With the increasing population, rapid urbanization, ecological environment deterioration, and serious water pollution, the quality and quantity of fresh water become crucial to human beings. Effective utilization of stormwater, one essential part of the water cycle, becomes critical for sustainable water management in the urban environment. Pollutants carried in stormwater runoff have raised severe concerns for the integrated water management of stormwater. This is especially the case along the coast of the United States, where polluted stormwater runoff from roads and highways is the largest source of water pollution. To provide effective precaution strategies and minimize the pollution impacts, real-time in situ monitoring of stormwater is an imminent topic in water quality engineering fields. During my doctorate research, I have developed a novel sensing technology multi-electrode array (MEA) capable of simultaneous monitoring of multiple water quality related parameters and thus making real-time in situ stormwater monitoring possible. Briefly, MEAs are fabricated by precisely printing multiple millimeter-sized electrodes on a flexible thin film using inkjet-printing technology. Compared to expensive though ineffective probes/sensors (more than $1,000 to $50,000 per sensor) that can only measure a single parameter at a single point, MEA possesses unbeatable advantages of easy fabrication, high accuracy, low cost (<$1/sensor), and easy deployment and replacement. By aligning multiple pieces of MEA sensors in storm water, and the results clearly showed the real-time in situ monitoring capability of MEAs for multiple parameters (e.g., oxygen, pH, temperature, conductivity, and chloride). This frontier research has received attention nationwide and was published in a high-impact journal (Sensors and Actuators B: Chemistry, Impact Factor: 5.8). This breakthrough research has led to a pilot-scale water quality monitoring system. Besides stormwater quality, stormwater transfer in soil is also critical for water quality and quantity. I have developed novel millimeter-sized soil moisture sensors (MSMS) using CD-etching technology. This small, thin MSMS can be directly inserted into soil layers without disturbing soil structure which fundamentally solves the severe disturbance problem of heavy soil sensors. Furthermore, multiple pieces of MSMS inserted vertically along soil depth can obtain the soil moisture at high resolution. None of any other soil sensors have this unique feature. MSMS can monitor stormwater quality and quantity during the infiltration process, something critical to integrated water management. I have successfully conducted lab-scale tests of MSMS in situ, monitoring water content in different types of soils, which is, to the best of my knowledge, the first national study of soil moisture profiling. Overall, my pioneering research of water quality sensors greatly enhances my understanding of stormwater monitoring, treatment, and management. Stormwater becomes one valuable treasure to human beings due to its large amount. Multidisciplinary knowledge is required to achieve a sustainable water usage for a bright future for our descendants' hands in hands!