

Opportunity Title: USFS Postdoctoral Fellowship in Water Resources

Opportunity Reference Code: USDA-USFS-2021-0113

Organization U.S. Department of Agriculture (USDA)

Reference Code USDA-USFS-2021-0113

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A complete application package consists of:

- An application
- Transcript(s) – For this opportunity, an unofficial transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. Selected candidate must provide proof of completion of the degree before the appointment can start. All transcripts must be in English or include an official English translation. Click [Here](#) for detailed information about acceptable transcripts.
- A current resume/CV
- Two educational or professional recommendations. At least one recommendation needs to be received in order for the mentor to view the application.

All documents must be in English or include an official English translation.

Application Deadline 9/21/2021 5:00:00 PM Eastern Time Zone

Description *Applications will be reviewed on a rolling-basis.

USFS Office/Lab and Location: A postdoctoral research opportunity is available with the U.S. Forest Service (USFS), Center for Forest Watershed Research. The Center is currently implementing a telework policy in response to the current coronavirus pandemic. As long as this is the case, the participant may be expected to participate in research and other mentoring activities 100% or less depending upon situations remotely. If and when the Center returns to normal in-office operations, the project will be based at the Santee Experimental Forest in Cordesville, South Carolina.

Research Project: Forest roads and associated stream crossing structures (e.g. relief culverts, bridges, etc) provide access for forest management. These essential infrastructures need to be properly designed, installed, and maintained for flooding resiliency and ecological benefits purposes. The U.S. Forest Service (USFS) manages approximately 370,000 miles of roads and at least 40,000 stream crossings along these roads. Undersized stream crossing structures (i.e. culverts) could result in structural failures, and, subsequently, increased flooding, soil erosion, causing significant economic losses and could affect stream connectivity, creating barriers to aquatic organisms. It is thus fundamentally important to conduct proper hydraulic design to accommodate extreme flow events impacting design life of these structures. Extreme precipitation events are growing more severe and more frequent in recent years due to increased atmospheric water vapor content resulting from rising air temperatures. As a result, land and water managers, planners, and researchers are increasingly concerned how such extreme precipitation events would affect design discharges, obtained by various widely used methods with currently available information, and ultimately the road drainage facilities, culverts, bridges, stream crossings and water management structures.

We are looking for a research postdoctoral fellow who has a good knowledge of extreme precipitation event dynamics due to changing climate and associated impacts on flooding



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dynamics, including design and risk analysis of road cross-drainage structures and stream crossings. Under the guidance of a mentor, the participant will examine and analyze large data sets from long-term hydro-climatic monitoring to derive precipitation intensity duration and flood frequency analyses for associated peak discharges impacting forest road cross-draining structures at three US Forest Service long-term experimental forest sites (Hubbard-Brook in New Hampshire, Frazier in Colorado, and H.J. Andrews in Oregon).

Learning Objectives:

- Measurement methods and resolutions of spatial and temporal distribution of historic precipitation and peak discharge data measured on long-term experimental forest watersheds
- Developing/analyzing regional precipitation intensity duration frequencies and flood frequencies using statistical probability distribution models
- Evaluation of widely used flood peak discharge methods for headwater forest watersheds
- Risk and vulnerability analysis of forest road culverts using the current data and future climate projections
- Geospatial modeling assessment of morphological vulnerability of forest road culverts
- Developing research manuscripts for journal publications and presenting results at professional society meetings/conferences

Mentor: The mentor for this opportunity is Devendra Amatya (Devendra.m.amatya@usda.gov). If you have questions about the nature of the research please contact the mentor.

Anticipated Appointment Start Date: 2021. Start date is flexible and will depend on a variety of factors.

Appointment Length: The appointment will initially be for one year, but may be extended upon recommendation of USFS and is contingent on the availability of funds.

Level of Participation: The appointment is full-time.

Participant Stipend: The participant will receive a monthly stipend of \$6,000, commensurate with educational level and experience, as well as partial coverage (75% of total premium) of individual health insurance. The participant will also receive a travel stipend for attendance at project meetings and presentations at scientific conferences.

Citizenship Requirements: This opportunity is available to U.S. citizens, Lawful Permanent Residents (LPR), and foreign nationals. Non-U.S. citizen applicants should refer to the [Guidelines for Non-U.S. Citizens Details page](#) of the program website for information about the valid immigration statuses that are acceptable for program participation.

ORISE Information: This program, administered by ORAU through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and USFS. Participants

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do not become employees of USDA, USFS, DOE or the program administrator, and there are no employment-related benefits. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE.

Questions: Please visit our [Program Website](#). After reading, if you have additional questions about the application process please email USForestService@orise.orau.gov and include the reference code for this opportunity.

Qualifications The qualified candidate should have received a doctoral degree in a physical science (e.g., forest hydrology or water resources) or civil/agricultural/water resources engineering discipline related to environmental/engineering hydrology/hydraulics. Degree must be completed by the appointment start date.

Preferred Skills:

- Strong quantitative/statistical computing and methods skills that integrate large data sets from long-term field hydro-meteorological observations and numerical modeling to understand hydrologic (rainfall-runoff) and climatologic processes and scaling effects, particularly in the context of climate variability and change including the downscaled ensemble model predictions
- Programming skills (R, SAS, Python, Data Science/Machine learning)
- Background in engineering design and risk analyses that relates to flooding
- Preferably skilled in Geospatial data acquisition from platforms like LiDAR, NexRad, and Satellite/aerial images, pre-processing, and hydrologic modeling analysis using ArcGIS and related software

ABOUT THE AREA

USDA Forest Service Santee Experimental Forest (SEF) is located within the **Francis Marion National Forest (FMNF)** near the town of Huger in Cordesville, South Carolina. Located in coastal counties of Charleston and Berkeley, the 2600 ha SEF was established in 1937 by the USDA Forest Service with a mission of silvicultural and hydrological research, environmental monitoring, demonstration and educational activities in support of sustainable forest management practices. The four long-term gauged experimental watersheds of varying scales at the SEF on freshwater wetland forests has its unique location draining to tidally influenced Huger Creek, headwater of East Branch of the Cooper River which drains into Charleston Harbor.

The FMNF is subjected to significant urbanization issues, with numerous rapidly growing urban communities found within and adjacent to the proclamation boundary. It is situated between two major metropolitan areas: Myrtle Beach (60 km to the north) and historic Charleston (50 km to the south). This part of coastal South Carolina is a popular tourist destination well known for its freshwater and saltwater recreation, golf/tennis, beautiful coastal scenery and historical landmarks dating back to colonial America. The climate is hot and humid in the summer and typically mild in the winter. With a population of over 128,000 residents,

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Charleston is the largest nearby metropolitan area. However, the towns of Moncks Corner (25 km), Goose Creek (55 km), Mount Pleasant (36 km), and McClellanville (32 km) are nearby.

Clemson University’s Baruch Research Institute of Coastal Ecology and Forest Science is located in Georgetown located about 60 km northeast from the SEF. Post-secondary education is available at the College of Charleston, Trident Technical College in North Charleston, Horry Georgetown Tech in Georgetown, Citadel in Charleston, and Charleston Southern.

Air transportation is available at the Charleston International Airport. There is an Amtrak station in North Charleston. South Carolina has an income tax and a sales tax that is 7%.

Housing prices are variable depending on location, but are significantly higher in Charleston County than Berkeley and Georgetown counties where most of the Francis Marion employees live. Prices for lakefront or oceanfront property/housing are considerably higher than for off-water property, due to high demand and limited availability in some areas. Rentals can be difficult to obtain in some areas and prices vary by location.

- Eligibility**

Requirements
- **Degree:** Doctoral Degree.
 - **Discipline(s):**
 - **Engineering** (3👁)
 - **Environmental and Marine Sciences** (3👁)