

RESEARCH PRIORITY AREA 1: STORMWATER MANAGEMENT

Low impact development How do the lifecycle costs and benefits of low impact development (LID) compare to conventional development in new, retrofit, and redevelopment applications, particularly regarding LID for stormwater treatment in urban and rural settings? What are the short-term and long-term implementation and maintenance cost and benefits of LID for developers, municipalities, communities, and individuals compared to that of conventional stormwater control measures (SCMs)? What is the short-term and long-term effectiveness of low impact development, specifically as related to stormwater treatment, costs and benefits, and water quality improvement? How can low impact development be encouraged and incentivized in North Carolina? For the questions above, how do costs and benefits for LID and conventional development compare across the different regions of the State?

Impervious cover impacts & mitigation How can we quantifiably mitigate the effects of impervious cover on water quality and aquatic life in different urban and rural stream settings and stormwater systems? What realistic management measures (including stream restoration practices, riparian buffers, and floodplain-stream reconnection) exist or can be further evaluated to address effects of impervious cover? How can watershed restoration activities be implemented to achieve macroinvertebrate recovery and recolonization?

Pollutant removal processes and credits How should pollutant removal credits be determined and evaluated for urban and rural stormwater control measures (SCMs), stream restoration practices and other management practices, in particular those aimed at managing nutrients, pathogens, and sediment? How can we better understand the processes by which SCMs and other management practices remove contaminants from stormwater and reduce impacts to receiving streams? Specifically for the state of North Carolina, and its physiographic regions (mountains, piedmont, and coastal plain), what location-based methods and criteria can be developed for evaluating SCM, stream restoration and management practice performance, credit accounting, and removal rates for pollutants (particularly nutrients, pathogens, and sediment)?

RESEARCH PRIORITY AREA 2: DRINKING WATER, WASTEWATER & WATER INFRASTRUCTURE

Risk and uncertainty In the face of changing population, land use, climate, and regulations, how can we quantify and manage risks and uncertainties in public water supplies? How should rate setting and financing capital improvements for water and sewer utilities be determined in the face of these risks and the changing physical and regulatory landscapes? How can utilities increase their resilience to these changes? What risks exist for human health and well-being related to water consumption and contact? How can these risks be adequately managed and communicated?

Customer behavior and utility relations Using social science and economic valuation methodologies, how can water/wastewater utilities better understand customers' level-of-service expectations, motivations for behaviors, willingness to pay for services (including ecosystem services that are protected through water treatment and management), and customer perceptions, attitudes, opinions and beliefs related to drinking water, wastewater, and reclaimed water? How can this information be applied to utility management? How do the aforementioned questions regarding expectations, behaviors, willingness to pay, etc. apply to private well owners? How do these factors influence the risk and health impacts assumed by private well owners? For private well owners, how are decisions made related to conducting testing, managing their systems and understanding and assuming risks related to supply, health and contamination?

Alternative water sources What alternative sources (graywater, harvested rainwater, reclaimed water) exist for differing consumptive uses (e.g. home irrigation)? What are the health risks of these alternative sources? What are the impacts of alternative water use on overall water supply and demand? How can public perception barriers or economic barriers be overcome to increase likelihood of acceptance, adoption and use of alternative sources?

Innovative processes What/how can innovative processes and technologies be applied to NC utilities for water and wastewater treatment, plant operation, energy production, distribution systems, waste discharge management, potable and reclaimed water supply, and the repair, management and planning of infrastructure? What information gaps exist and what processes are needed for effective utility management and treatment of emerging contaminants of concern?

RESEARCH PRIORITY AREA 3: GROUNDWATER & SURFACE WATER

What are the human impacts to groundwater and/or surface water availability and quality in North Carolina? What fundamental hydrogeological interactions of surface water and groundwater resources do we need to further understand in order to support the sustainable use of water resources? How can information and data gaps be addressed to better understand and manage groundwater and/or surface water resources?

RESEARCH PRIORITY AREA 4: WATERSHED MANAGEMENT

In NC watersheds where Total Maximum Daily Loads (TMDLs), nutrient management plans, and allocation management strategies and studies have been implemented, what changes in water quality and quantity have been observed? What are the sources, transport and fate of nutrients and sediments in surface waters in these watersheds? What physical, hydrological, biological and/or community dynamics need to be understood to enhance watershed management approaches to improve stream and human health, and ensure adequate supply?