Invasive Species Solutions

Protecting Nevada’s Lakes and Waterways
DRI has been researching solutions to the threats posed by invasive species of Quagga Mussels since 2007. The presence of invasive species in Lake Mead and its expansion to the entire Lower Colorado River signals the seriousness of the Quagga Mussel impact on our economy and water resource management. Dr. Kumud Acharya and his team research how this invasive species impacts the aquatic biodiversity and water quality in Lake Mead. The scope of research encompasses how invasions affect impoundments, electricity generation, and water conveyance structures along the Colorado River Aqueduct and Lake Mead.

Tailored Scientific Solutions for Nevada
Dr. Kumud Acharya’s expertise in biology and engineering includes prior projects with the Army Corp of Engineers, the Clark County Regional Flood Control District, U.S. Bureau of Reclamation, National Park Service, and the Southern Nevada Water Authority. Invasive species ecology management involves not only stopping the spread of these invasive species but also the restoration of aquatic systems; water quality management, and assessment of infrastructure in flood control areas.

Quagga Mussel Laboratory Capabilities
Located in Las Vegas, DRI’s Quagga Mussel lab provides a controlled environment for:
- Examining microscopic Quagga Mussel larvae characteristics, growth, behavior, and diet
- Evaluating how pH alteration, UV metering, and Chloramines inhibit growth rates and reproduction
- Assessing salinity factors to determine viability of establishing colonies in Lake Tahoe
- Field sampling of adult mussels and larvae using plankton tow nets and scuba equipment

National Problem Now in Our Backyard
Quagga Mussels reproduce quickly in waterways like the Colorado river, where they disrupt the ecosystems by out competing native species for food. They also damage the infrastructure of power plants and harbors. Water treatment plants are initially hit hardest because the water intakes bring the microscopic free-swimming larvae directly into the facilities. The U.S. Coast Guard estimates that economic losses and control efforts cost the United States about $5 billion each year.

Dr. Kumud Acharya uses special microscopes at the DRI Quagga Mussel Lab in Las Vegas

CONTACT
Kumud Acharya, Ph.D., Director
Ecological Engineering Program

LAS VEGAS CAMPUS: 755 E. Flamingo Road, Las Vegas, NV
PHONE: 702/862-5371
EMAIL: Kumud.Acharya@dri.edu
WEBSITE: dri.edu/eco-engineer

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Supporting Research of Urban and Rural Waterways and Lakes

Mitigating the spread of Quagga Mussels, tamarisks and other invasive species is a multifaceted process involving research of the quality of waterways in aquatic environments. Previous project research at DRI performed by Dr. Kumud Acharya and his team include:

ARID REGION RESTORATION OF URBAN FLOOD ZONES
Arid Regions Stream Restoration Workshops of the Urban Flood Demonstration Program examined top and bottom level approaches and challenges in stream restorations of the region including channel design, sediment transport, bank stability, vegetation surveying, floodplain/riparian corridor, and flow management. Workshops included researchers and practitioners from Southern Nevada Water Authority, John Hopkins University, U.S. Army Corps of Engineers, the University of New Mexico, U.S. Department of Agriculture, and the Nevada System of Higher Education.

SELENIUM MANAGEMENT IN THE LAS VEGAS WASH
The Las Vegas Wash and its tributaries are known to have elevated levels of selenium (Se). It is an essential element at lower but potentially toxic at higher concentrations. A process based mathematical model are being developed to estimate Se mass along the different pathways including seepage loss, sedimentation, volatilization and plant uptake in the Las Vegas Wash.

URBAN FLOOD PROGRAM
The Urban Flood Demonstration Program of the U.S. Army Corp of Engineers utilizes applied research collaborations between DRI and other stakeholders in the Southwestern United States. Initiated in 2003, the pro¬gram has fostered the development of innovative technologies for urban flood damage reduction and stream restoration in arid and semi-arid watersheds. The program continues to develop technologies for urban flood damage reduction and stream restoration in arid and semi-arid watersheds.

ECOLOGICAL ENGINEERING
Dr. Kumud Acharya’s Ecological Engineering research focuses on mitigating the impacts of human activities on the natural environment of severe flooding and watershed management in regions with rapidly developing population centers. By fusing engineering technology with biology and ecology, his ecological engineering approaches reduce adverse effects of human activities on rivers, lakes, wetlands, springs and estuaries.

Dr. Kumud Acharya
My current research combines basic and applied science from engineering, biology, ecology, and natural sciences for the restoration and construction of aquatic and terrestrial ecosystems. Ecological/Biological Engineering is a new emerging field of study integrating engineering technology with biology and ecology. Increasing rates of resource use and population growth have tended to magnify and complicate environmental problems that were already on the rise. A new range of sophisticated, powerful and newer techniques are required to solve these problems and that are often only possible by multi-disciplinary approaches. My research attempts to combine fundamentals of life science with basic engineering to develop cutting edge tools to solve complex environmental problems.