

Statement of Experience

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Leadership Overview

I have 40 years of experience in program development as a teacher, environmental research leader, federal program director, academic executive administrator, and community-natural resource advocate. My interests lie at the intersections between environmental science, community well-being, and economic benefit, especially in areas undergoing rapid climate change. I have worked in academic, government, and private sectors. I have successfully created, led, and developed academic, research, and community initiatives and have been responsible for hiring, motivating, counseling, and evaluating personnel in complex programs. I work collaboratively with other leaders, stakeholders, colleagues, and those I supervise, to identify strategic objectives and devise tactical plans to achieve shared objectives.

Strategic Planning

While at the University of New Hampshire, I was appointed by the Dean of the College of Life Sciences and Agriculture to chair a Strategic Planning Commission. The Commission included representatives from each department in the college and met with the faculty of every department in the college to identify their concerns about the past and aspirations for the future. I facilitated all these meetings and then organized the Commission’s report. This report became a blueprint for the future directions of the College. After my departure from UNH several of the organizational changes we suggested in this report were implemented by the current and later Deans.

I have contributed to multiple, national-level, strategic planning committees focused on the impacts of climate change on Arctic systems, the primary area of my personal, professional research. During the formative years leading up to the establishment of the National Environmental Observing Network (NEON) I served on or chaired several committees. I was a member of the working group that vetted the Freshwater Instrumentation to be used by NEON. I was a member and at times the co-lead for the Stream Ecological Observing Network (STREON), and from 2009-2014 I chaired the Domain 19 (Arctic Alaska) Science, Education, and Communication Committee that sought to coordinate NEON activities during its startup phase. From 2011 to 2018 I served on the Science Steering Committee (SSC) for the Search for Arctic Change (SEARCH). SEARCH is a strategic visioning committee funded by the National Science Foundation and focused on interagency and international coordination of research in the Arctic. As a member of the SSC, I chaired the “Permafrost” subcommittee, one of four thematic areas in the SEARCH strategic plan. Previously, from 2009-2010 I served on the Understanding Arctic Change task force, a subcommittee of SEARCH that was tasked to develop a general strategic plan for Arctic research.

Program Development

In 1987, as a recently hired assistant professor at the University of New Hampshire, I was invited to create and establish a new undergraduate major in Water Resources Management within the Department of Forest Resources. I developed all the documentation for this new major and guided it through the review process to successful implementation and then managed the new major, adding faculty and new courses. Based on the successes of this major, I led an effort to establish an M.S. program in Water Resources Management in the newly organized Department of Natural Resources at UNH. I subsequently organized a set of meetings that ultimately led to the establishment of an inter-departmental Ph.D. program in Natural Resources Management at UNH, which has since evolved into two Ph.D. programs focusing on Environmental Studies and Earth Systems Science.

In 1997, I was offered and accepted a position to lead the Catchment and Biospheric Processes research team at Manaaki Whenua/Landcare Research, in New Zealand. Landcare Research (now a part of the Maiangi Taiao/Bioeconomy Science Institute) is a Crown Research Institute (CRI) with offices throughout New Zealand. At the time I accepted this position the CRI model was a new and unique research structure for New Zealand and so the move to New Zealand was an opportunity to participate in a bold new national experiment in approaches to generate research, science and technology knowledge that were driven by stakeholder needs and intended for the public good. The Catchment and Biospheric Processes team was composed of a diverse group of Ph.D. level scientists with expertise that included catchment hydrology, sediment and erosion process, modeling, plant physiology, and greenhouse gas dynamics.

Shortly after assuming this position, I was asked to lead a new research program that was of strategic importance to the company. My charge was to create a vision for an entirely new research program in Integrated Catchment Management. No such program had existed in New Zealand before. I worked with colleagues at Landcare Research, other national research institutes, national universities, as well as regional and district resource management councils to create this new research program. The program we developed evolved into a multi-institutional and multi-disciplinary program of research focused on the environment, economy, and communities of the Motueka River and Tasman Bay. This unique, stakeholder-driven research program took a 'ridge tops to the sea' perspective on water resources management, integrating land management issues with river and coastal waters issues, in a combination of applied and basic research. The entire research program was vetted by stakeholders in the region. This program operated as a successful and productive research collaborative for ten years, even after I left as the program leader. Elements of the original program were incorporated into several new national research initiatives, and the concepts and operating principles of integrated catchment management are now deeply ingrained in natural resources research and management in New Zealand.

In a related effort, I led discussions to include the Motueka River ICM research program in a new international initiative led by UNESCO. The Hydrology for Environment Life and Policy (HELP) program was designed to share knowledge and experience about integrated catchment management among research and stakeholder groups around the world. It was recognized that the level of expertise and knowledge within individual catchment management groups varied considerably, with some groups having advanced capabilities and knowledge, while others were disadvantaged or developing. The goal of the program was to identify leading catchment groups who could serve as "demonstration" projects and provide experience and examples for developing catchment groups. The Motueka Integrated Catchment Management program was identified as one of only a few "demonstration" projects in the HELP international program.

In 2002 I returned to the US to accept the inaugural Robert and Genevieve Patrick Professorship in Watershed Science and Planning in the Rubenstein School of Environment and Natural Resources at the University of Vermont. In this position I began to cultivate relationships with local, state, and regional stakeholders; establish new research initiatives; and coordinate disparate programs that had related missions to use and develop knowledge to benefit the environment and economy of the Lake Champlain basin, the State of Vermont, and the broader region. During this period, I began to advocate for a more coordinated approach to these water-related initiatives, across the university.

In late 2021 I was charged by the Vice President of Research at the University of Vermont to develop a program of collaborative research that would contribute to the establishment of a new national cooperative research institute within the Alabama Water Institute at the University of Alabama – Tuscaloosa. The Cooperative Institute for Research to Operations in Hydrology (CIROH) was launched in 2022 to support NOAA's Office of Water Prediction and the National Weather Service with cutting-edge research to strengthen and improve forecasts of streamflow, floods, droughts, and water quality. I coordinated a suite of 10 projects that served as the University of Vermont's initial contribution to this consortium of 28 collaborating academic, government, and commercial institutions. This and additional funding I helped to secure led to the creation of the Water Resources Institute at the University of Vermont in 2023. This institute now serves to coordinate research on water resources among several dozen faculty researchers, their graduate students, and post-docs, from departments across the entire campus.

Program Administration

In my role as the program leader for Integrated Catchment Management at Landcare Research in New Zealand, I managed a research collaboration that involved Landcare Research, other national institutes (the National Institute for Water and Atmosphere, the Institute for Geological and Nuclear Sciences, and the Cawthron Institute), and regional stakeholders (the Tasman District Council). I was responsible for the intellectual as well as the financial management of this national research program that involved roughly 40 collaborators working on 10 interacting themes.

At the University of Vermont, I directed three independent, federally funded research programs. As director of the Lake Champlain Sea Grant (LCSG), I managed and developed resources for research, education, and outreach relevant to the mission of NOAA's National Sea Grant College Program. During my tenure as director, I was able to guide the LCSG from a "coherent area program" to National Sea Grant Institute status, quadrupling the funding for this regional program.

As director and principal investigator for Theme 1 of the Northeastern States Research Collaborative (NSRC) I managed an interdisciplinary research program focused on the integration of resource management and socio-economic concerns in the northern forests of the New England region. This collaboration is funded by the USDA Forest Service and includes the University of Vermont, the University of New Hampshire, the University of Maine, and the State University of New York College of Environmental Science and Forestry. During my tenure I spearheaded a complete overhaul of the program and successfully negotiated a 5x increase in funding for this regional program serving Vermont, New Hampshire, Maine, and New York.

As director of the Vermont Water Resources and Lake Study Center I managed and developed resources to support research on water resources of the state of Vermont and the Lake Champlain region. This center is part of the National Institutes for Water Research, funded by the US Geological Survey.

Stakeholder Relationships

Early in my career I interacted with the pulp and paper mill industry and with state environmental agencies in New England, to help identify the potential risks of applying biosolids in forest lands. In my role as program leader at Landcare Research in New Zealand, I interacted with other research organizations; universities; local, regional, and national government; and NGOs. I also interacted directly with leaders in the indigenous Māori tribes, who in New Zealand law and policy have special and significant interests in natural resources management in the country.

After moving to the University of Vermont in 2002, I interacted with city, regional, and state stakeholders. One of the first initiatives that I established was a program call Redesigning the American Neighborhood, which was funded by the US Environmental Protection Agency. This program focused on implementing green infrastructure alternatives for stormwater management in peri-urban environments. The specific objective was to explicitly involve homeowners, municipal resource managers, policy makers, consultants, students, and researchers in discussions and decisions about the purposes, types, and locations of green stormwater infrastructure in a neighborhood that was facing severe stormwater runoff issues. The project did not meet all its implementation objectives, largely because the time required to build community consensus was longer than the 5 year period of the award. However, the legacy of this program helped to inspire the creation of the first stormwater management utility in Vermont, the first stormwater management plans for urban streams, and contributed to a renewed focus on alternative ways to manage stormwater runoff.

For many years I was a member of the Technical Advisory Committee (TAC) of the Lake Champlain Basin Program (LCBP). For three years I was Chair of the TAC and was an *ex officio* member of the LCBP Executive Committee and Steering Committee. As the Director of the Lake Champlain Sea Grant Program, I continued to have a seat on the LCBP Steering Committee. In these capacities I have had the opportunity to work with key partners including the Commissioner of the Department of Environmental Conservation; the Secretary of the Agency Agriculture, Food and Markets; and with Vermont-and DC-based staff of the Vermont congressional delegations. In the non-governmental sectors, I worked closely with leaders of NGOs in the region and with private donors on projects of mutual interest in research and outreach.

Currently I serve on two state-level committees that require gubernatorial appointments. The Vermont Citizens Advisory Committee for the Future of Lake Champlain was established by statute in 1989 with a charge to collect data and information about stakeholder concerns regarding emerging issues affecting the environment, economy, and communities of the Lake Champlain basin and to report our findings and recommendations to the Vermont legislature annually. The Vermont Climate Council was established by the Vermont Legislature in 2020 via the Global Warming Solutions Act. In part this act directed the council to produce a Climate Action Plan to seek opportunities for long-term carbon sequestration in the state and to help Vermont communities prepare for the impacts of climate change. I was appointed by the governor to serve on the Science and Data Subcommittee of the council.

Synergistic Activities

In addition to committee assignments noted above, I developed and facilitated opportunities to stimulate communication and collaboration on research, training, and outreach at institutional, state, and national levels. I was a member of the Envisioning Environment working group that developed a vision for environmental research and education at UVM, to build on our

environmental mission. I was a Senior Science Advisor for Vermont EPSCoR initiatives including the Complex System, Research on Adaptation to Climate Change, and the related Northeastern Water Sensor Network projects.

From 1987 to 2023 I was a member of the stream and river research team, one of four core themes in the Arctic Long-Term Ecological Research project. From 2010 to 2023 I led this team which included approximately a dozen researchers at 5 independent institutions across the US. Our team conducted and inspired advanced research on stream and river ecosystem dynamics in the rapidly changing Arctic environment.

As part of one of my collaborative research projects, I pioneered one of the early uses of live-streamed webinars for advanced education and training in environmental science. The series of programs we developed was designed to inform participants about emerging research and important gaps in our understanding of climate change in the Arctic region. This initiative was offered for academic credit and engaged participants including graduate students, postdoctoral fellows, and established researchers from around the world.

I was for many years the representative for UVM in the Consortium of University Scientists for the Advancement of Hydrologic Sciences, Inc. (CUAHSI) and served on the Hydrologic Measurement Facility workgroup. In 2011, I was invited to participate in and present at a workshop organized by the National Science Board's Task Force on Mid-Scale Research, convened by the National Academy of Sciences.

Professional Research Interests

My research has focused on interactions between hydrological and biogeochemical processes, especially as these processes are influenced by land use practices and land cover characteristics at catchment scales. I have authored or co-authored nearly 140 peer-reviewed scientific publications and 50 peer-reviewed technical reports. I have participated in hundreds of professional presentations and dozens of invited presentations. Over my career I generated or managed just under \$35,000,000 in research funding.

Much of my research has focused on climate change impacts in the Arctic, especially the North Slope of Alaska. All my research has been collaborative, involving multiple institutions and colleagues. For example, in 2008 I initiated a project with collaborators across the United States and in Canada to use a systems approach to quantify the environmental consequences of thawing permafrost on the structure and function of the Arctic tundra landscape. At the time, this was a unique approach to research on an emerging topic of rapidly growing concern. Other recent collaborative Arctic research efforts that I have led or co-led include a project to investigate the ecological consequences of a highly unusual tundra wildfire, research on the ecological effects of changing seasonality in the Arctic, and research on altered hydrology and geochemistry of Arctic streams and rivers.

Another related theme of my research has focused on research relevant to adaptive management of land and water resources in urban and intensively utilized rural catchments. This research focuses on surface-water/groundwater interactions, land use impacts on river water quality, characterization of riparian structure and function, catchment scale hydrological modeling, coastal biogeochemical processes, and development of publicly accessible knowledge bases linked to GIS databases and web interfaces.

Earlier in my career I led projects to identify the hydrodynamics of runoff processes in landscapes under different land use, environmental impacts of applying municipal biosolids in forest lands, comparative studies of nitrogen cycling in streams, influences of riparian zone geomorphology on

nitrogen fluxes from tropical rain forests, impacts of whole-tree harvesting on nitrous oxide losses from northern hardwood forests, and nutrient cycling in tidal freshwater wetlands.

Teaching interests and experience

As a professor of undergraduate and graduate education, I developed approximately 20 courses, largely in the areas of watershed science and water resources research and planning. “Ecological risk assessment” was a common theme that ran through most courses I taught. This includes a course in Water Resources Management that I offered annually for 10 years at the University of New Hampshire, and a course specifically titled Ecological Risk Assessment that I offered annually for nearly 20 years at the University of Vermont. Both courses were based on the science and policies that are the foundation of risk assessment, augmented by my own research and program management experience. They also stressed the crucial importance of stakeholder involvement and community engagement for successful water resource management. In 1989 and again in 1993 I was awarded the Teaching Excellence Award in the Department of Forest Resources and the Department of Natural Resources, respectively, and in 1991 I was identified as the Outstanding Assistant Professor at the University of New Hampshire. I was twice nominated for the Kroepsch-Maurice Teaching Award, the highest teaching recognition offered by the University of Vermont.