

PAUL T. GREMILLION, Ph.D., P.E.

Professor, Department of Civil Engineering Construction Management & Environmental Engineering

Northern Arizona University, Flagstaff, Arizona 86011

Office: +1-928-523-5382 Email: paul.gremillion@nau.edu Web: <http://nau.edu/mercurylab>

Professional Expertise

Water Resources Management Assessment, monitoring, and modeling of surface water and groundwater systems at scales from small catchments to continental-scale basins, including the Nile River Basin, Nubian Sandstone Aquifer System, and Lake Baikal basin. Application of Global Environment Facility (GEF), Transboundary Diagnostic Analysis / Strategic Action Programme (TDA/SAP) methodology to translate technical approaches to sustainable policy actions in transboundary water systems.

Ecosystem Management Assessment of the status of human impacts on aquatic and terrestrial ecosystems and development of plans for ecosystem conservation and restoration. Experience in monitoring and restoration of acidified lakes and streams in the northeast United States and large-scale coastal restoration in Louisiana, USA. Transboundary experience supporting GEF / United Nations projects in the Nile River, Lake Chad, and Lake Baikal Basins.

Mercury in the Landscape Analysis of the movement of mercury from atmospheric sources and terrestrial releases to terminal receptors. Food web analyses of mercury bioaccumulation using light and heavy stable isotopes. Histories of mercury deposition using aquatic sediment cores and radioisotope tracers. Mercury distribution in the terrestrial landscape. Mercury inventories using frameworks such as UNEP Mercury Toolkit.

Environmental Governance Engagement of stakeholders at local, national, and international scales to implement policy-oriented solutions to water resource and ecosystem management problems. Experience in building support for technical approaches in coastal restoration, watershed protection, and groundwater resource management in the United States, Africa, and Central Asia.

Water, Sanitation, and Hygiene Assessment of the quality and resilience of water supplies and design of water/wastewater treatment systems. Design of water treatment and wastewater management systems for rural areas and emerging nations with particular emphasis on treatment strategies that can be accepted and maintained by stakeholders at the user and local governance levels.

Professional Positions

Technical and Policy Support for International Organizations

United Nations Office for Project Services (UNOPS) (3/2015 – 9/2015), International Expert (IICA-3), home based with mission travel. Led finalization process for the Lake Baikal Strategic Action Programme¹ (Global Environmental Facility / United Nations Development Program). Oversight of Mongolian and Russian national expert consultants in the revision of the SAP document and coordination with national ministries of environment and natural resources to assure integration of the project with national priorities. Participated in meetings in Ulaanbaatar, Mongolia and Moscow and Tanhoi, Russia, including the final Project Steering Committee meeting.

Deutsche GIZ² (9/2014 – 12/2014), International Expert, home based with mission travel. Assisted the Lake Chad Basin Commission to prepare for updating and implementation of the Strategic Action Programme for Lake Chad. Conducted a mission to Bonn, Germany to work with the GIZ Lake Chad team to prepare for 2015 activities in the management of Lake Chad.

¹ <http://baikal.iwlearn.org/>

² Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH

UNOPS (3/2014 – 9/2014), International Expert (IICA-3), home based with mission travel. Drafted a Strategic Action Programme for the GEF/UNDP/UNOPS project, Integrated Natural Resource Management in the Lake Baikal Basin Transboundary Ecosystem. Duties consisted of synthesizing the work of six national consultants from Russia and Mongolia; drafting the SAP document; presenting the draft SAP to the Project Steering Committee at a regional meeting; and finalizing the draft document.

International Atomic Energy Agency (IAEA), Office of Internal Oversight (10/2013 – 12/2013), Special Services Agreement Consultant, home based with mission travel. Technical consultant for, "Evaluation of the IAEA's Work Related to Understanding Marine, Terrestrial and Atmospheric Processes." Scope of evaluation included duty travel to Vienna, Seibersdorf, and Monaco to interview scientific staff of the IAEA Marine Laboratories (Monaco) and Terrestrial Ecology Laboratory (Seibersdorf) and provide end-of-project debriefings. The focus of the evaluation was to assess the degree to which the IAEA Environment Programme's efforts have reached policy makers and have led to particular socioeconomic benefits for its Member States. The approach for the evaluation considered theory of change and used the criteria of relevance, effectiveness, efficiency, sustainability, and impact.

IAEA, Department of Technical Cooperation (9/2013 – 10/2013), Technical Expert, home based with mission travel. Technical support for the implementation of the Strategic Action Programme of the Nubian Aquifer System. Assisted with planning for next steps toward implementing the Strategic Action Programme for the Nubian Aquifer. Water ministers from all four Nubian countries, as well as the chair of the Joint Authority for the Protection of the Nubian Aquifer and the Director General of the IAEA, attended this signing event.

IAEA, Department of Technical Cooperation (11/2011 – 11/2011), Technical Expert, home based with mission travel. Provided technical support for the final technical meeting of the Nubian Sandstone Aquifer Project. Project activities had been delayed due to political transitions in one of the participating countries. This final meeting was convened to adopt the Strategic Action Programme document. My duties included preparing the final SAP document, based on discussions held during this meeting. The Nubian SAP document was completed and approved by all four participating countries.

IAEA, Department of Nuclear Sciences and Applications, Water Resources Programme (7/2009 – 9/2010), Special Services Agreement Consultant; (7/2010 – 7/2011), P-4 Short Term, Temporary Staff, based in Vienna, Austria. Technical manager for two GEF Medium Size Projects: *Nubian Sandstone Aquifer Project*³ and *Mainstreaming Groundwater Considerations into the Integrated Management of the Nile River Basin*⁴. Oversight of national and international consultants; oversight of development, basin-scale hydrologic model of Nile River basin; interaction with project steering committees and national counterparts; reporting to UNDP and GEF.

Contribution to the Nubian project included coordinating the efforts of national and international consultants to draft national and regional project documents. The regional documents were adopted jointly by the four participating nations. Project responsibilities included coordination among the partner international organizations (UNDP, UNESCO, and GEF) as well as with national water ministries and a regional water management authority. Responsibilities included organizing national and regional meetings in Vienna, Khartoum, Cairo, and Tripoli.

³ <http://iwarearn.net/iw-projects/2020>

⁴ <http://iwarearn.net/iw-projects/3321>

Activities on the Nile project included basin-scale monitoring and modeling design to assess interactions between groundwater and surface water in riparian, lake, and wetlands regions in the Nile basin. Worked with regional and international experts to develop a modeling system driven by remotely sensed hydro-meteorologic data and calibrated with on-the-ground monitoring programmes. Worked with counterparts in national water ministries and the project steering committee to develop and implement coordinated monitoring plans. Organized two-week training programmes conducted in Cairo and Addis Ababa for all Nile Basin nations in isotopic sampling and modeling as part of capacity-development objectives. Responsibilities included organizing project steering committee meetings in Addis Ababa.

Northern Arizona University, Flagstaff, Arizona

Department: Civil & Environmental Engineering Department

Positions: Professor (2015-present); Associate Professor (2007-2015); Co-Director, Watershed Research & Education Program (2011-present); Deputy Coordinator, Arizona Water Institute (2007-2009); Assistant Professor (2003-2007)

Dates: 9/2003 to present

Duties: Teaching core undergraduate environmental engineering courses and senior engineering design (capstone) course; research in detecting environmental change in aquatic ecosystems by analyzing lake and reservoir sediment cores and acoustic imaging (sonar, side-scan sonar) of reservoir sediments.

Research:

Environmental Change in Arizona Reservoirs

This aspect of my research program focuses on how mercury and other metals are delivered to lakes and reservoirs, and how reservoirs differ from lakes in their capacity to create sediment records of water quality, primary productivity, and hydrology. My initial projects were concerned with establishing chronologies for sediment cores from about a dozen northern Arizona reservoirs and analyzing those sediments for anthropogenic metals. My students and I are now refining our techniques to reconstruct past storm and wildfire events by analyzing our archive of sediment cores for a variety of physical and chemical parameters. We are working toward the goal of tracking the sequestration and release of mercury stored in terrestrial ecosystems. With a recent project on Watson Lake, Arizona, we are also working on reconstruction of primary productivity and nutrient-cycling histories in reservoirs.

Natural Biomonitoring of Atmospheric Deposition of Metals

My research on delivery of metals to reservoirs led to interest on the occurrence and variability of atmospheric metals on the landscape. Naturally occurring biomonitoring provide a proxy for the deposition of a variety of anthropogenic compounds. Initial research on this topic was initiated through the efforts of a NSF Research Experiences for Undergraduates (REU) student I mentored in 2006. We sampled the epiphytic lichen *Xanthoparmelia*, which occurs widely across Arizona. Our analysis of these samples for mercury resulted in the publication of a peer-reviewed journal article and funding to collect baseline data associated with the commissioning of the Drake Cement Plant in the Verde Valley, Arizona. I was also invited to join a research group in Italy to sample lichens to detect effects of a smelter in central Italy.

Projects Funded:

Sediment Survey of Lakeside Lake, Tucson, Arizona. Co-principal Investigator. City of Tucson, 2015. \$9,500.

Mercury Concentrations in Lichen near Drake Cement, LLC. Principal Investigator. Salt River Project, 2013. \$3,200.