

Michael H. Simpson
Environmental Studies Department
Antioch University New England
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EMPLOYMENT HISTORY

Antioch University New England, Keene, NH

Current	Director, Resource Management and Administration Degree Program Co-Director, Center for Climate Preparedness and Community Resilience
2010 – 2016	Chair, Environmental Studies Department
1997 – 2010	Director, Resource Management and Conservation Degree Program
1985 – 1997	Faculty, Environmental Studies Department

MHS & Associates, LLC, Norwich VT

2004 – Present Principal and Owner

DSM Environmental Services, Inc. Ascutney, VT

1994 – 2004 Senior Environmental Scientist and Partner

Tellus Institute, Boston, MA

1989 – 1994 Senior Environmental Scientist

E & A Environmental Consultants, Stoughton, MA

1988 – 1989 Manager, Recycling and Composting Research and Projects

Massachusetts Department Environmental Quality & Engineering, Boston, MA

1987-1988 Compost Program Manager

Lombardo & Associates, Boston, MA

1986 Subcontractor for Design of Centralized Artificial Wetlands System for Septic Tank Effluent for Anne Arundel County, Maryland

Normandeau Associates, Bedford, NH

1986 Subcontractor for NH Coastal Wetlands Mapping Project & Assessment of Impacted Wetlands in the Town of Rye, New Hampshire

New Hampshire Resource Recovery Association, Concord, NH

1986 Executive Director

New Hampshire Resource Recovery Association, Concord, NH

1983 – 1985 Assistant Director, Community Technical Assistance & Cooperative Marketing of Recyclables

Office of State Planning, Coastal Program, Concord, NH

1982 Grant funded staff: Tidal Marsh Restoration

The New Hampton School, New Hampton, NH

1976 – 1981 Biology/Environmental Science Faculty, Dorm Master, Special Projects Director, Outing Club Director

EDUCATION

M.S. Resource Management & Administration. Antioch/New England Graduate School, 1986

M.A. Liberal Studies: Science Emphasis. Dartmouth College, 1981

B.A. Biology and Philosophy. Denison University, 1974

PROFESSIONAL CERTIFICATIONS

- NH Certified Wetlands Scientist
- ASTM Phase 1 Environmental Site Assessment
- NH Certified Level IV Solid Waste Facility Operator
- OSHA Hazardous Waste Operations and Emergency Response - 40-Hour

AWARDS

2016 Horace Mann Spirit of Service Award

MOST RECENT CONSULTANCIES:

- The Lifecycle Assessment and Embedded Materials and Energy in a Circular Economy for Rotterdam, NL - Circular and Low Carbon Initiative, International Solid Waste Association, Rotterdam, NL
- Organizational Health Assessment, Northeast Resource Recovery Association, Epsom, NH
- Technological Assessment and Revenue/Cost Impact from The Increase in Food Waste Delivery Due to the Enactment of VT Act 148, Green Mountain Compost, Williston, VT.

CURRENT SERVICE TO THE COMMUNITY

- Chair of New Hampshire Wetlands Scientists Discipline
- Board Member, New Hampshire Association of Natural Resource Scientists
- Upper Valley (NH & VT) Climate Adaptation Work Group
- Executive Board, Upper Valley (NH & VT) Sierra Club
- NH Coastal Climate Adaptation Work Group
- Science Advisory Committee, Lake Sunapee Protective Association

PREVIOUS SERVICE TO COMMUNITY

- New Hampshire Association of Natural Resource Scientists, Board President
- New Hampshire Association of Wetlands Scientists
- New Hampshire Corporate Wetlands Restoration Partnership, Board Member
- New Hampshire Legislative Commission for Development of Statewide Flood Control Plan
- New Hampshire DES Advisory Committee, In-lieu Fee Wetlands Mitigation
- New Hampshire DES Advisory Committee, Water Quality Standards for Wetlands
- New Hampshire DES Advisory Committee, Composting Best Management Practices
- New Hampshire DES Advisory Committee, Land Application of Septage
- New Hampshire DES Advisory Committee, Institution of ISO 14001 Standards
- Grantham, NH Conservation Commission & Trustee of Town Trusts
- Sunapee, NH Conservation Commission

PREVIOUS SERVICE TO ANTIOCH

- Chair Environmental Studies Department
- Faculty Senate Appointee to AUNE Board of Trustees
- Faculty Senate, Senate President
- AUNE Finance Committee
- AUNE Energy & Climate Action Task Force
- AUNE President's Transition Team
- Search Committee for AUNE President
- Search Committee for AUNE VP of Academic Affairs

WATER RESOURCE MANAGEMENT EXPERIENCE

Federally Awarded Grants

- USEPA, Climate-Ready-Estuarines, Washington, D.C., Assessment of Culvert Infrastructure Impact from Landuse Decisions and Projected Climate Change -Oyster River Basin NH, with the NH Piscataqua Region Estuaries Partnership, Durham, NH, **Principal Investigator**
- NOAA, Washington, D.C., SARP, Design and Implementation of a Stakeholder-Engaged Decision-Support Program for Adapting Civil Water Infrastructures for Climate and Land-Use Change - Lake Sunapee Basin NH, **Principal Investigator**
- NOAA, Washington D.C., SARP Long term Climate Information and Forecasts Supporting Stakeholder-Driven Adaptation decisions for Urban Water Resources – Minnehaha Watershed, MN, **Principal Investigator**
- NOAA, Washington, D.C., CICEET, Assessing the Risk of 100-year Floods in the Lamprey River Watershed Resulting from Changes in Climate and Land Use, with UNH Earth, Oceans and Space Institute Center, Durham, NH, **Researcher & Co-Author**
- NOAA, Washington, D.C., CICEET, Forging the Link Between Research-Based Institutions, Watershed Assistance Groups, and Municipal Land Use Decisions, with UNH Stormwater Center, Durham, NH, **Researcher & Co-Author**
- USEPA, Region 1, Boston, MA, Solid Waste Curriculum Utilizing Critical Thinking Skills, with the New Hampshire Resource Recovery Association, Concord, NH , **Principal Investigator**

Applied Research:

- **Biological / Chemical Parameters for Artificial Wetlands System for Treatment of Regionally Generated Septage:** researched wetlands designs for the treatment of nitrogen, phosphorus, TSS and BOD removal in a multi-stage wetland system in Anne Arundel County, MD. Project for Lombardo & Associates, Boston, MA.
- **Surface and Groundwater Monitoring for Potential Contamination from a Municipal Landfill:** Water sampling from multiple groundwater wells and surface water flowage for volatile organic carbon compounds, heavy metals, conductivity and pH. Statistical test completed on all well data for significant exceedence of regulatory environmental standards. For Municipality of Dover, VT.
- **Groundwater Monitoring for Contamination of Leaking Underground Storage Tank:** Water sampling from multiple groundwater wells for volatile organic carbon compounds. Included ground water flow mapping, plume demarcation and removal of contaminants. Statistical test completed on all well data for significant exceedence of regulatory environmental standards. For Private Client, Windsor, VT.
- **Assessment of Potential Phosphorous and Nitrogen Loading & Removal From a Constructed Wetland:** A constructed weir system to remove TSS, Phosphorus and Nitrogen from micro-watershed run-off into Lake Sunapee was assessed so to provide weir operation guidance for different seasons of the year. Baseline vegetative community structure and diversity was collected in wetlands above and below the weir system. For the Lake Sunapee Protective Association, Sunapee, NH.
- **Assessment of Wetlands and Other Sensitive Receptors From the Extraction of Groundwater:** Developed a model, in conjunction with a hydro-geologist and geophysicist to ascertain which wetlands should be monitored for impacts from large groundwater withdrawals from bedrock wells. Developed a monitoring protocol prior to, during and after a 72 hour pump-down test of all production wells. Results established maximum pump rate for those wells and the model has been subsequently referenced by DES water resource specialists. Research conducted at the Sunapee Springs Water Company, George Mills, NH.
- **Impacts to Riparian Corridors from Increased Run-off:** Through a statistical analysis Global Climate Change Models were down-scaled so to project change in frequency of intense precipitation events at the local level. This information was applied to Geographic Information System (GIS) representation of the natural watershed

configurations combined with the constructed drainage infrastructure within the city. Combined with scenarios of build-out based on current zoning, flooding and culvert failure was projected. Based on the types, size and number of culverts projected to fail a replacement-cost analysis was completed. For the Keene, NH City Planning Department and the Keene Committee on Climate Change

- **On-site Treatment of Oil Contaminated Soils:** Development of on-site biological treatment methodology to mitigate contaminated soils from an oil spill. Included technology design and oversight of construction followed by oversight of seasonal management plan. Seasonal sampling of shallow and deep soils and reporting to regulatory agency performed. Private Client, Brownsville, VT.

Publications: Water Resource Management Focus

Simpson MH, (2019) Peatlands in a Changing Climate: Vulnerability and Resilience, Resource Vol 19:2, pp 9-15.

Simpson MH, (2018) *The System is Changing: Take Note Wetland Scientists*, Resource Vol 18:2, pp 8-11.

Gruber JS, Rhoades JL, **Simpson MH**, Stack L, Yetka L, Wood R (2017) *Enhancing climate change adaptation: strategies for community engagement and university-community partnerships*, Journal of Environmental Studies and Sciences Vol. 7, pp 10-24.

Abrash Walton A, **Simpson MH**, Rhoades J, Daniels C (2016) *Local solutions report: Identifying and meeting the needs of local communities adapting to climate change*, Keene, NH: Antioch University New England Center for Climate Preparedness and Community Resilience.

Moore TL, Gulliver JS, Stack L, **Simpson MH** (2016) *Stormwater management and climate change: vulnerability and capacity for adaptation in urban and suburban contexts*, Climatic Change: Vol.138:3, pp 491-504.

Gruber JS, Rhoades JL, **Simpson MH**, Stack L, Yetka L, Wood R (2015) *Enhancing climate change adaptation: strategies for community engagement and university-community partnerships*, Journal of Environmental Studies and Sciences; published online: 2/27/15, 16 pp. can be retrieved at: <http://link.springer.com/article/10.1007/s13412-015-0232-1>

Simpson MH (2015) *Sending a Signal for Change: leading by example through individual and institutional commitments to fossil fuel divestment*; Stanford Social Innovation Review; 3/3/15; can be retrieved at: http://ssir.org/articles/entry/sending_a_signal_for_change

Stack LJ, **Simpson MH**, Gruber JS, Moore TL, Yetka L, Eberhart L, Gulliver J, Smith J, Mamayek T, Anderson M, Rhoades J (2014) *Long-term climate information and forecasts supporting stakeholder-driven adaptation decisions for urban water resources: Response to climate change and population growth*. Final project report: Sectoral Applications Research Program FY2011, Climate Program Office, National Oceanic and Atmospheric Administration: 38pp.

Gulliver JS, Moore TLC, Stack L, **Simpson MH** (2014) *Impact of Climate Change on Drainage Infrastructure in the Twin Cities Metro*, Water resources Science Seminar Series, University of Minnesota, October 10, 2014.

Wake C, Miller, S, Roseen R, Scholz A, Rubin F, **Simpson MH**, Sinnott C, Peterson J and L Townson (2013) *Assessing the Risk of 100-year Freshwater Floods in the Lamprey River Watershed of New Hampshire Resulting from Changes in Climate and Land Use*. Final Project Report funded under National Oceanic and Atmospheric Administration CICEET Grant: 31 pp; can be retrieved at: <http://100yearfloods.org/resources/#Reports>

Simpson MH, Stack LJ, Gruber J, Wood R, Crosslin T, Lawson C, Roseen R, Smith J (2012) *Stormwater drainage system vulnerability, capacity, and cost: response to climate change and population growth*. Final project report: Sectoral Applications Research Program FY2009, Climate Program Office, National Oceanic and Atmospheric Administration: 84 pp.

Roseen R, Jananski T, Houle J, **Simpson MH** and J Gunderson (2011) *Forging the Link: Linking Economic Benefits of Low Impact Development and Community Decisions*. Final Project Report funded under National Oceanic and Atmospheric Administration CICEET Grant: 154 pp; can be retrieved at: https://www.sugarsync.com/pf/D070179_6282356_272805

Gunderson J, Roseen R, Houle J and **MH Simpson** (2011) *Cost effective Low Impact Development in Commercial and Residential Development*. Stormwater. March-April: 38-45; can be retrieved at: <http://digital.stormh2o.com/publication/?i=61938&p=&pn=>

Houle J, Gunderson J, **Simpson MH**, Roseen R and T Janeski (2011) *Economical CSO Management. Stormwater*. May: 7 pp; can be retrieved at: <http://www.stormh2o.com/SW/Articles/142116.aspx?format=2>

Roseen, RM, Janeski TV, **Simpson MH**, Houle JH, Gunderson J, Ballester TP (2011) *Economic and Adaptation Benefits of Low Impact Development*, presented at the 2011 International LID Symposium, Philadelphia, PA; can be retrieve at: https://www.researchgate.net/publication/273766067_Economic_and_Adaptation_Benefits_of_Low_Impact_Development

Stack L, **Simpson MH** Crosslin T, Roseen R., Sowers D. and C. Lawson, 2010. *Oyster River Culvert Analysis*. Final Project Report funded under a US EPA Climate Ready Estuaries Grant: 68 pp; can be retrieved at: http://www.prep.unh.edu/resources/pdf/oyster_river_culvert-prep-10.pdf

Presentations: Water Resource Focus

Impacts of a Changing Climate on Wetland Ecosystems - Center for Climate Preparedness & Community Resilience national webinar - April 27, 2020

Vulnerability of High-elevation Waters to a Changing Climate - NH Water and Watershed Conference - Plymouth NH - March 13, 2020

Response to The Threat of Extreme Heat - Security And Sustainability Forum & Union of Concerned Scientist's national webinar – September 9 2019

Where to Put the Water: Assessing the Vulnerability of Urban Stormwater Systems to a Changing Climate, National Webinar, Center for Climate Preparedness and Community Resilience, September 20, 2017.

Innovative Strategies for Organizing, Implementing and Funding Climate Adaptation, National Adaptation Forum, St Paul MN, May 9-11, 2017

The Urban Tree: An Elegant Response to Climate Challenges, Climate March and Rally, Keene NH, April 29, 2017

A Review of Climate Trends That Impact Forested Watersheds, USDA -Adapting Forest Watersheds to Climate Change Workshop, Keene, NH, April 4-5, 2017

A Changing Climate: Some Implications for Riparian Corridors, NH Water and Watershed Conference, Plymouth NH, March 24, 2017.

Building Local Capacity to respond to the Impacts of Climate Change, 17th National Conference and Global Forum on Science, Policy, and the Environmental: Integrating Environment and Health, Washington DC, January 24-26, 2017.

Cooperative Marketing: A Business Model for the Right Reasons, Keynote Speaker, Summit for Recycling, Grand Junction CO, June 14, 2016.

Adapting to a Changing Landscape in the Context of a Changing Climate, Association for Environmental Studies and Science Annual Meeting, Washington DC, June 8-11, 2016.

A Changing Climate: Some Implications for Wetlands Restoration, Keynote Speaker, Society of Wetland Scientists Annual Meeting, Plymouth MA, April 16, 2016.

Preparing Communities For an Uncertain Future: In Light of a Changing Landscape and Climate, Keynote Address, Minnesota Association of Watershed Districts Annual Meeting, Alexandria MN, December 3-5, 2015.

Innovations in Urban Adaptation, National Adaptation Forum, St Louis MO, May 12-14, 2015.

Assessing Vulnerability of Water Conveyance Infrastructure from a Changing Climate in the Context of a Changing Landscape, National Webinar, Center for Climate Preparedness and Community Resilience, November 13, 2014.

Foundation Principals of Adaptation Planning, Local Solutions: The Northeast Climate Preparedness Conference, Manchester NH, May 19-21, 2014.

A Changing Climate: Some Implications for Natural Resource Scientists, Keynote Speaker, NH Association of Natural Resource Scientists Annual Meeting, Concord NH, January 24, 2014

A Changing Climate in the Context of a Changing Landscape, Adaptation in the Great Lakes Conference, Ann Arbor MI, June 24-26, 2014

Historic Rainfall and Stormwater Infrastructure Vulnerability, Minnehaha Watershed District Stakeholders Meeting, Minneapolis MN, January 22, 2013

Invited Testimony to Joint Committee of Keene (NH) Planning and City Council on the scientific basis of buffer distances from wetlands and streams in order to effectively mitigate non-point source pollutants. Keene NH, October 9, 2012.

Community -Based Vulnerability Assessments and Stakeholder Capacity Building for Extreme Storm Events, Meeting of Climate Scientists, Stratus Inc., Boulder CO, July 6, 2012

Impact to Aquatic Organism Passage from Landuse and Climate Changes, Keynote Speaker, Annual Meeting of the New England Chapter of the North American Lakes Managers Association, Durham NH, June 9, 2012

Vulnerable Stream Crossings: A Future Look at a Changing Landscape and Climate, Invited Plenary Speaker to the US EPA sponsored New England Association of Environmental Biologists, Falmouth MA, March 22, 2012

Projecting Culvert and Road Crossing Vulnerability from a Changing Climate and Landuse, New Hampshire Water & Watershed Conference, Plymouth NH, March 23, 2012

Translating Research into Policy: How to Participate Effectively in the Policy Process, National Council on Science and Environment & Antioch University New England sponsored half-day workshop, Pew Conference Center, Washington DC, January 17, 2012

Preparing communities for an Uncertain Future in Light of a Changing Landscape and Climate: A Multidisciplinary Approach to Effective Adaptation, Association for Environmental Studies and Science Annual Meeting, Burlington VT, June 23-25, 2011

Sunapee Watershed Infrastructure Project, Annual meeting of the New England Chapter of the North American Lake Management Society, University of Rhode Island, Kingston RI, June 4, 2011

The Beaver Brook Watershed, Keene Dynamic Watershed, for the Planning Board and Conservation Commission, Keene NH, April 6, 2011

The Need for Scientists to Effectively Communicate Results to Local Decision-makers, Collaborative Adaptive Management Network Conference, Keene, NH, April 16, 17, and 18, 2011

Integrated Modeling to Assess Climate Change on the Environment and Human Health: The Oyster River Culvert Analysis Using Climate Change Scenarios, US Environmental Protection Agency "Integrated Modeling to Characterize Climate Change Impacts and Support Decision Making" meeting, Atlanta, Georgia, February 1-2, 2011

Climate Change Adaptation: Identifying Risk and Costs for Culvert Infrastructure, Grappling with Stormwater Management in this Era of Climate Change Conference, Augusta, ME, November 30, 2010.

Preparing Communities to Adapt to an Increase in Run-off and Peak Flow Due to a Changing Climate, Water Resources Symposium, University of Massachusetts Amherst MA, October 28, 2010

Climate Change Adaptation for a NH Coastal Watershed: Identifying Risk and Costs for Culvert Infrastructure, NH Joint Water and Watershed Conference, Concord, NH, November 13, 2009

Water-Conveyance Infrastructure Susceptibility to Climate Change, State of the Estuaries Conference, Sommersworth, NH, October 16, 2009

Climate Change Adaptation For a Coastal Watershed, AWRA Summer Specialty Conference, Snowbird, Utah, June, 2009

Adaptation and Resiliency for Local Communities to Climate Change, at the Massachusetts Estuaries Conference, Wanquoit Bay Estuary Reserve Training Center, Hyannis, MA, April 8 2009

Invited Testimony to the NH Legislative Commission charged with developing recommendations for a statewide plan for storm water management, Concord NH, November 3, 2008

Projected Extreme Storm Events and Freshwater Flooding of Coastal Systems, meeting on Climate Change and Coastal Flooding, at the Institute for the Study of Earth, Oceans and Space, University of New Hampshire, Durham NH, June 16, 2008

The Need to Adapt to Climate Change Is Now, at the Great Bay National Estuary guest lecture series, Greenland NH, March 3, 2008.

Invited Testimony to the NH Legislative Commission charged with developing a statewide flood hazard mitigation plan on the need to prepare for climate change induced precipitation impacts, Concord NH, September 25, 2007.

Water From The Hills: A Call For Action, presented at the summer speaker series of the Lake Sunapee Protective Association, Sunapee NH, August 15, 2007.

Preparing for Climate Change: A Small City's Mid-century Culvert Drainage Needs, presented at both the Maine and New Hampshire Water Resource Conferences, the former at Augusta Civic Center, Augusta ME, March 21, 2007; the latter at the Grappone Center, Concord NH, April 9, 2007.

Impacts from Projected Climate Changes to Riparian Wetland Systems in Low Order Streams, presented at the bi-annual conference of the Society of Wetland Scientists, Holy Cross College, Worcester MA, November 10, 2006.

The Future of Storm Water and Impacts to Culverts in the Upper Watershed Due to Climate Change in New England, New England Storm Water Conference, New England Center, University of New Hampshire, Durham, NH, October 12, 2006.

Projects/Consultancies

Delineation: The following projects are representative of jurisdictional delineations utilizing the 1987 Army Corps Methodology in combination with the New England Hydric Soil Manual Criteria and referencing the Fish and Wildlife Wetlands Plant Indicator list.

- ***Wetlands Delineation and Field Mapping For Construction of Regional Landfill***, For Upper Valley Regional Solid Waste District, Hartland, VT.
- ***Wetlands Delineation and Field Mapping for a Proposed Construction and Demolition Regional Landfill***, Shaftsbury VT. For Private Client
- ***Wetland Delineation for Parking Lot and Associated Drainage System Improvement***: Grantham, NH. For Grantham Elementary School.
- ***Delineation for Road and Pipeline Corridor***: All wetlands delineated on a 500 acre parcel so to determine access road and pipeline corridors for large-scale groundwater extraction project. For Sunapee Springs Water Company, Sunapee, NH.
- ***Wetlands Delineation and Application for Stream Crossing***: For Osgood Welding, Claremont, NH.
- ***Multiple Wetlands Delineation Projects***: Subcontracted to Surveying Firms of: Bedard and Associates, Wilmot, NH and Clayton Platt, Inc. Grantham, NH.

Assessment and Classification: The following projects focused upon assessing wetlands for functional value and/or the classification of wetlands reflecting the US Fish and Wildlife classification systems (Cowardin, et. al).

- ***Riparian Corridor Impact Assessment***, Under EPA 319 funds, and in conjunction with Moosewood Ecological, providing the City of Keene, a multi-fact assessment of impacts to the impacted urban stream corridor of the lower Beaver Brook. This analysis includes wildlife habitat and connectivity, non-point source pollution and a stream geomorphology assessment.
- ***Tidal Wetland Assessment Methodology***: Developed for Normandeau Associates and utilized to determine comparative health of tidal and freshwater tidal wetland systems within the NH Coastal Zone; for NH CZM Program, Subcontracted to Normandeau Associates, Bedford, NH.

- **Classification of a Community's Wetland Systems:** For the Planning Dept., conducted a city-wide survey of all wetlands. With a combination of photo-interpretation and ground-truthing, classifying all wetlands down to class level, utilizing the US Fish and Wildlife classification system. For Concord, NH
- **Culvert & Road Crossing and Infrastructure Risk,** Under EPA National Estuaries grant, providing NH DES Estuaries Program, an analysis of water conveyance infrastructure at risk for the entire Oyster River basin due to a combination of future build-out and projected climate change influence on storm intensity and duration
- **Hydrologic Assessment and Wetlands Delineation** For a private client, assessing the impacts of developing a abandoned gravel pit to site a solid waste facility in southern, NH that would serve as a regional materials recovery and compost facility for supermarket generated organic materials.
- **Wetlands and Soils Assessment for Factory Expansion:** Included determination of potential wetlands and analysis of soils for disturbance and indicators of hydric conditions. For DoorCrafters, Inc., Ludlow, VT.
- **ASTM Phase 1 Site assessment For 39 acres of Wetland:** For a parcel transferred From the Trust of Public Land to US Fish and Wildlife Service, Swanton, VT. For Trust foe Public Lands , Montpelier, VT
- **Pond Site Assessment:** Included delineation all wetlands on property and choosing a site that would location that could utilize site hydrology while minimizing impacts to existing wetlands. Private Client, Lyme, NH
- **Watershed Wetlands Survey:** Associated With the Siting of a Bedrock Well. For Lake Sunapee Water Company, Sunapee, NH.
- **Assessment of Impacted Tidal and Freshwater Tidal Wetlands:** within the Town of Rye For New Hampshire's CZM Program, Subcontracted to Normandeau Associates, Bedford, NH.

Mitigation and Restoration: The following projects reflect projects with significant efforts that focused upon mitigation or restoration of wetlands and associate upland buffers. Aspects of the projects often required jurisdictional delineations and/or functional assessments.

- **Wetlands Mitigation and Restoration,** Due to an order from state regulators to restore, providing a private client regulator interface, design, construction oversight, and post construction monitoring at an ongoing commercial gravel extraction operation.
- **Wetland and Wetland Buffer Planting Plan:** In conjunction with a major stream crossing and bank disturbance. Lamb property, Andover, NH.
- **Wetland Buffer Mitigation Design:** Included a jurisdictional delineation in conjunction with pond establishment for Shepard Butler Landscape Architect project in Orford, NH
- **Creation and Implementation of a Restoration Plan:** To address wetlands impacts resulting from logging and grubbing operation and included a vernal pool restoration. Private Client, Bath, NH
- **Wetlands Assessment and Mitigation Plan to Restore a Dredged and Filled Wetland:** Private Client, Grantham, NH.
- **Stream Restoration:** This project included the creation and submittal of all regulatory documentation and performance of site monitoring for 2 subsequent years. Private Client, Canaan, NH
- **Wetland Buffer Planting Plan:** For Shepard Butler Landscape Architect project in Boston, MA
- **Wetlands Assessment, Mapping and Mitigation Plan to Restore Filled Wetland:** Private Client, Sunapee, NH.
- **Wetlands Restoration Plan for a Filled Wetland:** Private Client, Claremont, NH.
- **Assessment of Regulatory Compliance of a Restored Wetland:** Private Client, Grantham, NH.
- **Hydrological Assessment for Potential Pond Site,** For a private client in Acworth, NH, assessing the ground and surface water hydrology of an upland site for determining potential for a pond site. Including wetland delineation and permitting, as well as interface with landscape architect for design and plantings

Watershed Scale Analyses: These projects reflect analysis of potential impact on water quality, run-off potential or ground water impact due to changes in land use within micro-watersheds.

- **Assessment of Causal Agents Contributing to Phosphorus Loading:** in Jobs Creek Micro-watershed. Antioch Project For Lake Sunapee Protective Association, Sunapee, NH

- **Upper Montane Watershed Assessment:** This project looked specifically at forestry, high elevation subsistence husbandry and agriculture and low-elevation banana plantation activities and their impact on water quality within the Los Novellos River watershed. For EARTH University, Guacimo, Costa Rica.
- **Non-point Pollutant Source Analysis: Lower Beaver Brook:** Conducted individual lot analyses for potential sources of non-point pollutants based on land-use behavior, soils and buffer integrity for an urban stream. Macro-invertebrate rapid assessment as pollutant indicators as well as invasive plant surveys were completed. Recommended prioritization for mitigation and educational outreach to reduce possible pollutant loads were provided. Water Division, City of Keene NH.
- **Seven Micro-Watershed Rapid Assessments:** Conducted within the Lake Sunapee Watershed. For the Lake Sunapee Protective Association to assess run-off, soil loss and phosphorus loading impacts due to projected build-out.
- **Potential Contaminant Source Survey Associated With Establishment of Bedrock Wells:** Include an ASTM Phase 1 assessment of 500 acre property as well as a watershed- scale survey of land use and potential contaminant sources. A land use management and education plan was also developed. For Sunapee Springs Water Company, Georges Mills, NH.
- **Wildlife Habitat Analysis and Vernal Pool Inventory, for the expansion of the Crotched Mountain Ski Resort , Franconstown, NH:** Along with *Moosewood Ecological*, this project also required meeting with federal, state and local regulatory agencies as well as providing information to local land trusts regarding protection of critical wildlife habitat and travel corridors. Client contact Covell & Associates, Lyndeborough, NH.
- **Marine Pollution Prevention Assessment Lake Powell, Utah:** For Aramark, Inc. and National Park Service. Under a grant from State of Utah, Pollution Prevention Program.
- **Pollution Prevention Watershed Assessment for Sundance Ski Area, Provo, Utah:** Under a grant from State of Utah, Pollution Prevention Program

MATERIALS MANAGEMENT EXPERIENCE

Research Grants

- USEPA, Region 1, Boston, MA, Solid Waste Curriculum Utilizing Critical Thinking Skills
- Collaborative Working Group, St. Gallen, Switzerland, Privatized Waste Service Capacity Building in Post-Conflict Liberia
- American Forest and Paper Association, Degradability of Coated Paper Products Through In-Vessel Composting
- MA Department of Environmental Protection, Hospital Waste Minimization Practices White Paper
- Archers Daniels Midland, Degradability Research of Corn-Starch Plastic Bags
- National Corn Growers Association, Leaf and Yard Waste Composting Manual

Publications: Materials Management Focus

Daniels C, **Simpson, M** and S Whitman, 2021. *A Model City: Resilient, Circular, Equitable and Regenerative*, Briefing Paper Center for Climate Change and Community Resilience, 60 pp.

Scheinberg A, Paul J, Zabaleta I, Paalvast H, Tsydenova N and **M Simpson**, 2020. *Circularity and Resource Efficiency: Methods and metrics to assess circularity in materials management systems in cities*. The Circular and Low Carbon Project, Briefing Paper, International Solid Waste Association; 10 pp.

Simpson M, 2019. *Food Waste Diversion Hierarchy*, Training Manual. USDA Epicure Grant, Northeast Resource Recovery Association; 35 pp.

Scheinberg, A and **M Simpson**, 2015. *A Tale of Five Cities: Frameworks for Inclusive, High-Performance Recycling in Low- and Middle-income Countries*. Waste Management & Research (submission code:WMR-13-0162).

Scheinberg A, Spies S, **Simpson M**, and AJ Mol, 2011. *Assessing urban recycling in low and middle income countries: Building on modernized mixtures*. *Habitat International* 35:188-198

Scheinberg A, **Simpson M** and Y Gupt, 2010. *Economic Aspects of the Informal sector in Solid Waste*. GTZ (German International Co-operation), the CWG (Collaborative Working Group on Solid Waste Management in Mid and Low Income Countries) and the German Ministry of Foreign Affairs, Eschborn, Germany; can be retrieved at: <http://www.cwgnet.net/prarticle.2010-11-04.5920431459/prarticle.2011-03-30.0366272418>

Simpson M, 2010 Chapter 4: *Profiling the Reference Cities in Solid Waste Management in the World's Cities*. Scheinberg A., Rodic-Wiersma L. & D. Wilson (Eds.). United Nations Human Settlement Program. Earthscan Publishing, London UK: 228 pp.

Scheinberg, A, **Simpson M** and Y. Gupt, 2007; *Economic Aspects of Informal Sector Activities in Solid Waste Management*, CWG/GTZ Research Report, WASTE, Gouda, NL.

Simpson M and N Dulac, 2005; *Environmental Research: Cycles of Carbon and Nitrogen & Interaction with Waste Management Practices*; UWEP Working Paper, WASTE, Gouda, NL.

Simpson M, 1996. *Total Cost Accounting for Solid Waste Management*, SPRA News & (Summer) & *Solid Waste Rate Setting*, SPRA News, (Winter), Tucson, AZ.

Simpson M, 1989. *Leaf and Yard Waste Composting: Economic Overview*, Recycling News, Vol. 6, No. 4, Concord, NH; P. 5.

Presentations: Materials Management Focus

The Lifecycle Assessment and Embedded Materials and Energy in a Circular Economy - Circular and Low Carbon Initiative, International Solid Waste Association, Rotterdam, NL, January 29, 2020

The Perfect Storm: The Collapse of the US Recycling Industry - International Solid Waste Association meeting, Rotterdam, NL, November 28, 2019

Glass/Trash /Recycling In Crisis: The China National Sword - NH Department of Environmental Services, Concord, NH, May 2, 2019

Dirt on Dirt: Composting Basics 101, Webinar, Northeast Resource Recovery Association, October 8, 2018

Best Management Practices for Static Aerated-Pile Composting of Food Waste. The 38th Northeast Resource Recovery Association Conference, Manchester, NH, May 21 & 22, 2018

Learning from Past Mistakes: Composting for the Future, The 36th Northeast Resource Recovery Association Conference, Manchester, NH, June 8 & 9, 2016

Translating Research into Policy: How to Participate Effectively in the Policy Process, National Council on Science and Environment & Antioch University New England sponsored half-day workshop, Pew Conference Center, Washington, DC, January 17, 2012

Thirty years of Recycling in the Northeast, The 30th Northeast Resource Recovery Association Conference, Manchester, NH, June 6 & 7, 2011

The Need for Scientists to Effectively Communicate Results to Local Decision-makers, Collaborative Adaptive Management Network Conference, Keene, NH, April 16, 17, and 18, 2011

Scavengers, Micro-enterprises and Global Warming, ANE Speakers Series, Keene, NH, 2003

Designing Municipal Scale Composting Systems, New Hampshire DES Solid Waste Seminar, Hampton, NH, 2002

Finding Economies of Scale in Solid Waste Recovery, National BioCycle Conference, Burlington, VT, 2000

Total Cost Accounting in Solid Waste Management, Fifth Annual Southwest Public Recycling Association conference, Phoenix, AZ, 1997

The New York Times Did Recycling a Favor, Keynote speech at the Second Annual Utah State Recycling conference, Salt Lake City, UT., 1996

An Economic Guide to Composting Alternatives for Solid Waste Management. The New England Resource Recovery conference -Portland, ME. 1994

Garbage to Gold: Urban Waste Management, Jakarta, Indonesia. World Bank, World Development Report Seminars Series, Washington, D.C., 1993

Full Cost Accounting for Waste Reduction, Diversion and Disposal: A 31 County Case Study. ECO World '92, American Society of Engineers, Washington, D.C., 1992

Integrating Leaf and Yard Waste Composting with Waste to Energy Facilities. North American Recycling Congress - Charlotte, NC. 1990

A Regional Approach to Recycling for the Public Sector. North American Recycling Congress -Seattle, WA, 1988

The Economics of On-Farm Composting. The Farm Composting Conference -University of Massachusetts, Amherst, MA, 1987

Projects/Consultancies

2004 - Present (MHS & Associates)

- ***Utilizing a Circular Materials Economy to Frame a Model-City, Junto Group, San Francisco, CA***
Contributing to a urban development vision of a how to design a new model-city that incorporates a circular materials economy framework that emphasizes community resilience, equitable participation of the citizenry and minimizing the extraction of materials and expenditure of energy to provide the products consumed by the city. Avoided emissions and greenhouse gas creation were addressed in this analysis. Researcher and Author
- ***Organizational Health Assessment, Northeast Resource Recovery Association, Epsom, NH***
At the request of the Board of Directors of NRRA., the business model, operations, staffing and data management of the organizations cooperative market is being assessed. This is within the framework of international market dynamics which have significantly impacted recovered mixed paper, glass and electronics revenue streams for NRRA. As part of this analysis is to assess potential liability for the organization under federal statutes, as well as any potential challenges with cash-flow, on a quarter by quarter basis in the upcoming year(s). Researcher and Author
- ***Technological Assessment and Revenue/Cost Impact from The Increase in Food Waste Delivery Due to the Enactment of VT Act 148, Green Mountain Compost, Williston, VT.***
Due to the increase in volume of high-nitrogen feedstock arriving at Green Mountain Compost's facility as the result of the organics materials landfill ban being implemented in Vermont, this project was first assessing the efficiency of through-put of the current operation and projecting where compost methodology will need to change, both through equipment use and standard operating procedures, in order to handle any increased volume of food waste coming on site. Labor time-motions studies, energy, water and waste water use were documented to come up with a net cost per unit end-product (bagged compost), as well as, how the economics will change as additional high-nitrogen food waste moves through the system. Researcher and Author
- ***Design & Construction of Odor Biofilter and Redesign of Composting Methodology, Dartmouth College, Hanover, NH***
To revamp and upgrade an institutional composting process and the associated odor controls so to compost food waste, paper products and manures through active, static aerated composting methodology. Analyses include

changes in porosity, density moisture content oxygen consumption through the two stage composting process as well as determining stability of the final compost product. In addition, the project requires the design and installation of a biological filter to treat process air from the active composting bays. The client was left with an operator's manual for both the composting and biofiltration process. Designer, Researcher and Author

- **Compost Site Feasibility Analysis for the Composting of Food Waste At The Retire Nike Missile Site, Randolph, MA**, for the Massachusetts Department of Environmental Management. To assess viability of closed military reservation as potential compost site, including ASTM Phase 1 site assessment, endangered and threaten species habitat assessment, projected costs for final closure of abandoned military infrastructure and development of a privatized composting facility. Project Manager, Field Researcher and Co-Author.
- **Waste Management Capacity Building in Post-Conflict Liberia**, under a grant from Collaborative Working Group and in collaboration with the International Rescue Committee and DUCOR, Liberia. To assess points of intervention for the development of micro-enterprises to remove waste and clean streets in the greater Monrovia area. Specific work-products include: materials handling strategy, cash-flow analysis and a business plan for expansion of services to the 31 markets within the City. Research Director and Author
- **Assessment of Waste Prevention in Massachusetts' Acute Care Hospitals**, for the Massachusetts Department of Environmental Protection, and in conjunction with Terra, Newburyport, MA. To assess, through surveys and literature research, the current state of waste prevention in Massachusetts acute care hospitals. Includes an analysis of trends analyses in acute care hospital services and health care industry so to project possible impacts on waste generation and composition. Researcher and Co-Author
- **Assessment of Multi-material Recovery Technology Pro-Formas** For a private client, assessing the financial stability of a national consortium's proposal for a materials recovery facility, which includes organics capture for composting and anaerobic digestion.
- **Carbon and Nitrogen Greenhouse Gas Impacts from Integrated Waste and Wastewater Management in the Developing South**, for WASTE, Advisers on Urban Environment and Development, Netherlands, under the UWEP initiative. To assess the approach developed to quantify the net reduction in the release of the greenhouse gases, in CO₂ and N₂O equivalents, as the result of instituting and integrated solid waste management strategy and decentralized wastewater treatment approaches for countries in the developing world. The final analysis also critiques a strategy for creating a Clean Development Mechanism (Kyoto Protocol) for instituting an integrated solid waste management approach at the city level. Research Reviewer and Co-Author
- **Status of Global Urban Solid Waste Management, Nairobi, Kenya**
For WASTE Netherlands, under a contract with the UN Habitat Program, assess both formal and informal sector waste management activities in 20 cities ranging in population size from 50,000 to 10 million residents. Specific tasks include the development of standardized protocol for information/data collection, provide quality control on the data collected by city-partners. Analyze trends and major issues facing these systems, including the related issues pertinent to the millennium goals in regards to poverty, gender and public health. The outcome is an authored report delivered to the UN General Assembly in 2010. Research Designer, Data Analysis and Co-Author
- **Economic Impact of Informal Sector Scavenging in the Developing South**. Under a grant awarded from Deutsche Gesellschaft fur Technische Zusammenarbeit (The German Ministry for Economic Development) and in conjunction with WASTE Netherlands, conduct research on efforts to manage waste for rapidly expanding cities within six countries in the developing world. Modeling economic impacts to determine the value provided by the scavenger community, both to the solid waste system and to the local economy as a whole. Scenario analyses will project the costs if these informal sector waste handling activities ceased and the formal sector expanded their efforts to provide a similar service. The analysis includes costs of environmental impacts quantified by carbon equivalents. Lead researcher and co-author.

1985 – 2004 (while at Antioch University New England)

- **Initiation of a National Solid Waste Policy Planning Process**, conducted under a US EPA *ECO-links* grant for the Bulgarian Ministry of Planning and the Environment. Expanding stakeholder capacity beyond central government control; including NGOs, local government officials, news media and educators. Researching appropriate technology and strategies applicable for Bulgaria, developing associated training materials, facilitation and training and final framing of objectives to incorporate into a national waste management policy. Co-Trainer and Co-Facilitator.

- ***Economic Development for the Informal Sector by Expansion of Materials Recovery Micro-enterprises***, for the Ministry of Environment and Forests, Government of India, at the Training Program on Urban Solid Waste Management To present an approach to overcome institutional challenges to the integration of informal sector micro-enterprises, which recover recyclables, into a formal waste management strategy so to reduce waste disposal and extend landfill life. Co-author and Co-Presenter
- ***Landfill Assessment and Organics Recovery Feasibility Study***, for WASTE Netherlands, to evaluate the current state of the Blagoevgrad, Bulgaria municipal landfill operation and assess the potential for landfill mining. Includes a future landfill design combined with feasibility study of diverting organic material to a composting alternative by the informal sector micro-enterprises already established to capture recyclables. Technical Specialist and Trainer.
- ***Solid Waste Rate Setting Analysis***, for the City of Keene, NH. To develop alternative solid waste and recycling collection scenarios that includes a full-cost accounting of capitalizing, managing and operating the solid waste collection and transfer system by the City as compared to bid prices being offered by private solid waste companies. A final report presented to the city council. Cost Analysis and Co-Author
- ***Incorporation of "Critical Teaching Skills" Into School Curricula on Waste Management and Recycling***, under a US EPA Education Grant and in conjunction with the New Hampshire Resource Recovery Association. To develop a four module curriculum for middle school students, including multiple exercises to introduce students to the concept of materials sustainability. Each exercise designed to utilize the two or more tenets central to the educational theory of *critical thinking skills*. Final document for distribution throughout the US EPA regions. Co-Author
- ***Facts About Septage Disposal***, for the NH Resource Recovery Association and funded under an EPA 205j grant. To create an outreach presentation, with associate training material, on the technical aspects of septage disposal options within the State of New Hampshire. Author
- ***Technical Site Assessment and Economic Analysis for an Institutional Food Waste Composting and Residue Transfer Station Facilities***, for the University of Massachusetts, Amherst, MA. To evaluate multiple locations for facility siting, including odor modeling, noise impact assessment and environmental impact analysis to neighbors, adjacent wetlands and natural resources. Project Manager and Field Researcher. (while at DSM Environmental)
- ***Grocery Store Sustainability***
In conjunction with Manomet Center for Conservation Science, overseeing a graduate student Collaborative Service Learning Project to develop training modules for *Level 2*, third party certification for supermarket sustainability; tasks include: developing webinar training modules, creation of FAQ sheets and development of appropriate social metrics to add to assessment scoring. Advisor
- ***Climate Data Initiative***
In conjunction with White House's Office of Science and Technology Policy, beta-test the *Climate Resilience Toolkit's* initial modules targeting coastal communities being impacted by sea-level rise and agricultural communities being impacted by drought. Qualitative data will be collected from local decision makers through a *facilitated community of practice* model. This information will inform NASA and NOAA designers on how to better structure the toolkit to drive local decisions about climate adaptation strategies.) Co-Director

1994 – 2004 (selected projects with DSM Environmental Services)

- ***Development of a Privatized Source-Separated Food Waste and Separate Biosolids In-vessel Composting Facility***, for the Town of Hanover, NH and Dartmouth College. Providing technical assistance for 25-ton-per-day facility design, permitting requirements, development of cash flow projections, debt/equity needs assessment and facilitating location of potential equity investors, construction management and assessment of first year of operation. Facility Co-designer, Air Treatment Biofilter Designer, Construction and Shake-out Operations Manager.
- ***Compost Facility Operator Training***, for Delaware's Department of Natural Resources and Environmental Control. Develop and deliver a multi-day training for current and potential compost facility operators throughout the state of Delaware. Curriculum included, the biology of composting, site assessment and design, compost pile formation, monitoring and management, assessing compost stability and marketing of compost. Author and Trainer.
- ***Field Test of the Biodegradability of Coated Paper Products***, under a grant from *The American Forest and Paper Association*. To conduct field trial so to ascertain how well coated milk cartons and coated paper, would decompose

through each stage of a three phase composting process utilizing an agitated bay, in-vessel composting system.
Research Designer and Data Analysis

- **Biodegradable Plastic Bag Field Research Pilot**, for Massachusetts Department of Environmental Protection and Marlborough, MA, in conjunction with Bedminster Bioconversion. To characterize collected MSW going to an in-vessel co-composting facility to ascertain film plastic weight (wet) in relationship to other waste stream components, both curbside field test for biodegradable bag integrity and in-situ tests at the facility to ascertain biodegradability. Research Designer, Field Researcher and Author. (while at DSM Environmental)
- **Materials Diversion Analysis for Dartmouth College's Food Services**, under a grant from the *American Forests and Paper Association*. To determine materials collection and diversion strategies from disposal, as well as assessment of internal procurement and operations to enhance waste minimization. This analysis included the net impact of biological demand to waste water streams from in-sink food disposals. Research Design, and Co-Author
- **"Jobs Through Recycling" Economic Development Demonstration Project**, under a two-year, US EPA funded effort to the Southwest Public Recycling Association, Tucson, AZ. To develop approaches to marshal local economic development resources and manufacturing technical assistance so to enhance manufacturing of products from recycled material within the states of Utah, Colorado, New Mexico and Arizona. Development of twelve demonstration manufacturing projects that enhance the diversion of secondary materials, employ more people and results in capital investment into the rural west/southwest region. All projects necessarily included stakeholder capacity building and proposal evaluation. Project Manager, Facilitator, Trainer
- **Waste Minimization Analysis** for *Deseret Industries* of the Church of Latter Day Saints. Analysis of materials handling process flow, facility activity foot print and in-put/out-put analysis so to develop alternatives methods for accepting and recovering materials. Associated return-on-investment analysis and staff training completed. Project Manager.
- **Flathead County, Montana - Solid Waste Management Plan Cost Analysis**, for the Flathead County Solid Waste Management District. To facilitate the development of acceptable alternative options for an integrated solid waste management system. Included a multi-scenario cost analysis, which was subsequently used to develop a solid waste rate-setting structure for the District. Project Manager, Researcher
- **Pollution Prevention Commercial Facility Assessments**, for Utah's Department of Environmental Quality. To develop model approaches for pollution prevention for the commercial sectors of printing, wood processing, and maintenance garage facilities. The analyses included an economic analysis of a return-on-investment for instituting any recommended changes in operational behavior, technology or purchases. Project Manager.
- **Recycling Reclamation Study**, for *Pikitup*, Johannesburg, South Africa's. To assess waste generation and composition, which includes commercial sector waste sorts; research of informal sector recycling infrastructure to ascertain how street and dump collectors can be integrated into the formal waste management system. Focus group research on willingness-to-participate in an expanded recycling effort and an economic analysis of collection and processing options. Field Researcher and Co-Author.
- **Strategic Plan for Pollution Prevention Intervention**, under Environmental Planning Grant from US Department Commerce for the Vermont Small Business Development Corporation. To facilitate development of a cooperative plan for the Vermont Manufacturing Extension Center, the Vermont Department of Environmental Conservation and the Small Business Development Corporation to provide environmental assistance to Vermont manufacturers to maximize energy and pollutant minimization. Co-facilitator.
- **Marine Operations Pollution Prevention Assessment**, for the US National Park Service, Lake Powell. To assess and propose changes in purchasing, equipment and standard operating procedures to minimize pollutants that could negatively impact lake waters. Project Manager.
- **Commercial Manufacturing Waste Minimization**, for all community economic development organizations in the greater New York City region. To develop and implement a "Train-the-Trainer" commercial waste minimization curriculum, using the garment industry as the training case study. Include a return-on-investment and cash flow analysis methodology. Project Manager, Trainer.
- **Ski Area Pollution Prevention Assessment**, for the Sundance Ski Area, Film Institute & Ranch in Provo, Utah. Conduct a site assessment, provide P² recommendations and conduct associated analysis of return-on-investment.

Subsequent training for staff including developing internal, accounting, communication and education systems.
Project Manager and Trainer

- **Hunts Point Food Distribution Center and Fulton Fish Market Organics Recovery Feasibility Study**, for the New York City Economic Development Authority and the New York Department of Sanitation. To determine generation rate and composition of market produce and fish waste streams, requesting and assessing industry responses for potential composting, anaerobic digestion and fertilizer production technologies, ranking potential sites for facilities and completing an economic analysis with associated alternative financing options. Technology Assessment and Field Researcher.

1989 – 1994 (selected projects with the Tellus Institute)

- **Multi-year MSW Urban Compost Development Project**, for the Indonesian Center for Policy Implementation Studies, in conjunction with the Harvard Institute of Economic Development. To develop an implementation model for informal sector recycling micro-enterprises to interface with the formal solid waste management system to develop marketable compost products. Including public sector planning support, micro-financing, development of a permanent school for compost operations and marketing; establishment of 5 pilot facilities, with subsequent economic analysis and compost market assessment. Technical Specialist, Trainer.
- **New York City Solid Waste Plan**, for the NYC Department of Sanitation, developed an analysis of generation, composition of residential and commercial waste streams. Developed an integrated approach to collection, transfer, processing and disposal. Supplemented this plan with a systems cost analysis for different scenarios of collection and facility mixes. Co-Project manager and Co-author
- **Economic Analysis of Future Solid Waste Management Options**, for the US National Park Service, Grand Canyon National Park. To evaluate options for diversion of park generated materials from disposal to recovery. Conduct an alternative costs analyses including collection, transfer and transport systems, which included scenarios where park personnel versus privatized companies provided components of the system management and operations. Project Manager and researcher
- **Development of WastePlan: A Computer Model for Full Cost Accounting for Integrated Waste Management Planning**, Provided cost-benefit analyses for local and regional solid waste planners. Use of *WastePlan* is necessarily coupled with local stakeholder capacity building so to determine both the choice of system components as well as subsequent scenario and sensitivity analyses. Co-designer, Multiple Projects' Researcher and/or Manager
- **Anaerobic Digestion Technology Assessment**, for the Rhode Island Solid Waste Management Corporation. To develop and evaluate responses for a request for qualification from North American and European MSW anaerobic digestion technologies. The technical assessment was coupled with an annualized net cost projection including capital, O&M and labor costs. Project manager and Author
- **Feasibility Analysis for Composting Riker's Island Prison Wastes**, for the NYC Department of Sanitation, developed an analysis of prison generated organic waste streams. Assessed the alternative modes of moving materials within the prison grounds, located appropriate composting site locations. Assisted in the development of the request for proposals from system vendors and evaluated and short-listed the proposals submitted. Project Manager and Author

1988 – 1989 (selected projects with E&A Associates)

- **Bench-Scale Composting Research on Bag Biodegradability**, for Archers Daniel Midland, Chicago, Illinois. To design bench-scale composter and methodology to test the biodegradability of cornstarch bags under controlled laboratory conditions. Subsequent institution of collection pilot to evaluate both curbside bag durability and degradability of bags through windrow-turn composting approach. Research Design, Field Research.
- **Compost System Design to Incorporate Grass**, for the City of Temple Terrace, Florida, design of a wet-season -- dry-season municipal scale composting methodology to accept large volumes of high-nitrogen grass waste. This was accompanied by a proposed curbside collection strategy and related cost analysis. Designer, Trainer and Author
- **Compost Operations and Marketing Manual for Rhode Island Communities**, for the Rhode Island Department of Environmental Management. To develop of facility operators' standard operating procedures for composting

municipally generated organic wastes, with this manual was a multi-day training curriculum initially tested in two Rhode Island communities. Author and Trainer.

1986 - 1988 (at Massachusetts Dept. of Environmental Quality Engineering)

- **Composting Plan for the Commonwealth of Massachusetts.** Develop a multi-year strategy for instituting compost projects throughout Massachusetts so to divert materials from disposal. Author.

- **Researching Potential Contaminants from Composting Leaves and Grass.** To research potential contaminants found in yard waste including percentage of non-degradable materials through a bulk curbside collection, the heavy metal content of the final compost and potential nitrogen leaching due to high rates of grass additions to the composting process. Research Design and Data Analysis

- **Education Strategy and Curriculum for Municipal Scale Composting.** To develop a two year composting training strategy to prepare communities to compost municipally generated yard waste in light of a proposed disposal ban on this material within the Commonwealth of Massachusetts Project Manager, Author and Co-Trainer

- **Recycling Plan for the Commonwealth of Massachusetts.** Massachusetts Department of Environmental Quality Engineering. Plan to recycle 25% of the Commonwealth's waste stream utilizing strategies for multi-material collection and institution of centralized materials recovery facilities (MRF). Co-author and Community Outreach.

- **Regulations for Composting of Organic Materials.** In conjunction with Massachusetts Department of Environmental Quality Engineering (DEQE) and Massachusetts Department of Food and Agriculture (DFA), develop the regulations for composting food waste, yard waste and agricultural waste within the Commonwealth of Massachusetts. Project Manager and Co-author