

TRANSFORMING GLOBAL ARSENIC and FLUORIDE DRINKING WATER CRISIS INTO AN ECONOMIC OPPORTUNITY: ROLE OF LEHIGH UNIVERSITY'S HYBRID ION EXCHANGE NANOTECHNOLOGY

Arup K. SenGupta, P.C. Rossin Professor

**Department of Civil and Environmental Engineering
Department of Chemical Engineering
Lehigh University
1 West Packer Avenue, Bethlehem, PA 18015 USA**

ABSTRACT

Although unknown nearly twenty five years ago, natural arsenic contamination of groundwater has emerged as a major global crisis affecting over fifty countries. In the United States, nearly seven thousand communities are now required to introduce additional treatment to reduce the arsenic level in groundwater in order to make it fit for potable usage. However, the adverse health effects resulting from drinking of arsenic contaminated groundwater are most apparent in south and southeast Asia in countries like Bangladesh, Cambodia, Nepal, India, Laos and China where over 200 million people, according to World Health Organization (WHO), are threatened with arsenic-inflicted health impairment caused by drinking of contaminated groundwater. Fluoride is also a naturally present contaminant in ground water mostly in the continents of Africa and Asia responsible for severe dental and skeletal fluorosis. Altogether, nearly 500 million people around the world lack access to safe drinking water due to natural arsenic and fluoride contamination. It is ironic that a majority of the affected people also make less than \$2 per day.



Bangladesh women in line to collect arsenic-safe drinking

During the last 15 years, a new class of adsorbent or filter materials called Hybrid Ion Exchanger Nanomaterials or HIX-Nano has been developed at Lehigh University, field tested and subsequently commercialized globally to mitigate arsenic and fluoride crisis. The HIX-Nanomaterials remove arsenic and fluoride selectively and most importantly, they can be recycled and reused for many years providing safe drinking water. During the last ten years, these materials have provided arsenic- and fluoride-safe drinking water to over one million people around the world. In addition, HIX-Nanotechnology has created employment opportunities, spurred economic growth in affected countries and helped women empowerment.