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Research Statement

Research Skills and Interest

I am an applied microeconomist, with a specialization in environmental and natural resource economics. My research skills and interests revolve around the broad issues of natural resource management and the economic valuations of environmental and ecosystem services at the local and global scales. My research also integrates theories and concepts from sustainable development and public policy into environmental modeling. My empirical research assimilates evidence from the theory- and data-driven process. I use various empirical approaches, such as statistical and econometric analysis, optimization theory, and system dynamics modeling, in my applied research. My broader research philosophy stems from my goal of developing a well-recognized research profile that embodies a uniquely concrete relevance, both in literature and decision making.

With the non-market attributes of environmental goods and services, the environmental damage containment attempts (e.g., local and global pollution, subsequent repercussions across extensive social and economic panorama) remain theoretically and practically challenging. A growing population and improved quality of life have resulted in mounting pressures on the exhaustible natural resources, coupled with elevated environmental footprints. Heterogeneity in the risks and opportunities with environmental and natural resource issues span across spatial confines. For instance, urbanization continues to generate newer dynamics, including unprecedented pressure on limited natural resources (e.g., urban water and energy crisis problems) and environmental quality (e.g., air and water quality issues in most large cities). Accessibility and ability to rejoice modern goods and services (e.g., modern energy services, piped water access) can be the challenges in rural areas, particularly in developing countries. Spatial diversity reflects the need for different theories and practices in dealing with such aspects. That is, the relevance of holistic approaches to identify appropriate economic policies and the empirical bearing to investigate the economic values of environmental and natural resource commodities continues to remain critical. Economic theories and methods provide a blend of rigorous techniques for related applied research. My research converges around such multi-faceted environmental and natural resources topics.

Dissertation

My dissertation examines the economic, environmental and policy aspects of the optimal management of natural resource and environmental services. The policy relevance, in a broader context of the interlinked nexus between the energy, water, agriculture, and environmental sectors, generates the motivation for my work. The core theme of my dissertation is interconnectedness, in terms of evaluating environmental policies and identifying alternative environment resilient policies. This resulted in three distinct chapters.

The first chapter (which is also my job market paper), entitled "Policy Effectiveness, Spatial Dependencies and Energy Market: Evidence from the Renewable Portfolio Standard" deals with the empirical evaluation of the Renewable Portfolio Standard (RPS) in the United States. The RPS is a state-level policy, which mandates electricity suppliers to include a certain fraction of renewable electricity in their total electricity sales over a specified time period. The chapter adopts the panel fixed effect and spatial econometric methods for annual data from 1990 to 2014 for 47 states. The results indicate that the impact of the RPS, while exhibiting spatial dependencies, varies by technology type. The RPS policy motivates renewable energy development for solar and wind technologies, while the impact is not significant for biomass and geothermal resources. The policy effectiveness for the relevant technologies implies that RPS policies can be more successful if they are tailored effectively to encompass the range of renewable technologies with a specific mandate for each of them.

My second chapter ("Dairy Manure Management and Renewable Energy Production: Evidence from New Mexico's Large Dairies") is an economic and environmental assessment to determine the best alternative dairy waste management approaches. This chapter uses a cost-benefit analysis and life cycle assessments by compiling and analyzing publicly available data. The results illustrate comparatively higher economic and environmental benefits from the integration of bioenergy production in the alternative waste management considerations.

The final chapter ("Demand Response in the Natural Gas Markets: A case of sectoral natural gas consumption in the United States") explores the temporal and spatial dynamics of sectoral natural gas demand in the United States. The panel fixed effect model is used to analyze monthly data for 2001 through 2015. The results explain the inter- and intra-sectoral movement of natural gas consumption across the United States, concerning the covariates.

Other Research Works and Experience

My previous research has covered a variety of economic, environmental and natural resource issues in both developed and developing country contexts. My referred research, entitled "Household Preferences for Cooking Fuels and Inter-fuel Substitutions: Unlocking the Modern Fuels in the Nepalese Household" examined the household preferences for cooking fuels. This inquiry was coupled with a policy analysis for transitioning towards modern fuel services in Nepal. This research found the forest sector institutions (forest ownership, distance to the forest) as significant factors in rearranging the fuel consumption bundles across households. In another peer-reviewed research ("Valuing Farm Access to Irrigation in Nepal: A Hedonic Pricing Model"), I investigated the non-market valuation of irrigation water access in rural Nepal. The results illustrated the critically important role of access to irrigation, coupled with multiple irrigation sources, in restoring rural wealth. I also studied the individual responsiveness of income to the demand for a variety of food attributes (i.e., micro- and macro-nutrients) in Nepal; this research is in 'Revise and Resubmit' at the Agricultural Economics. My other studies involved investigating the interlinked aspects and associated economic impacts from the energy, water, food and environmental goods and services.

The research training throughout my graduate studies provided me with the opportunity to explore and exploit a wide variety of data: micro, macro, experimental, qualitative and quantitative survey response, non-random, cross-sectional, panel, and time-series. My collaborative abilities and interests emerged from my extensive work with researchers from a variety of disciplines. I gained interdisciplinary collaborative experience working with teams of economists, hydrologists, engineers, sociologists and system dynamics modeling experts from many academic institutions, national laboratories, communities and government agencies on various funded projects to develop integrated models in the contexts of social and natural sciences nexus. I worked with a diverse research team to design, implement and analyze a household survey on energy, water and environmental issues in New Mexico.

Future Research Aspirations

Economic theory based environmental policy research is relevant to the growing concerns in environmental and natural resources management. The optimal management considerations are gaining momentum across the research and policy spectrums. I continue exploring the synergies and tradeoffs across the social, economic, environmental and natural resources sectors. More specifically, my near future plan is to consolidate my works on such dynamics in the energy, water, environmental and food sectors, while working to unveil new research frontiers in the interconnected areas.

Research in this area requires a thorough understanding of core economic theories, with a mastery of empirical techniques. A mix of extensive empirical tools (i.e., econometric, integrated optimization, experimental and system dynamics models) facilitates a groundwork with quantification and connections of relevant information to generate new knowledge. I continue expanding my skills of such diverse research tools rooted in economic theories. My goals of acquiring unique and useful data involves compilation from public sources, scholarly collaborations and self-collection (revealed and contingent valuations surveys). Development and deployment of robust research proposals to successfully procure external (and internal) research support tools are my major next steps in accomplishing the ambitious research goals.