

Daya Muralidharan

Department of Economics
University of California, Riverside
Riverside CA 92521
Phone: (951) 640-9825
Email: daya.muralidharan@email.ucr.edu

Placement Director: Prof. Susan Carter
(951) 827-1589 susan.carter@ucr.edu
Placement Coordinator: Gary Kuzas
(951) 827-1474 gary.kuzas@ucr.edu
Fax: (951) 827-5685

Education:

Ph.D.	University of California, Riverside (GPA: 3.9)	(March 2008)
M.A.	Gokhale Institute of Politics and Economics Pune, India.	June 2000
B.A.	The Ethiraj College for Women, University of Madras Chennai, India.	June 1998

Dissertation: *Microeconomics of water and forest management: spatial variability, dynamics, and credit availability*

Committee: Dr. Keith C. Knapp (*Chair*), Dr. Kurt A. Schwabe, Dr. Linda Fernandez, Dr. Aman Ullah

Major Fields: Environmental and Natural Resource Economics, Econometrics

Minor Field: Development Economics

Research Interests: Water Management, Sustainability, Deforestation, Natural Resource Use

Teaching Interests: Environmental Economics, Natural Resource Economics, Ecological Economics, Microeconomics, Econometrics

Research Experience:

- Graduate Student Researcher (UC, Riverside) Spring 2005, Fall 2007 – present
- Research Assistant (Gokhale Institute of Politics and Economics, Pune, India) Summer 2000

Teaching Experience:

- Instructor (UC, Riverside)
 - International Finance Summer 2004
 - Introduction to Environmental Economics Summer 2006
- Teaching Assistant (UC, Riverside) Fall 2001 – Spring 2006, Winter 2007
 - Introduction to Economics, Introduction to Microeconomics, Introduction to Macroeconomics, Introduction to Environmental Economics, Introductory Econometrics, Microeconomic Theory, Macroeconomic Theory, Natural Resource Economics, Research Methods in Business and Economics.

Publications:

“Judicial Reforms, Development, and India,” in *Essays in Development Economics*, Ira Athale, ed., Gokhale Institute Students’ Publications Series No. 1, Gokhale Institute of Politics and Economics, Pune, India, August 2000, pp 10-16.

Working Paper:

Spatial Dynamics of Water Management in Irrigated Agriculture, Daya Muralidharan and Keith C. Knapp

Work-In-Progress:

1. Impact of access to credit on forest resource use by *Orang Asli* in Peninsular Malaysia, Daya Muralidharan and Kurt A. Schwabe
2. Comparison of common property and optimal control in groundwater use decisions for Kern county, Daya Muralidharan and Keith C. Knapp

Conference Presentations:

1. ***Spatial Dynamics of Water Management in Irrigated Agriculture***
Daya Muralidharan and Keith C. Knapp
Poster Presentation, First Western Forum on Energy and Water Sustainability, Santa Barbara, CA, March 2007.
2. ***Spatial Dynamics of Water Management in Irrigated Agriculture***
Daya Muralidharan and Keith C. Knapp
9th Occasional Workshop in Environmental and Resource Economics, Santa Barbara, CA, November 2006.
3. ***Spatial Dynamics of Water Management in Irrigated Agriculture***
Daya Muralidharan and Keith C. Knapp
Economic Theory Seminar Series, Department of Economics, UC, Riverside, October 2006.

Referee:

Industrial Relations, June 2004.

Awards:

- *Outstanding Teaching Assistant*, Department of Economics, University of California, Riverside, 2005 – 2006.
- *Phi Beta Kappa International Scholarship Award*, Alpha Association of the Phi Beta Kappa Alumni in Southern California, 2005 – 2006.
- *Chancellor’s Distinguished Fellowship Award*, Department of Economics, University of California, Riverside, 2001 – 2005.
- *V.L. Ethiraj Scholarship*, The Ethiraj College for Women, Chennai, India, 1997 – 1998.
- *Dharmaprakasa Lokkur S. Venkaji Rao Medal*, First in B.A. Economics, The Ethiraj College for Women, Chennai, India, 1995 – 1998.
- *Seventh Rank in Economics*, University of Madras, India, 1995 – 1998.

References:

Dr. Keith C. Knapp
Department of Environmental Sciences
Cooperating Faculty, Department of Economics
University of California, Riverside, CA 92521
Phone: (951) 827-4195
E-mail: keith.knapp@ucr.edu

Dr. Kurt A. Schwabe
Department of Environmental Sciences
Cooperating Faculty, Department of Economics
University of California, Riverside, CA 92521
Phone: (951) 827-2361
E-mail: kurt.schwabe@ucr.edu

On sabbatical at
CSIRO Land and Water
Policy and Economic Research Unit
Urrbrae, SA 5064
Australia

Dr. Linda Fernandez
Department of Environmental Sciences
Cooperating Faculty, Department of Economics
University of California, Riverside, CA 92521
Phone: (951) 827-2955
E-mail: linda.fernandez@ucr.edu

Microeconomics of water and forest management: spatial variability, dynamics, and credit availability**Daya Muralidharan**

The ability of a dwindling natural resource base to meet society's ever-increasing demand has received much attention in the field of natural resource and environmental economics. Many if not most resources can provide a variety of services to society, and hence a better understanding of the value of each sort of service becomes imperative if one is concerned with efficient use of such resources. For instance, groundwater can be as a drinking water source or as an input into irrigated agricultural production; forest resources can be used as an input into pulp and paper production, or a source of income and livelihood for poor forest fringe communities. As most natural resources fall into the category of common property resources, the ability of the market, when left to its own devices, to allocate these resources to their highest valued uses is limited. This market failure is particularly compounded in developing countries, where poor resource management can have very deleterious effects on the standard of living of local populations. The optimal use of these resources also raises questions about inter-generational equity since current resource usage inevitably impacts future availabilities, if not in quantity then surely in quality. My research contributes to the growing body of literature that addresses these issues.

My dissertation comprises three core essays. A brief description of each follows:

Essay 1: Spatial Dynamics of Water Management in Irrigated Agriculture

Irrigated agriculture provides 40% of worldwide food supplies, but uses large amounts of scarce freshwater supplies and contributes to environmental degradation (nutrients, pesticides and salinity). At the very core of this problem lie decisions made by irrigators subject to biophysical relations. This research develops a microeconomic model of irrigation management taking into account the dynamics of plant growth over the season, spatial variability, and fundamental principles from subsurface hydrology. The production function is defined implicitly as a daily model of plant growth over the season. Non-uniformity (spatial variability) is introduced by assuming a lognormal spatial density function for water infiltration integrated over the field. Optimal water applications are obtained by maximizing profits subject to the various constraints.

The empirical component of the study uses cotton as the target crop. In general, the analysis shows that introducing spatial variability common to traditional irrigation systems increases applied irrigation water by 30% or more over profit-maximizing levels if spatial variability is ignored. Likewise, deep percolation flows are also greatly increased over the uniform case. As these flows contain pesticides, nutrients, and salts, accurately accounting for spatial variability becomes fundamental for both understanding how natural resource and environmental problems arise in irrigated agriculture as well as predicting grower response to various regulatory policies. The analysis finds relatively small costs in reducing deep percolation flows up to a certain level. Irrigation systems differ with respect to uniformity of water application. Changes in water use and profits are examined for different irrigation systems. More uniform systems result in lower water applications and deep percolation flows.

Essay 2: Comparison of common property and optimal control in groundwater use in Kern County

Groundwater comprises approximately 20% of the world's freshwater withdrawals, while in the United States it contributes to 42% of the water used in irrigation. The goal of this research is to compare common property and optimal control decisions for groundwater use in order to achieve sustainable use and management of groundwater resources. Parameters are estimated using Kern County data. The model incorporates multiple crops and irrigation systems. A running horizon dynamic optimization routine is used in the optimal case in order to correct for the terminal horizon problem. The analysis evaluates the impacts of changing energy prices on source control decisions (e.g., irrigation system choice, applied water rates, crop mix), and the impacts on groundwater quantity.

Essay 3: Relationship between credit and NTFP collection for the *Jah Hut* community in Peninsular Malaysia

It is estimated that nearly 80% of the developing world relies on non-timber forest products (NTFPs) for nutritional, health, and income needs. This includes about 60 million indigenous people who rely on forest resources as a form of alternate livelihood. For those who rely on forest resources in this manner, many alternate sources of reducing risk and smoothing consumption, including access to credit, are not readily available.

This paper examines how access to credit impacts natural resource use among 259 *Orang Asli* households from the *Jah Hut* community living on the margin of the Krau Forest Reserve in Peninsular Malaysia. A two-stage switching regression model is used in the analysis. In the first stage, a probit regression model is used to determine the factors that influence a household's (unobservable) excess demand for credit. In the second stage, we use separate regression equations to model NTFP collection decision of the two groups of households (credit constrained and non-constrained). The Inverse Mills Ratio is obtained from the first stage probit regressions and used in the second stage regressions to correct for any potential sample selection bias.