

REFERENCES

- Ahmed, I. and Umar, R. 2009. Groundwater flow modelling of Yamuna–Krishni interstream, a part of central Ganga Plain, Uttar Pradesh. *J. Earth Syst. Sci.* 118(5): 507–523.
- Al-Badry, H.J., and Shamkhi, M.S. 2021. Estimation of spatial groundwater recharge using WetSpas model for East Wasit Province, Iraq. *Wasit J. Engg. Sci.* 9(2): 20–30.
- Armanuos, A.M., Negm, A.M., Yoshimura, C., and Saavedra Valeriano, O.C. 2016. Application of WetSpas model to estimate groundwater recharge variability in the Nile Delta aquifer. *Arab. J. Geosci.* 9: 553. <https://doi.org/10.1007/s12517-016-2580-x>
- Ashaolu, E.D., Olorunfemi, J.F., Ifabiyi, I.P., Abdollahi, K., and Batelaan, O. 2020. Spatial and temporal recharge estimation of the basement complex in Nigeria, West Africa. *J. Hydrol. Reg. Stud.* 27: 100658. <https://doi.org/10.1016/j.ejrh.2019.100658>
- Aslam, M., Arshad, M., Singh, V.P., and Shahid, M.A. 2022. Hydrological modelling of aquifer recharge and discharge potential by coupling WetSpas and MODFLOW for the Chaj Doab, Pakistan. *Sustainability* 14(8): 4421. <https://doi.org/10.3390/su14084421>
- Asrade, T.M. 2024. Application of coupled WetSpas-M and MODFLOW models to estimate spatial-temporal water balance components in the Chemoga watershed, Ethiopia. *Water Pract. Technol.* 19(9): 3833–3854. <https://doi.org/10.2166/wpt.2024.228>
- Asrade, T.M., Tadesse, K.B., Kerebih, M.S., and Ayinalem, S.B. 2024. Assessment of groundwater recharge using WetSpas-M and MODFLOW coupling in Jedeb

- watershed, Upper Blue Nile Basin, Ethiopia. *Air Soil Water Res.* 17(1): 1–12.
<https://doi.org/10.1177/11786221241253325>
- Batelaan, O., and De Smedt, F. 2001. WetSpas: A flexible GIS-based distributed recharge methodology for regional groundwater modelling. *IAHS Publ.* 269: 117–269.
- Batelaan, O., and De Smedt, F. 2007. GIS-based recharge estimation by coupling surface–subsurface water balance. *J. Hydrol.* 337: 337–355.
- Batelaan, O., and Woldeamlak, S.T. 2007. ArcView interface for WetSpas: User manual (Version 13-06-2007). Dept. Hydrol. Hydraul. Engg., Vrije University Brussel, Belgium.
- Berehanu, B., Ayenew, T., and Azagegn, T. 2017. Challenges of groundwater flow model calibration using MODFLOW with particular emphasis on Upper Awash River Basin, Ethiopia. *J. Geosci. Environ. Prot.* 5(3): 50–66.
- Bhatu, H., Kapupara, P., Gohel, J., and Dadhaniya, H. 2020. Study on groundwater potential using MODFLOW for Kalipat village. *Ind. J. Pure Appl. Biosci.* 8(3): 539–544.
- Bhandari, R., and Pathak, D. 2019. Groundwater flow modeling in Chitwan Dun Valley, Nepal. *J. Inst. Sci. Technol.* 24(2): 30–38.
- CGWB. 2013. Ground water information: Malappuram district, Kerala. *CGWB Rep.* Central Ground Water Board, Govt. of India.
- CGWB. 2023. National compilation on dynamic ground water resources of India. *CGWB Rep.* Central Ground Water Board, Govt. of India.

- Das, B., Singh, S., Thakur, P., and Jain, S.K. 2024. Assessment of future groundwater levels using Visual MODFLOW in the Gomti River Basin, India. *Theor. Appl. Climatol.* 155(4): 2917–2936.
- Debnath, M., Sarangi, A., Singh, D.K., and Sena, D.R. 2021. Trend analysis and spatio-temporal variability of groundwater table depth in Central Punjab, India. *J. Hydrol. Reg. Stud.*
- Dowlatabadi, S., Amirabadizadeh, M., and Zarei, M. 2024. Coupling of WetSpa-M and MODFLOW models for groundwater flow assessment. *Q. J. Engg. Geol. Hydrogeol.* 57(1): 45–59.
- Fahad, K.H., Hussein, S., and Dibs, H. 2020. Spatial–temporal analysis of land use and land cover change detection using remote sensing and GIS techniques. *IOP Conf. Ser. Mater. Sci. Engg.* 671(1): 012046.
- Ganasri, B.P., and Dwarakish, G.S. 2015. Study of land use/land cover dynamics through classification algorithms for Harangi catchment area, Karnataka State, India. *Aquatic Procedia* 4: 1413–1420.
- Gull, S., Shah, S.R., and Dar, A.M. 2022. Assessing land use/land cover change detection of north-eastern watersheds of Kashmir Valley using GIS and remote sensing techniques. *Water Pract. Technol.* 17(8): 1603–1614.
- Honnannanavar, A., Patil, N., and Patil, V. 2023. Groundwater flow modeling of a microwatershed using Visual MODFLOW Flex. *Curr. World Environ.* 18(2): 740.
- Kahsay, G.H., Gebreyohannes, T., Gebremedhin, M.A., Gebrekirstos, A., Birhane, E., Gebrewahid, H., and Welegebriel, L. 2018. Spatial groundwater recharge estimation in Raya Basin, Northern Ethiopia: an approach using GIS-based water balance model. *Sustain. Water Resour. Manag.* 5: 961–975.
<https://doi.org/10.1007/s40899-018-0272-2>

- Khalil, K., Khan, Q., and Mohamed, M. 2022. Modeling aquifer storage and recovery using MODFLOW in eastern UAE. *Sci. Rep.* 12: 17537.
- Kinattinkara, S., Arumugam, T., Kuppusamy, S., and Krishnan, M. 2022. Land use/land cover changes of Noyyal watershed in Coimbatore District, India, mapped using remote sensing techniques. *Environ. Sci. Pollut. Res.* 29(57): 86349–86361.
- Kumar, G.P., and Kumar, P.A. 2014. Development of groundwater flow model using Visual MODFLOW. *Int. J. Adv. Res.* 2(6): 649–656.
- Lasya, C., and Inayathulla, M. 2015. Ground water flow analysis using Visual MODFLOW. *IOSR J. Mech. Civ. Engg.* 12(2): 5–9.
- Legesse, S. 2009. Integrated hydrogeological investigation of Upper Bilate River catchment, southern Rift Valley of Ethiopia. *Unpubl. M.Sc. Thesis* Addis Ababa Univ., Ethiopia, 111p.
- Meresa, E., and Taye, G. 2018. Estimation of groundwater recharge using GIS-based WetSpass model for Birki watershed, Ethiopia. *Sustain. Water Resour. Manag.* 5: 1555–1566.
- Mondal, N.C. 2019. Groundwater modelling using Visual MODFLOW in the last two decades in India: A review. *Hydrol. Sci. J.*
- Namitha, M., Devi Krishna, J., Sreelekshmi, H., and Muhammed Ashik, P. 2019. Ground water flow modelling using Visual MODFLOW. *J. Pharmacogn. Phytochem.* 8(1): 2710–2714.
- Prasad, Y.S., and Rao, Y.R.S. 2018. Groundwater flow modelling of a micro-watershed in the upland area of East Godavari District, Andhra Pradesh, India. *Model. Earth Syst. Environ.* 4(3): 1007–1019.

- Reddy, P. V. R. M., Shankar, M.G., Reddy, B.J., Naik, Y.S., Ramana, R.V., Rekha, D.V. S. R. L., Kumar, V. H.V., and Singarao, M. 2021. Watershed Programme Impact Assessment Study on LULC and NDVI using Remote Sensing and GIS in Srikakulam District of Andhra Pradesh. *Int. J. Curr. Microbiol. App. Sci.* 10(03): 2112-2119.
- Sajjad, M.M., Wang, J., Abbas, H., Ullah, I., Khan, R., and Ali, F. 2022. Impact of climate and land-use change on groundwater resources: Faisalabad District, Pakistan. *Atmosphere* 13: 1097.
- Salem, A., Dezsö, J., and El-Rawy, M. 2019. Assessment of groundwater recharge, evaporation, and runoff in the Drava Basin in Hungary with the WetSpa model. *Hydrology*. 6(1): 23. <https://doi.org/10.3390/hydrology6010023>
- Shah, S.A., Kiran, M., Nazir, A., and Ashrafani, S.H. 2022. Exploring NDVI and NDBI relationship using Landsat-8 OLI/TIRS. *Malays. J. Geosci.* 6(1): 8–11.
- Shakoor, A., Arshad, M., Ahmad, R., Khan, Z.M., Qamar, U., Farid, H.U., Sultan, M., and Ahmad, F. 2018. Development of groundwater flow model (MODFLOW) to simulate the escalating groundwater pumping in Punjab, Pakistan. *Pak. J. Agric. Sci.* 55(3).
- Shiklomanov, I.A. 1993. World freshwater resources. *Water Int.* 18: 206–211.
- Shrestha, S., Bach, T.V., and Pandey, V.P. 2016. Climate change impacts on groundwater resources in Mekong Delta under representative concentration pathways (RCPs) scenarios. *Environ. Sci. Policy.* 61: 1–13. <https://doi.org/10.1016/j.envsci.2016.03.010>
- Siddik, M.S., Tulip, S.S., Rahman, A., Islam, M.N., Haghghi, A.T., and Mustafa, S.M.T. 2022. The impact of land use and land cover change on groundwater recharge in

northwestern Bangladesh. *J. Environ. Manag.* 315: 115130.

<https://doi.org/10.1016/j.jenvman.2022.115130>

Surinaidu, L., Rao, V.G., Rao, N.S., and Srinu, S. 2014. Hydrogeological and groundwater modeling studies to estimate the groundwater inflows into the coal mines at different mine development stages using MODFLOW, Andhra Pradesh, India. *Water Resour. Ind.* 7: 49–65.

Vilasan, R.T. and Kapse, V.S. 2022. Monitoring spatio-temporal dynamics of land use/land cover changes using remote sensing and GIS—a case study of Ernakulam district, India. *Applied Ecol. Environ. Res.* 20(4).

Wang, C.Y., and Manga, M. 2021. Groundwater flow and transport. *Water Earthquakes*. pp: 9–22. Springer International Publishing. https://doi.org/10.1007/978-3-030-64308-9_2

Yasin, M.Y., Abdullah, J., Mohd. Noor, N., Mohd. Yusoff, M., and Mohd. Noor, N. 2022. Landsat observation of urban growth and land use change using NDVI and NDBI analysis. *IOP Conf. Ser. Earth Environ. Sci.* 1067: 012037.