HYUNJE YANG

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EDUCATION

The University of Texas at Austin (UT Austin) **Austin, TX**
Candidate for Ph.D. in Civil Architectural and Environmental Engineering *Aug. 2023 – Present*

- *UT Austin Engineering Fellowship,* Cockrell School of Engineering and UT Austin Graduate School

Seoul National University (SNU) **Seoul, Korea**
M.S. in Forest Environmental Science *Mar. 2016 – Feb. 2018*

- Thesis: "Formula for Calculating Mean Velocity in Mountain Streams using the Salt Dilution Method" (Advisor: Prof. Sangjun Im)
- *Teaching Assistant, "*Forest Geological Information" (Spring 2016)

B.S. in Forest Environmental Science *Mar. 2012 – Feb. 2016*

- *National Scholarship Award* for 7 semesters, Ministry of Science and ICT

RESEARCH EXPERIENCE

National Institute of Forest Science (NIFoS) **Seoul, Korea**
Researcher, Forest Environment and Conservation Department *Mar. 2018 – Apr. 2023*

- Establishment of Big Data and Integrated Utilization System for Flash Floods in Forest Watershed Mar. 2021 – Apr. 2023
  - Develop flash flood forecasting models using time series flood datasets and machine learning approaches.
  - Optimize devices and algorithms for the flash flood warning system suited to forested areas.
- Development of Forest Water Management Technology to Reduce Stream Depletion and Nonpoint Source Pollution
  - Monitor and collect data on changes in water quality after forest fire and forest thinning as the preliminary stage for analysis.
- Quantification and Improvement of Forest Water Yield for Sustainable Supply of Freshwater Mar. 2018 – Apr. 2023
  - Calibrate interest parameters and analyze their uncertainties on a physical hydrological simulation model via Bayesian approach and Generalized Likelihood Uncertainty Estimation (GLUE), via *in situ* measurement of water cycles in different forest stands.
  - Collect hydrological monitoring data for hydrograph analysis; compared various estimation methods to quantify the baseflow most rationally from streamflow in forested catchments.
  - Estimate the soil hydraulic properties and predictive uncertainties based on a national scale spatial big dataset using machine learning models; examined the influence of environmental features on soil properties through sensitivity analysis.

    ※ Selected as a 10-year national R&D project with a $2.8M grant/year.
- Long-term Monitoring of Flow Characteristics in Different Forest Stands and Locations Mar. 2018 – Apr. 2023
  - Collect the long-term water level and meteorological data from 52 sites and compare their hydrological characteristics.
  - Evaluate the effect of forest thinning on the forest water cycle changes based on double mass curves and nonparametric statistics.

Seoul National University (SNU) **Seoul, Korea**
Researcher, Department of Forest Environmental Science *Jun. 2013 – Feb. 2018*

- Hydraulic Relation of Discharge and Velocity in Mountain Streams Using Salt Dilution Method Mar. 2016 – Feb. 2018
  - Measured *in situ* stream mean velocity and discharge via salt dilution; developed a mean velocity prediction formula based on forested topographical information and stream discharge using a nondimensionalized equation.
- Monitoring of Floods in Mountainous Areas and Critical Runoffs in Urban Areas Jun. 2013 – Feb. 2016
  - Participated in the 5th CALS Research Fellowship Program as an undergraduate researcher.
  - Measured *in situ* stream bed materials and organized flash flood velocity data in urban areas.

PUBLICATIONS

[Journals]

- **Yang, H.**, Lim, H., Moon, H., Li, Q., Nam, S., Choi, B., and Choi, H.T. "Identifying the Minimum Number of Flood Events for Reasonable Flood Peak Prediction of Ungauged Forested Catchments in South Korea" *Forests*, **2023**, 14(6): p. 1131. https://dio.org/10.3390/f14061131
- Nam, S., **Yang, H.**, Lim, H., Kim, J., Li, Q., Moon, H., and Choi, H.T. "Short-Term Effects of Forest Fire on Water Quality Along a Headwater Stream in the Immediate Post-Fire Period" *Water*, **2023**, 15(1): p.131. https://doi.org/10.3390/w15010131
- **Yang, H.**, Lim, H., Moon, H., Li, Q., Nam, S., Kim, J., and Choi, H.T. "Simple Optimal Sampling Algorithm to Strengthen Digital Soil Mapping Using the Spatial Distribution of Machine Learning Predictive Uncertainty: A Case Study for Field Capacity Prediction."

Land, **2022**, 11(11): p.2098. https://doi.org/10.3390/land11112098

- **Yang, H.**, Yoo, H., Lim, H., Kim, J., and Choi, H.T. "Impacts of Soil Properties, Topography, and Environmental Features on Soil Water Holding Capacities (SWHCs) and Their Interrelationship." *Land*, **2021**, 10(12): p.1290. https://doi.org/10.3390/land10121290
- Lim, H.**, Yang, H.,** et al. "Development of Pedo-Transfer Functions for the Saturated Hydraulic Conductivity of Forest Soil in South Korea Considering Forest Stand and Site Characteristics." *Water*, **2020**, 12(8): p. 2217. https://doi.org/10.3390/w12082217
- **Yang, H.,** Choi, H.T., and Lim, H. "Effects of Forest Thinning on the Long-Term Runoff Changes of Coniferous Forest Plantation." *Water*, **2019**, 11(11): p. 2301. https://doi.org/10.3390/w11112301
- **Yang, H.**, Choi, H.T., and Lim, H. "Applicability Assessment of Estimation Methods for Baseflow Recession Constants in Small Forest Catchments." *Water*, **2018**, 10(8): p. 1074. https://doi.org/10.3390/w10081074
- **Yang, H.**, Lee, S., and Im, S. "Hydraulic Relation of Discharge and Velocity in Small, Steep Mountain Streams Using Salt Dilution Method." *Journal of Korean Society of Forest Science*, **2018**, 107(2): p. 158-165. https://doi.org/10.14578/jkfs.2018.107.2.158
- **Yang, H.**, Im, S., Lee, Q., Eu, S., and Lee, E. "Flow Measurement of Mountain Streams using Salt Dilution Method." *Journal of the Korean Society of Forest Engineering*. **2016**, 14(1): p. 1-6. https://www.earticle.net/Article/A276485

[Books]

- Choi, H.T., Kim, J., Lim, H., and **Yang, H.** *Standard Manual for Developing Forest Soil Water Map*. National Institute of Forest Science: Seoul, South Korea, **2021**. (ISBN: 9791160195859)
- Choi, H.T., Kim, J., Lim, H., **Yang, H.**, and Yoo, H. *Long-term Monitoring of Forest Catchment Runoff Characteristics by Different Forest Sites and Stands.* National Institute of Forest Science: Seoul, South Korea, **2021**. (ISBN: 9791160195514)
- Choi, H.T., Kim, J., Seol, A., Jang, J., Jung, S., Kim, S., Lim, H., **Yang, H.** and Yoo, H., *A Study on the Quantification and Improvement of Forest Water Yield for Sustainable Supply of Freshwater.* National Institute of Forest Science: Seoul, South Korea, **2021**. (ISBN:9791160195507)
- Choi, H.T., Kim, J., Lim, H., **Yang, H.**, and Yoo, H. *Development and Utilization of the Forest Water Map*. National Institute of Forest Science: Seoul, South Korea, **2020**. (ISBN: 9791160194999)
- Kim, J., Choi, H.T., Lim, H., **Yang, H.**, and Yoo, H. *Analysis on the Current Status of River Survey Methodology for the Effective Investigation of Forest Drought.* National Institute of Forest Science: Seoul, South Korea, **2020**. (ISBN: 9791160194913)
- Choi, H.T., Lim, H., and **Yang, H.** *Development Method and Application of Forest Water Map.* National Institute of Forest Science: Seoul, South Korea, **2019**. (ISBN: 9791160193800)

CONFERENCE PRESENTATIONS

[Oral Presentations]

- **Yang, H.**, Lee, J.W. "Towards Resilient Texas: Rapid Storm Surge Prediction Using Machine Learning" Planet Texas 2050 Symposium, Texas, USA, Feb. 27-29, **2024**.
- **Yang, H.**, Choi, H.T., and Lim, H. "Estimating Flood Peaks in Ungauged Forested Catchments" Joint Symposium on Forest Science, Seoul, Korea, Feb. 15-16, **2023**.
- **Yang, H.**, Lim, H., Li, Q., Nam, S., Choi, H.T., Kim, J., and Moon, H. "Developing Flash Flood Predictive Model Using LSTM Neural Networks for Mountainous Areas." Proceeding of the International Symposium on Forest Science, Daegu, Korea, Aug. 24-26, **2022**.
- **Yang, H.**, Lim, H., Choi, H.T., and Lee, J. "Development of Throughfall Simulation Models and Prediction Uncertainty Estimation by Different Forest Stand Characteristics." EGU General Assembly 2022, Vienna, Austria, May 23-27, **2022**. *Online.*
- **Yang, H.,** Lim, H., Choi, H.T., Kim, J., and Nam, S. "Comparing Machine Learning Algorithms for Developing Optimal PTF and DSM Models in South Korea." Joint Symposium on Forest Science, Seoul, Korea, Feb. 9-10, **2022**.
- **Yang, H.,** Lim, H., Choi, H.T., and Kim, J. "Identifying the Characteristics of Forest Water Cycle in Different Forest Stands and Rainfall Events." Proceedings of the International Symposium on Forest Science, Pyeongchang, Korea, Aug. 18-20, **2021**. *Online*.
- **Yang, H.,** Lim, H., Choi, H.T., and Kim, J. "Estimating the Spatial Distribution of Forest Soil Water Retention using the Machine Learning Model." Joint Symposium on Forest Science, Seoul, Korea, Feb. 17-18, **2021**. *Online*.
- **Yang, H.**, Choi, H.T., and Lim, H. "Pedo-Transfer Functions (PTFs) Development for the Saturated Hydraulic Conductivity of Forest Soil." Proceedings of the International Symposium on Forest Science, Seoul, Korea, Aug. 19-20, **2020**. *Online*.
- **Yang, H.**, Choi, H.T., and Lim, H. "Hydraulic Properties of Forest Soils in Different Soil Texture." Proceeding of Summer Meeting of the Korean Society of Forest Science, Seoul, Korea, Aug. 29, **2019**.
- **Yang, H.,** Choi, H.T., and Lim, H. "Effects of Forest Thinning on the Water Yield Increase Based on the Long-term Rainfall and Streamflow Monitoring." Joint Symposium of Forest Science, Jinju, Korea, Feb. 20-21, **2019**.
- **Yang, H.**, Choi, H.T., and Lim, H. "Selection of the Proper Baseflow Recession Constant Estimation Methods for the Reasonable Hydrograph Analysis in Small Forest Catchments." Joint Symposium of Forest Science, Seoul, Korea, Aug. 29-30, **2018**.
- **Yang, H.**, Lee, S., and Im, S. "Development of Estimation Formula for the Mean Stream Velocity in Steep Mountain with Salt-

dilution Method." Joint Symposium of Forest Science, Chuncheon, Korea, Feb. 21, **2018**.

[Poster Presentations]

- **Yang, H.**, Lee, J.W. "Storm Surge Hazard Estimation for Texas Coastal Areas Using Machine Learning." 2024 CAEE Graduate Symposium, Texas, USA, Feb. 23, **2024**.
- **Yang, H.**, Moon, H., Lim, H., Kim, J., and Choi, H.T. "Expected amount of data accumulation to develop reasonable flash flood predictive models using machine learning approaches." AGU Fall Meeting 2022, Illinois, USA, Dec. 12-16, **2022**. *Online.*
- **Yang, H.**, Lim, H., Choi, H.T., Kim, J., and Nam, S. "A Novel Method for Selecting Priority Soil Sample Sites using Prediction Uncertainty of Machine Learning Model Based on Geospatial Information." Frontiers in Hydrology Meeting 2022, San Juan, Puerto Rico, Jun. 19-24, **2022**. *Online.*
- **Yang, H.**, Lim, H., Kim, J., and Choi, H.T. "Effects of Soil Topographical Properties on the Forest Soil Field Capacity using Machine Learning Approach." AGU Fall Meeting 2021 Louisiana, USA, Dec. 13-17, **2021.** *Online.*
- **Yang, H.** and Im, S. "Salt-dilution Velocity Prediction in Naturalized Channels." SNU and U. of Tokyo Joint Workshop, Seoul, Korea, May 9, **2017**.
- **Yang, H.** and Im, S. "Flow Measurement of Mountain Rivers using Salt-dilution Method." The 7th International Symposium of the Asian University Forests Consortium, Hokkaido, Japan, Oct. 11-14, **2016**.

REGISTERED PATENTS

- Preparation Method of Forest Water Map using the Computer Program and System — Jan. 2022
- Optimal Land Selection Method of Forest Thinning for Water Yield using the Forest Water Map and System — Jan. 2022
- Detection Method for the Water-Saturated Weak Area of Forest Soil for Improving Landslide Danger Map using the Forest Water Map and System — Jan. 2022
- Identification Method of the Forest with Superior Functions for Water Recharge and Its System — Jan. 2022
- Evaluation Method of Water Yield Function using the Forest Water Map and System — Jan. 2022

TECHNICAL SKILLS

Programming: MATLAB (R), Python, R, C, C++, ArcGIS (R), QGIS (dedicated to computer coding for national R&D projects)

Modeling: Hydrological simulation modeling, Machine learning models

Experimental: Installation of various hydrological instruments and data collection via datalogger, water level gauge, sap flow measure, automatic water sampler, water cycle in forests, etc.

AWARDS AND HONORS

Third Prize in Poster Presentation, 2024 CAEE Graduate Symposium — Feb. 2024
Best Oral Presentation, Joint Symposium of Forest Science 2023 — Feb. 2023
Silver Prize, Seoul International Invention Fair 2021 (SIIF), Korea Invention Promotion Association — Dec. 2021
Excellence Prize, Commendation of the 23rd Regiment Commander, Republic of Korea Army Training Center — May 2020
Merit-based Scholarship, Seoul National University — Sep. 2016
Lecture & Research Scholarship, Seoul National University — Mar. 2016
Best Poster Award, JSPS Core-to-Core Program, Asian University Forests Consortium 7th International Symposium — Oct. 2016

MUSIC ACTIVITIES

Founder and Leader, Rock Band "Muguet" — May 2014 – Present

- Founded and led a rock band of X members; performed as a *Songwriter, Vocalist, Pianist,* and *Guitarist.*
- Performed in numerous band concerts; placed *top 3* in 2015 SNU Student Band Competition and received a grant for music recording.
- Discography:
  - Original Album "**Muguet - Forest Dawn**" 2022 (Available on major music streaming services, e.g., *Spotify, YouTube Music*, and *Apple Music*); Digital Single "**Muguet - Butterfly**" 2015 (University Compilation Album; produced with SNU funding).
  - All songs available on Muguet's official YouTube channel: youtube.com/channel/UCCzGQL4V6IbUW6j2q3xn5Lg/featured

Singer, Guitarist, and Pianist, SNU Central Band Club "Meari" and College Band Club "Megimsori" — Mar. 2013 – Jun. 2015

- Performed several times during the university festival every semester.

EXTRACURRICULAR ACTIVITIES

Membership: International Forestry Students' Association (02/2014-02/2016)

- Poster presentation: "Urban and School Forest in Korea," 2015 Asia Pacific Regional Meeting in Taiwan.
- Discussed forest science issues and held academic seminars with other student members.

Leadership: *President,* UT Austin Korean Student Association (09/2023-Present)
Volunteer, Habitat for Humanity: Served 100+ hours and built 5+ houses (02/2013-02/2015)
President & Founder, 'WITHYOU' Education Volunteer Club: Tutored math to low-income students (03/2009-03/2013)

Military Service: *Technical Research Personnel,* National Institute of Forest Science (04/2019-04/2022)
5th Company Commander Trainee, Korea Army Training Center (05/2020)