paper entitled "Spring temperatures in the far-western Nepal Himalaya since A.D. 1640 reconstructed from *Picea smithiana* tree-ring widths" published in *Climate Dynamics* 45, 2069-2081, 2015 **(correspondence author)**

2008 **B.S.Venkatachala Memorial Gold Medal:** for the best research work done among the Young Scientists of the Birbal Sahni Institute of Palaeobotany, Lucknow, India.

2006 **Young Scientist Award** and **Second-Best Presentation:** by Department of Science and Technology for the research contribution on Palaeoclimate studies (16th December, 2006). Department of Geology, University of Jammu, Jammu, India

IN-HOUSE PROJECTS AT BSIP, LUCKNOW:

April, 2021–March, 2025 Project: *Late Pleistocene–Holocene vegetation and climate reconstructions for the Himalayan region: understanding the dynamics and forcing mechanisms*
Working as a core team member
Status: Ongoing

Project: *Quaternary Monsoon/ Climate reconstruction through high resolution multi - proxy studies of Lacustrine archives from central India (Core Monsoon Zone and Indo-Gangetic Plain)*
Working as an associate member
Status: Ongoing

April, 2019–March, 2021 Project: *Tree-ring based climate reconstruction of the Eastern Himalaya: A spatio-temporal perspective ofmulti-decadal variability*
Status: Completed

April, 2017–March, 2019 Project: *Spatio-temporal reconstruction of temperature and hydroclimatic variability in eastern and western Himalaya based on tree-rings*
Status: Completed

April, 2012–March, 2017 Project: *Tree-ring analysis from high altitude areas of Himalayan region: A comparative approach with emphasis on the eastern sector* (Project number: 10.2 under XII Five Year Plan (2012-2017))
Status: Completed

April, 2007–March, 2012 Project: *Analysis of climatic changes based on multi proxy data during Holocene from peninsular and Himalayan region* (Project number: 10.2 under XI Five Year Plan (2007-2012))
Status: Completed

EXTRAMURAL / SPONSORED PROJECTS:

Co-Principal Investigator Project: *Response of forest ecosystem to climate change in the Karnali region of Nepal Himalaya*
Sponsor: Tribhuvan University, Kirtipur, Nepal.
Principal Investigator: Narayan Prasad Gaire, Patan Multiple Campus, Tribhuvan University, Lalitpur, Nepal.
Status of the project: Ongoing

Principal Investigator	Project: *Past climate change and tree line dynamics based on tree-ring data from the Himalayan region* Sponsor: SERB Division, DST, New Delhi Status of the project: Completed
Member	Project: *Tree line shift in central Nepal Himalaya and climate reconstruction of past millennia* Sponsor: Nepal Academy of Science and Technology, Nepal. Principal Investigator: Tree-ring society of Nepal; Status of the project: Completed
Co-Principal Investigator	Project: *Analysis of Climatic changes since LGM from South-West continental margin India using multi-proxy data: Pollen, Diatom and Tree-ring data* Sponsor: ISRO-GBP, India. Principal Investigator: Dr. Amalava Bhattacharyya, BSIP, Lucknow, India Status of the project: Completed

PARTICIPATION IN OTHER PROJECTS:

22/08/2003 – 28/03/2007	Worked as: Senior Research Fellow (SRF) Project/ Principal Investigator: *Analysis of climatic changes in North-east India during last several thousand years using pollen and tree-ring data* / A. Bhattacharyya, BSIP, Lucknow Sponsor: Department of Science and Technology, New Delhi
01/01/2003 – 30/06/2003	Worked as: Junior Research Fellow (JRF) Project/ Principal Investigator: *Analysis of climatic changes vis-à-vis glacial fluctuations using pollen and tree-ring data in Gangotri glacier area, Garhwal Himalaya* / A. Bhattacharyya, BSIP, Lucknow Sponsor: Department of Science and Technology, New Delhi
21/05/2002 – 31/12/2002	Worked as: Junior Research Fellow (JRF) Project/ Principal Investigator: *Analysis of climatic changes in eastern Himalayan region using tree-ring data* / A. Bhattacharyya, BSIP, Lucknow Sponsor: Department of Science and Technology, New Delhi

PUBLICATIONS:

Publication's summary:

Total Publication **73** [*Journal Articles, Reviews and Book chapters* ***69;*** *Scientific report* ***4***]

Journal Articles, Reviews and Book Chapters

2024 [69] Mehrotra N, **Shah SK**, Kar R. 2024. Palynology: a tool to decipher the impact of anthropogenic activity on palaeo-vegetation - a review based on fossil pollen records from India. In Samanta B, Thakre D. (Eds): *Application of Palynology in Stratigraphy and climate studies*. Springer. Gewerbestrasse, Switzerland (In Press)

[68] Singh AK, **Shah SK**, Pandey U, Deeksha, Thomte L, Rahman TW, Mehrotra N, Singh DS, Kotlia BS. 2023. Vegetation Index (NDVI) reconstruction from western Himalaya through dendrochronological analysis of *Cedrus deodara*. *Theoretical and Applied Climatology* 115: 1713-1723. https://doi.org/10.1007/s00704-023-04718-4

2023

[67] Babushkina EA, Zhirnova DF, Belokopytova LV, Mehrotra N, Dergunov DR, **Shah SK**, Veganov EA. 2023. Conifer quantitative wood anatomy as proxy data: application in agricultural yield reconstruction. *Trees*. https://doi.org/10.1007/s00468-023-02437-x

[66] Pandey U, Nakatsuka T, Mehrotra N, Zhen L, Kato Y, Sano M, **Shah SK.** 2023. Tree-rings stable isotope ($\delta^{18}O$ and $\delta^{2}H$) based 368 years long term precipitation reconstruction of South Eastern Kashmir Himalaya. *Science of the Total Environment* 892*:* 164640. https://doi.org/10.1016/j.scitotenv.2023.164640

[65] Mehrotra N, Basavaiah N, **Shah SK.** 2023. Revisit the Medieval Warm Period and Little Ice Age in Proxy Records from Zemu Glacier Sediments, Eastern Himalaya: Vegetation and Climate Reconstruction. *Quaternary* 6(2): 32 https://doi.org/10.3390/quat6020032

[64] Gaire NP, **Shah SK**, Sharma B, Mehrotra N, Thapa UK, Zan ZX, Aryal PC, Bhuju DR. 2023. Spatial minimum temperature reconstruction over the last three centuries for eastern Nepal Himalaya based on tree rings of *Larix griffithiana*. *Theoretical and Applied Climatology* 152. 895-910. https://doi.org/10.1007/s00704-023-04432-1

[63] **Shah SK**, Berkelhammer M, Li Q, Mehrotra N, Thomte L, Shell R, Pandey U, Gaire NP, Kathayat G, Sinha A. 2023. Regional tree-ring oxygen isotope deduced summer monsoon drought variability for Kumaun-Gharwal Himalaya. *Quaternary Science Reviews* 301: 107927. https://doi.org/10.1016/j.quascirev.2022.107927

[62] Thomte L, **Shah SK**, Mehrotra N, Saikia A, Bhagabati AK. 2023. Dendrochronology in the tropics using tree-rings of *Pinus kesiya*. *Dendrochronologia* 78: 126070. https://doi.org/10.1016/j.dendro.2023.126070

[61] Gaire NP, Fan ZX, Chhetri PK, **Shah SK**, Bhuju DR, Wang J, Sharma B, Peilli S, Dhakal YR. 2023. Treeline Dynamics in Nepal Himalaya in a Response to Complexity of Factors. In Singh SP, Reshi ZA, Joshi, R (Eds): *Ecology of Himalayan Treeline Ecotone*, Springer, Singapore. https://doi.org/10.1007/978-981-19-4476-5_22

[60] Pandey U, **Shah SK**, Mehrotra N. 2023. Fluctuations of Kolahoi glacier, Kashmir valley, its assessment with tree-rings of *Pinus wallichiana* and comparable satellite imageries and field survey records. In Pandey M, Pandey PC, Ray Y, Arora A, Jawak SD, Shukla UK (Eds): *Advances in Remote Sensing Technology and The Three Poles*, John Wiley & Sons Ltd: 203-212. https://doi.org/10.1002/9781119787754.ch13

[59] Deeksha, Mehrotra N, Thomte L, **Shah SK**. 2023. Seasonal and annual rainfall trends in Chhattisgarh, Central India – A study towards understanding hydroclimatic scenario for environmental assessment. In Jain R. (Ed): *Global Environmental Challenges Management & Sustainable Development*. Pratush Publisher, New Delhi.

2022

[58] Mehrotra N**, Shah SK**, Basavaiah N, Kar R. 2022. Middle to Late Holocene climate, vegetation and sea-level changes in NW Tripura, northeast India, based on palynological and mineral magnetic evidence. *Journal of Paleolimnology 68:* 297-313. https://doi.org/10.1007/s10933-022-00249-6

[57] Gaire NP, Zaw Z, Fan ZX, Bräuning A, Sharma B, Dhakal YR, Timilsena R, **Shah SK**, Bhuju DR. 2022. Increasing extreme events in the central Himalaya revealed from a tree-ring based multi-century streamflow reconstruction of Karnali River Basin. *Journal of Hydrology* 610: 127801. https://doi.org/10.1016/j.jhydrol.2022.127801

[56] Thomte L, Bhagabati AK, **Shah SK.** 2022. Soil moisture-based winter-spring drought variability over West Karbi Anglong region, Assam, Northeast India using tree-rings of *Pinus kesiya*. *Environmental Challenges* 7: 100512. https://doi.org/10.1016/j.envc.2022.100512

[55] Thomte L, **Shah SK**, Mehrotra N, Bhagabati AK, Saikia A. 2022. Influence of climate on multiple tree-ring parameters of *Pinus kesiya* from Manipur, Northeast India. *Dendrochronologia* 71: 125906. https://doi.org/10.1016/j.dendro.2021.125906

[54] **Shah SK**, Mehrotra N, Gaire NP, Thomte L, Sharma B, Pandey U, Katel O. 2022. Potential utility of Himalayan tree-ring $\delta^{18}O$ to reveal spatial patterns of past drought variability – It's assessments and implications. In Kumaran KPN, Padmalal D (Eds): *Holocene Climate Change and Environment*, Elsevier. 265-292. https://doi.org/10.1016/B978-0-323-90085-0.00003-6

[53] Demina AV, Belokopytova LV, Zhirnova DF, Mehrotra N, **Shah SK**, Babushkina EA, Vaganov EA. 2022. Degree of connectivity in reconstructed precipitation dynamics and extremes for semiarid regions across South Siberia. *Dendrochronologia* 71. 125903. https://doi.org/10.1016/j.dendro.2021.125903

2021 [52] Upadhyay KK, **Shah SK**, Roy A, Tripathi SK. 2021. Dendroclimatology of teak indicates prevailing climatic conditions of tropical moist forests in India. *Ecological Indicators* 129: 107888. https://doi.org/10.1016/j.ecolind.2021.107888

[51] Babushkina EA, Zhirnova DF, Belokopytova LV, Mehrotra N, **Shah SK**, Keler VV, Vaganov EA. 2021. Prospects of Using Tree-Ring Earlywood and Latewood Width for Reconstruction of Crops Yield on Example of South Siberia. *Forests* 12: 174. https://doi.org/10.3390/f12020174

2020 [50] Thomte L, **Shah SK**, Mehrotra N, Bhagabati AK, Saikia A. 2020. Response between tree-rings of *Pinus kesiya* and daily climate – A study from Manipur, Northeast India. *The Palaeobotanist* 69: 27-34. https://doi.org/10.54991/jop.2020.28

[49] Gaire NP, Fan ZX, **Shah SK**, Thapa UK, Rokaya MB. 2020. Tree-ring record of winter temperature from Humla, Karnali in central Himalaya: A 229 years-long perspective for recent warming trend. *Geografiska Annaler: Series A, Physical Geography* 102(3): 297-316. https://doi.org/10.1080/04353676.2020.1751446

2019 [48] **Shah SK**, Pandey U, Mehrotra N, Wiles GC, Chandra R. 2019. A winter temperature reconstruction for the Lidder Valley, Kashmir, Northwest Himalaya based on tree–rings of *Pinus wallichiana*. *Climate Dynamics* 53: 4059-4075. https://doi.org/10.1007/s00382-019-04773-6

[47] Speer JH, **Shah SK**, Truettner C, Pacheco A, Bekker MF, Dukpa D, Cook ER, Tenzin K. 2019. Past Flood and River Flow Variability from Extreme Events Recorded in Trees Rings on the Dhur River, Bhutan. *Dendrochronologia* 56: 125606. https://doi.org/10.1016/j.dendro.2019.125605

[46] Upadhyay KK, **Shah SK**, Roy A, Mehrotra N, Tripathi SK. 2019. Dendrochronological potential of *Tectona grandis*, *Pinus kesiya* and *Quercus serrata* from Mizoram, Northeast India. *Indian Journal of Ecology* 46(4): 722-728

[45] Bhandari S, Gaire NP, **Shah SK**, Speer JH, Bhuju DR, Thapa UK. 2019. A 307-year tree-ring SPEI reconstruction indicates modern drought in western Nepal Himalayas. *Tree-ring Research* 75(2): 73-85. https://doi.org/10.3959/1536-1098-75.2.73

[44] **Shah SK**, Singh R, Mehrotra N, Thomte L. 2019. River flow reconstruction of the Lohit River Basin, North-east India based on tree–rings of *Pinus merkusi*i (Merkus pine). *The Palaeobotanist* 68: 113-124. https://doi.org/10.54991/jop.2019.38

[43] Gaire NP, Dhakal YR, **Shah SK**, Fan ZX, Bräuning A, Thapa UK, Bhandari S, Aryal S, Bhuju DR. 2019. Drought (scPDSI) reconstruction of trans-Himalayan region in western Nepal using *Pinus wallichiana* tree-rings. *Palaeogeography, Palaeoclimatology, Palaeoecology* 514: 251-264. https://doi.org/10.1016/j.palaeo.2018.10.026

[42] Mehrotra N**, Shah SK**. 2019, Basavaiah N, Laskar AH, Yadava MG. Resonance of the '4.2ka event' and terminations of global civilizations during the Holocene, in the palaeoclimate records around PT Tso Lake, Eastern Himalaya. *Quaternary International* 507: 206-216. https://doi.org/10.1016/j.quaint.2018.09.027

2018 [41] **Shah SK**, Pandey U, Mehrotra N. 2018. Precipitation reconstruction for the Lidder Valley, Kashmir Himalaya using tree-rings of *Cedrus deodara*. *International Journal of Climatology* 38: 758-773. https://doi.org/10.1002/joc.5405

[40] Babushkina EA, Belokopytova LV, Zhirnova DF, **Shah SK**, Kostyakova TV. 2018. Climatically driven yield variability of major crops in Khakassia (South Siberia). *International Journal of Biometeorology* 62: 939-948. https://doi.org/10.1007/s00484-017-1496-9

[39] Babushkina EA, Belokopytova LV, **Shah SK**, Zhirnova DF. 2018. Past crops yield dynamics reconstruction from tree-ring chronologies in the forest-steppe zone based on low-and high-frequency components. *International Journal of Biometeorology* 62: 861-871. https://doi.org/10.1007/s00484-017-1488-9

[38] Mehrotra N**, Shah SK**. 2018. A preliminary study of the modern pollen of Tripura, Northeast India. *The Palaeobotanist* 67: 21-31. https://doi.org/10.54991/jop.2018.45

[37] Pandey U, **Shah SK**, Mehrotra N. 2016. Tree-ring studies from Kashmir valley: Present status and future perspectives. *Geophytology* 46(2): 207-220.

2017 [36] **Shah SK**, Mehrotra N. 2017. Tree–ring studies of *Toona ciliata* from subtropical wet hill forests of Kalimpong, eastern Himalaya. *Dendrochronologia* 46: 46-55. https://doi.org/10.1016/j.dendro.2017.10.001

[35] Gaire NP, Bhuju DR, Koirala M, **Shah SK,** Carrer M, Timilsena R. 2017. Tree-ring based spring precipitation reconstruction in western Nepal Himalaya since AD 1840. *Dendrochronologia* 42: 21-30. https://doi.org/10.1016/j.dendro.2016.12.004

[34] **Shah SK**, Pandey U, Mehrotra N, Chandra R. 2017. Tree-ring analysis of *Cedrus deodara* in Pahalgam, Kashmir valley, India: influence of climate and regional linkages. *Himalayan Research Journal* II(III): 1-8.

[33] Mehrotra N, **Shah SK**, 2017. The Late Quaternary sediments from Tripura, North-east India: perspective on the constraints of their radiocarbon dating. *Geophytology* 47(2): 221-227.

[32] Mehrotra RC, Mehrotra N, Srivastava G, **Shah SK.** 2017. Occurrence of fossil woods in the Unakoti district, Tripura and their palaeoclimatic significance. *Journal of the Palaeontological Society of India* 62(1): 17-30.

2016 [31] Dhakal YR, Gaire NP, Aryal S, **Shah SK,** Bhandari S, Kunwar U, Rayamajhi S. Treeline shift in central Nepal Himalaya and climate reconstruction of past millennia. 2016 In: Bhuju DR, McLaughlin K, Sijapati J, Devkota BD, Shrestha N, Ghimire GP, Neupane PK. (eds.), Building Knowledge for Climate Resilience in Nepal. Nepal Academy of Science and Technology, Lalitpur. Pp 41-44.

2015 [30] **Shah SK**, Touchan R, Babushkina E, Shishov VV, Meko DM, Abramenko OV, Belokopytova LV, Hordo M, Jevšenak J, Kędziora W, Kostyakova TV, Moskwa A, Oleksiak Z, Omurova G, Ovchinnikov S, Sadeghpour M, Saikia A, Sidenko T, Strantsov A, Tamkevičiūtė M, Tomusiak R, Tychkov I, Sewastynowicz Ł. 2015. August-July precipitation from tree rings in forest-steppe zone of central Siberia (Russia). *Tree-ring research* 71(1): 37-44. https://doi.org/10.3959/1536-1098-71.1.37

[29] Thapa UK, **Shah SK,** Gaire NP, Bhuju DR. 2015. Spring temperatures in the far-western Nepal Himalaya since A.D. 1640 reconstructed from *Picea smithiana* tree-ring widths. *Climate Dynamics* 45: 2069-2081. https://doi.org/10.1007/s00382-014-2457-1

2014 [28] Bhattacharyya A, Mehrotra N, **Shah SK,** Basavaiah N, Chaudhary V, Singh IB. 2014. Analysis of vegetation and climate change during Late Pleistocene from Ziro Valley, Arunachal Pradesh, Eastern Himalaya Region. *Quaternary Science Reviews* 101: 111-123. https://doi.org/10.1016/j.quascirev.2014.07.008

[27] **Shah SK,** Bhattacharyya A, Chaudhary V. 2014. Streamflow reconstruction of Eastern Himalaya River, Lachen '*Chhu*', North Sikkim, based on tree-ring data of *Larix griffithiana* from Zemu Glacier basin. *Dendrochronologia* 32: 97-106. https://doi.org/10.1016/j.dendro.2014.01.005

[26] **Shah SK**, Shekhar M, Bhattacharyya A. 2014. Anomalous distribution of *Cedrus deodara* and *Pinus roxburghii* in Parbati valley, Kullu, Western Himalaya: An assessment in Dendrochronological perspective. *Quaternary International* 325: 205-212. https://doi.org/10.1016/j.quaint.2013.09.024

[25] Mehrotra N, **Shah SK,** Bhattacharyya A. 2014. Review of Palaeoclimate records from Northeast India based on Pollen proxy data of Late Pleistocene-Holocene. *Quaternary International* 325: 41-54. https://doi.org/10.1016/j.quaint.2013.10.061

[24] **Shah SK,** Bhattacharyya A, Mehrotra N. 2014. Tree-ring studies from eastern Himalaya: Prospects and challenges. *Himalayan Research Journal* 2(1): 76-87.

2013 [23] **Shah SK**, Bhattacharyya A, Shekhar M. 2013. Reconstructing discharge of Beas river basin, Kullu valley, western Himalaya based on tree-ring data. *Quaternary International* 286: 138-147. https://doi.org/10.1016/j.quaint.2012.09.029

[22] Thapa U, **Shah SK**, Gaire NP, Bhuju DR, Bhattacharyya A, Thaguna GS. 2013. Influence of climate on radial growth of *Abies pindrow* in Western Nepal Himalaya. *Banko Janakari – A Journal of Forestry Information for Nepal* 23(2): 14-19.

[21] Chaudhary V, Bhattacharyya A, Guiot J, **Shah SK**, Srivastava SK, Edouard J-L, Thomas A. 2013. Reconstruction of August-September temperature, in North-Western Himalaya since AD 1773, based on tree-ring data of *Pinus wallichiana* and *Abies pindrow*. In: Kotlia BS. (ed.), Holocene: Perspectives, Environmental Dynamics and Impact Events, Nova Science Publishers Inc., pp 145-156.

2012 [20] **Shah SK**, Bhattacharyya A. 2012. Spatio-temporal growth variability three *Pinus* species of Northeast Himalaya with relation to climate. *Dendrochronologia* 30: 266-278. https://doi.org/10.1016/j.dendro.2012.02.003

[19] Bhattacharyya A, Shekhar M, **Shah SK**. 2012. Role of tree-ring study in forest management: Prospects in Indian context. In: Panda S, Ghosh C, (eds.) Diversity and Conservation of Plants and Traditional Knowledge. Bishen Singh Mahendra pal Singh, Dehradun, pp 287-298.

2011 [18] Bhattacharyya A, Mehrotra N, **Shah SK**. 2011. Holocene vegetation and climate of South Tripura based on Palynological analysis. *Journal Geological Society of India* 77: 521-526. https://doi.org/10.1007/s12594-011-0056-x

[17] Managave SR, Sheshshayee MS, Ramesh R, Borgaonkar HP, **Shah SK**, Bhattacharyya A. 2011. Response of cellulose δ18O of teak trees in differing monsoon environments to monsoon rainfall. *Dendrochronologia* 29: 89-79. https://doi.org/10.1016/j.dendro.2010.05.002

[16] Brown PM, Bhattacharyya A, **Shah SK**. 2011. Potential for developing fire histories in chir pine (*Pinus roxburghii*) forests in the Himalayan foothills, India. *Tree-ring Research* 67(1): 57-62. https://doi.org/10.3959/2009-15.1

[15] Gaire NP, Dhakal YR, Lekhak HC, Bhuju DR, **Shah SK**. 2011. Dynamics of *Abies spectabilis* in relation to climate change at the tree line ecotone in Langtang National Park, Nepal Himalaya. *Nepal Journal of Science and Technology* 12: 220-229.

[14] Bhattacharyya A, Ranhotra PS, **Shah SK**. 2011. Spatio-Temporal Variation of Alpine Vegetation vis-à-vis Climate during Holocene in the Himalaya. *Memoir of the Geological Society of India* 77: 309-319.

2010 [13] Gaire NP, Dhakal YR, Lekhak HC, Bhuju DR, **Shah SK**. 2010. Vegetation Dynamics in Treeline Ecotone of Langtang National Park, Central Nepal. *Nepal Journal of Science and Technology* 11: 107-114.

2009 [12] **Shah SK**, Bhattacharyya A. 2009. Tree-ring analysis of sub-fossil woods of *Pinus wallichiana* from Ziro valley, Arunachal Pradesh, North-East Himalaya. *Journal of Geological Society of India* 74: 503-508.

[11] **Shah SK**, Bhattacharyya A, Chaudhary V. 2009. Climatic influence on radial growth of *Pinus wallichiana* in Ziro valley, North-east Himalaya. *Current Science* 96(5): 697-702.

[10] Bhattacharyya A, **Shah SK**. 2009. Tree-ring study in India – Past appraisal, present status and future prospects. *IAWA* 30(4): 361-370. https://doi.org/10.1163/22941932-90000224

2008 [09] Chakraborty S, Dutta K, Bhattacharyya A, Nigam M, Schuur EAG, **Shah SK.** 2008. Atmospheric ^{14}C variability recorded in tree-rings from Peninsular India: implications for fossil fuel CO_2 emission and Atmospheric transport. *Radiocarbon* 50(3): 321-330. https://doi.org/10.1017/S0033822200053467

[08] Bhattacharyya A, **Shah SK**, Chaudhary V. 2008. Feasibility of tree ring data in Palaeoseismic dating in northeast Himalaya. *Journal of Geological Society of India* 71: 419-423

2007 [07] Bhattacharyya A, Eckstein D, **Shah SK**, Chaudhury V. 2007. Analyses of climatic changes around Perambiculum, south India based on early wood mean vessel area of teak. *Current Science* 93(8): 1159-1164.

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[05] **Shah SK**, Bhattacharyya A, Chaudhary V. 2007. Reconstruction of June-September Precipitation based on tree-ring data of Teak (*Tectona grandis* L.) from Hoshangabad, Madhya Pradesh, India. *Dendrochronologia* 25: 57-64. https://doi.org/10.1016/j.dendro.2007.02.001

2006 [04] Mehrotra RC, Bhattacharyya A, **Shah SK**. 2006. Petrified neogene woods of Tripura. *The Palaeobotanist* 55: 67-76. https://doi.org/10.54991/jop.2006.96

[03] Bhattacharyya A, **Shah SK**, Chaudhary V. 2006. Would tree-ring data of *Betula utilis* be potential for the analysis of Himalayan Glacial fluctuations? *Current Science* 91(6): 754-761.

[02] Bhattacharyya A, Ranhotra PS, **Shah SK**. 2006. Temporal and spatial variations of late Pleistocene-Holocene climate of the western Himalaya based on pollen records and their implications to Monsoon dynamics. *Journal Geological Society of India* 68: 507-515.

2003 [01] Bhattacharyya A, Chaudhary V, **Shah SK.** 2003. Tree-Ring Analysis of Tropical Indian Trees. In *Proceedings of the International PAGES workshop and training program at the French Institute, Pondicherry*, pp 241-242.

Scientific reports

2023 [04] Mehrotra N, **Shah SK**. 2023. Insight into the 4.2 ka event records in northeastern India: a global connection and the geological evidence. *PAGES Newsletter* 31(1): 28-29. https://doi.org/10.22498/pages.31.1.28

2020 [03] **Shah SK,** Kapur VV, Manoj MC, Srivastava J, Prasad V. 2020. Recent Advancement(s) at the Birbal Sahni Institute of Palaeosciences, Lucknow: An Overview. *Proceedings of Indian National Science Academy 86(1).* 675-688. https://doi.org/10.16943/ptinsa/2020/49826

2016 [02] Bhuju DR, **Shah SK,** Gaire NP. 2016. Environmental reconstruction and impact of climate change on vegetation at tree-lines of Nepal Himalaya. *Annual report of Pro Natura Foundation Japan* 24, pp 24

2014 [01] Mehrotra N, **Shah SK.** 2014. Review of Holocene palaeoclimate of Northeast India based on Pollen records. Quaternary Geology and Climate Change Newsletter 1(1), pp 15-16.

PUBLICATION IN HINDI:

2023 [01] पाण्डेय उत्तम, गाँधी नवीन, **शाह संतोष कुमार**, मेहरोत्रा निवेदिता. २०२३. जलवायु परिवर्तन अनुसन्धान में वृक्षो का योगदान। इंद्रधनुष पत्रिका, अंक २१, पृष्ठ १०-११.

RESEARCH SUPERVISIONS:

Ph.D. Thesis

2023-Ongoing [05] *Title*: Response of forests of Karnali region to climate change in the Nepal Himalaya using tree rings of multi-tree taxa
Scholar: Yub Raj Dhakal (TU Funded Project Research Scholar)
Ph.D. Registration: Tribhuvan University, Nepal.
Supervisor: Prof. Narayan P. Gaire, Department of Environmental Science, Patan Multiple Campus, Tribhuvan University, Lalitpur, Nepal.
Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

2022-Ongoing [04] *Title*: Evaluation of climatic indices and past climate reconstruction using tree-rings of *Abies spp*. from the Himalaya region
Scholar: Tanveer W. Rahman (UGC-JRF)
Ph.D. Registration: Gauhati University, Guwahati, Assam, India.
Supervisor: Prof. Anup Saikia, Department of Geography, Gauhati University, Guwahati Assam, India.
Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

2021-Ongoing [03] *Title*: Hydroclimatic variability based on instrumental and proxy records of Chhattisgarh, Central India
Scholar: Deeksha (DST-INSPIRE Fellow)
Ph.D. Registration: Lucknow University, Lucknow, India.
Supervisor: Prof. Munendra Singh, Department of Geology, CAS, Lucknow University.
Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

2018-2022 [02] *Title*: Climate signals from multiple tree-ring parameter of *P. kesiya* from Northeast India
Scholar: Lamginsang Thomte (UGC-JRF)
Ph.D. Registration: Gauhati University, Guwahati, Assam, India.
Supervisor: Prof. A K Bhagabati Department of Geography, Gauhati University, Guwahati Assam.

Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

2014-2018 [01] *Title*: Dendroclimatology of Liddar valley and adjoining areas in Kashmir Himalaya

Scholar: Uttam Pandey (DST Funded Project JRF)
Ph.D. Registration: Lucknow University, Lucknow, India.
Supervisor: Prof. Munendra Singh, Department of Geology, CAS, Lucknow University.
Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

***M.Sc. Dissertation*s**

2023 10] *Title*: --
Student: Basunandan Handique
Affiliation: Department of Geology, Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India
Supervisor: Dr. Ravindra Kumar, Department of Geology, Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India
Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

2023 [09] *Title*: *Multispecies tree-ring based streamflow reconstruction in Parvati valley, Western Himalaya, India*
Student: Asmaul Husna
Affiliation: Tropical Forestry, Dresden University of Technology, Germany / Department of Science, University of Copenhagen, Denmark.
Supervisor: Dr. Ernst van der Maaten, Institute of Forest Growth and Forest Computer Sciences, Tharandt, Germany.
Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

2020 [08] Title: *Snowfall reconstruction of Pahalgam, Lidder valley, Jammu and Kashmir based on tree-rings of Cedrus deodara*
Student: Deeksha
Affiliation: CAS in Geology, University of Lucknow, Lucknow, India.
Supervisor: Prof. Munendra Singh, Department of Geology, CAS, Lucknow University.
Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

[07] Title: *Snowfall data analysis of Jammu and Kashmir, India*
Student: Ayush Bharti
Affiliation: Department of Energy and Environment, Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India.
Supervisor: Ms. Priyanka Singh, Department of Geology, Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India
Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

2019 [06] Title: *Tree-rings study of Pinus wallichiana from Chumey valley, Bumthang, Bhutan*
Student: Jambay Dema
Affiliation: College of Natural Resources, Royal University of Bhutan, Lobesa, Bhutan
Supervisor: Dr. Om Katel, College of Natural Resources, Royal University of Bhutan, Lobesa, Bhutan
Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

[05] Title: *Response of climate on radial growth of Pinus kesiya in East Khasi Hills of Meghalaya, India*
Student: Iaikitkupar Lyngdoh
Affiliation: College of Natural Resources, Royal University of Bhutan, Lobesa, Bhutan
Supervisor: Dr. Om Katel, College of Natural Resources, Royal University of Bhutan, Lobesa, Bhutan
Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

2017 [04] Title: *Tree-ring based streamflow reconstruction for the Lohit basin, Arunachal Pradesh, North-east India*
Student: Rohini Singh
Affiliation: School of Earth Sciences, Department of Geology, Banasthali University, Rajasthan, India
Supervisor: Mr. Amit K. Mishra, School of Earth Sciences, Department of Geology, Banasthali University, Rajasthan, India
Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

2013 [03] Title: *Climatic reconstruction of western Nepal Himalaya spanning over three centuries as inferred from ring-widths of Picea smithiana (Wall.) Boiss*
Student: Udya K.Thapa
Affiliation: Golden Gate Int'l College (affiliated to Tribhuvan University, Kathmandu, Nepal), Nepal
Supervisor: Dr. Dinesh Raj Bhuju, Nepal Academy of Science and Technology, Nepal
Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

2009 [02] Title: *Forest ecology and tree-ring pattern at the treeline of Langtang National Park, Rasuwa, Nepal Himalaya*
Student: Yub Raj Dhakal
Affiliation: Central Department of Environmental Science, Tribhuvan University, Nepal
Supervisor: Dr. Dinesh Raj Bhuju, Nepal Academy of Science and Technology, Nepal
Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

[01] Title: *Ecology and Dendroclimatology of Treeline Forest in Langtang National Park, Nepal Himalaya*
Student: Narayan Prasad Gaire
Affiliation: Central Department of Environmental Science, Tribhuvan University, Nepal
Supervisor: Dr. Dinesh Raj Bhuju, Nepal Academy of Science and Technology, Nepal
Co-Supervisor: Santosh K. Shah, Birbal Sahni Institute of Palaeosciences, Lucknow, India.

SYNERGISTIC ACTIVITIES:

Resource Person

2022 [06] Imparted training at BSIP, Lucknow on "*Basic Dendrochronology and its application in climate reconstruction*" to a Scientist and a Chief Technical Officer from Institute of Wood Science and Technology, Bangaluru, India; September 12-16, 2022

2018 [05] Instructor for "*Training on Dendrochronology and its application*" held at Resources Himalaya Foundation, Kathmandu, Nepal; organized by Tree-ring Society of Nepal; August 24-25, 2018

[04] Group Leader/ Instructor for field week of project *Dendroclimatology and Dendrohydrology* during *10th World Dendro Conference*; June 2-22, 2018

2017 [03] Training Workshop on *"Tree ring analysis using Matlab and R"* Tree-ring and Environmental Change Group, Xishuangbanna Tropical Botanical Garden (XTBG), Chinese Academy of Sciences, P.R. China; January 31, 2017

2014 [02] Training Workshop on *"Reconstructing Climate Using Dendrochronological Tools"* held at Resources Himalaya Foundation, Kathmandu, Nepal; organized by Tree-ring Society of Nepal; February 3-7, 2014

[01] Training Workshop on "*Concepts in Quaternary climate studies with emphasis on Dendrochronology and Palynology*" held at Srinagar, Garhwal Himalaya, Uttaranchal; organized by BSIP, Lucknow, India; 2009

Organizer

2022 [04] Co-Organizing Secretary, "*The 7th Asian Dendro-Conference & the 7th Chinese Dendro-Conference, Land-sea Interaction and Environmental Issues"*, April 20-24, 2022

2021 [03] Training coordinator, for National virtual training programme *"Quaternary Palynology – Lets explore the fascinating world of pollen & spores"* organised Association of Quaternary Researchers in association with Birbal Sahni Institute of Palaeosciences, Lucknow; February 22-24, 2021.

2019 [02] Local Organizer, for virtual online conference on "*Earth's Changing climate*", Online conference organized by Society of Earth Scientist, October 15-17, 2020

[01] Organizing Secretary of "*AsianDendro 2019 - The 6th Asian Dendrochronology Conference*" held at BSIP, Lucknow during November 24–30, 2019

Scientific Committee Member

2018 [02] *10th World Dendro Conference*; June 2-22, 2018

2015 [01] The fourth *International Asian Dendrochronological Conference on climate change and tree rings*, Kathmandu, Nepal; March 9-12, 2015

Organizing Committee Member

2017 [02] Brainstorming workshop on "*Quaternary Environments and Climates: Focus on Holocene and Anthropocene*" BSIP Lucknow, February 21–23, 2017

2014 [01] National conference on "*Quaternary Climate Change: New approaches and emerging challenges*" BSIP Lucknow, December 15–16, 2014

Session Chaired

2018 [03] For session Dendrohydrology during *10th World Dendro Conference*; June 2–22, 2018

2014 [02] For session "High resolution Palaeoclimatic Change" *National Conference on Quaternary Climate Change: New Approaches and Emerging Challenges*" held at BSIP, Lucknow; December 15–16, 2014

2011 [01] For session "Vegetation and land-cover calibration: Models & Methods" *IGBP PAGES PHAROS Workshop: Land-cover reconstructions in the monsoon affected tropical world-pollen modelling approach and data synthesis* held at French Institute of Pondichrerry, Puducherry; January 27–29, 2011

External Examiner for PhD viva-voce

2018 [03] Department of Env. Science, Tribhuvan University, Kathmandu, Nepal; August, 2018

2016 [02] Institute of Forestry, Pokhara, Tribhuvan University, Nepal; November, 2016

[01] Department of Environmental Science, Tribhuvan University, Kathmandu, Nepal; September, 2016

PROFESSIONAL MEMBERSHIPS:

- Vijnana Bharati (VIBHA) – *Life Member*
- The Indian Science Congress Association – *Life Member*
- Asian Dendrochronology Association (ADA) – *Member*
- East Himalayan Society of Spermatophyte Taxonomy – *Life Member*
- The Palaeobotanical Society – *Life Member*
- Palaeontological Society of India – *Life Member*
- Tree-ring society of Nepal – *Member*

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MY SHORT BIODATA

Santosh K. Shah is from Kalimpong, a beautiful hill station in northern West Bengal, India. After completing his master's in Botany from North Bengal University, Siliguri, Darjeeling, he did his Ph.D. from Birbal Sahni Institute of Palaeobotany under the supervision of Dr. Amalava Bhattacharyya. He was awarded the Ph.D. degree from the University of Lucknow, Lucknow, India, His Ph.D. thesis is on "Analysis of climatic changes in Northeast Himalaya and its comparison with Western Himalaya during Late Quaternary."

Presently, Santosh K. Shah works as Scientist 'E' at Birbal Sahni Institute of Palaeosciences, Lucknow. His research interest is Dendrochronology, i.e., the study of tree rings, which encompasses reconstruction and analysis of climate variability and change over the Common Era, past drought, floods, river flow reconstruction, glacier fluctuation, and climate field reconstruction. He has carried out tree ring studies in trees of India, Nepal, Bhutan Himalaya, and Russia towards past climate reconstructions. In addition to tree ring analysis, he is also engaged in Palaeovegetation and Quantitative past climate reconstruction based on Pollen data from the Himalayan region. He has published 73 papers in refereed national and international journals and as a book chapter. He has supervised two Ph.D. students (one in Geology and the other in Geography) and is currently supervising four more Ph.D. students in Geology, Geography, and environmental sciences, one in Nepal. In addition, he supervised the dissertations of 10 master's students in geology and environmental sciences. In addition, he was a resource person or course instructor of dendrochronology for various training programs organized in India, Nepal, Bhutan, and China. He received various recognition for his research work, and some are – First recipient of the B.S. Venkatachala Memorial Gold Medal in 2008, the Young Scientist Award in 2006 from PAC-ES, Department of Science and Technology, India; Diamond Jubilee Medal of BSIP, Lucknow in 2016 and he is Fellow of East Himalayan Society for Spermatophyte Taxonomy. He received the prestigious INSA Bilateral Exchange Fellowship from the Indian National Science Academy of India to conduct research in China in 2019. He is a member of several scientific associations and was President of the Asian Dendrochronological Association during 2019-2021. He is a founder and governing body member of the Association of Quaternary Researchers (AOQR) and Treasurer of the AOQR.