

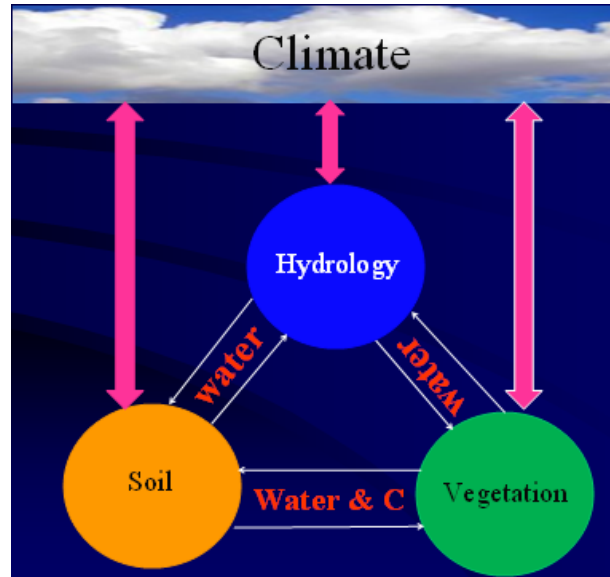
## OVERVIEW OF ACCOMPLISHMENTS IN RESEARCH/SCHOLARSHIP/CREATIVE WORKS

### Research Interest

The ultimate goal of my research is to “develop and use an ecohydrology approach to quantify hydrology-soil-vegetation dynamic interrelations at watershed scale in changing climate.” My research can be grouped into two categories (i.e., basic versus applied) as bulleted below.

#### Basic Research:

- Physical mechanisms of runoff, evapotranspiration, infiltration, percolation, and flow routing
- Physical models of hydrologic processes in natural and man-made systems
- Effects of anthropogenic activity versus climate change on hydrology at various spatiotemporal scales
- Ecohydrologic processes in changing climate



#### Applied Research:

- Conservation-restoration effects of native and constructed wetlands
- Hydrologic effects of microtopographic features (e.g., raised roads and natural depressions)
- Low impact development (LID) and best management practice (BMP)
- Interactions among agricultural practice, bioenergy production, and water resources
- Nonstructural mitigation measures for flooding and drought in changing climate
- Geographic information system (GIS) and remote sensing (RS) applications in water resources

### Scientific Contributions

- Developed a trend analysis approach for precipitation, temperature, streamflow, and water quality, that can be used to consider nonstationarity due to step changes
- Developed a modified rational equation (MoRE) and a modified curve number (MoCN) method for more robust and accurate rainfall-runoff modeling
- Developed an integrated aeolian and fluvial prediction (IAFP) model, which is the first-of-its-kind model that can simulate water and wind erosion as interrelated processes
- Put forward a hypothesis on soil water evaporation in arid environment with a top dry soil layer most of the time, which can improve the prediction of land-atmosphere interactions
- Developed a “hydrologic equivalent wetland” (HEW) concept, which makes it possible to accurately assess wetland conservation-restoration effects on water quantity and quality at watershed scale
- Developed a new universal statistics, namely “performance virtue” ( $PV_k$ ), for measuring simulation performance of hydrologic models
- Instrumented (along with Inner Mongolia Agricultural University, China) a hydro-climate monitoring network (spanning 1000 km distance along the Mongolian plateau of China) to collect data for studying climate change

- Instrumented (along with Virginia Wesleyan College and Virginia Tech) a monitoring network in Norfolk, Virginia, USA to collect data for studying climate change
- Instrumented (along with Virginia Tech) a monitoring network in Virginia Beach, Virginia, USA to collect data for studying effects of LID devices and BMPs on urban stormwater quantity and quality
- Launched a new academic journal (titled “*International Journal of Water Sciences (IJWS)*”) and served the journal as the editor-in-chief from 2012 to 2014
- Convened four sessions in four international conferences, and served three academic journals as an associate editor and numerous journals as a referee
- Developed a number of peer-reviewed journal papers and other publications as well as extensively presented on national/international conferences and/or workshops
- Established a research collaboration network consisting of high-profile researchers across USA, China, and Canada



### Contributions to Relevant Research at ODU

- Boosted research in hydrology, hydraulics and water resources, as indicated by the significantly-increased number of doctoral and master students focusing on these subjects
- Established the field monitoring sites, which can be used by students (especially doctoral and master) to collect data needed for thesis/dissertation research
- Developed both internal and external grants to support graduate students
- Purchased equipment and software packages needed to conduct research in water resources
- Increased the national and international visibility of the Environmental and Water Resources Program as well as the department, college, and university, as indicated by the collaborative research networks, the international visiting scholars, and the diverse graduate students
- Added the unique but complementary capacity to address the campus-wide initiative/priority in climate change adaptation and mitigation, which is closely related to hydrology and water resources

### What's next in My Research?

Advance my current knowledge to realize the ultimate goal mentioned above; secure more external supports; train more future scientists; excel water resources research at ODU, and provide more services