2011-12 Sustainability Science Fellows

Updated 3/12/11

The Sustainability Science Program is pleased to announce the 2011-12 Fellows. The cohort includes 8 post-docs, 6 mid-career research fellows, and 6 doctoral fellows, and has citizens from eleven countries: Bangladesh, Brazil, Bulgaria, Canada, China, India, Israel, Italy, Kenya, Peru, and USA.

Angelica Almeyda Zambrano
Giorgio Ruffolo Post-doctoral Fellow
Current position: Doctoral student
PhD, Anthropology, Stanford University (expected 2011)
Dissertation: The political ecology of forest conversion in the tri-national border of southwest Amazonia
SSP Project: *Spatio-temporal dynamics of human-environment interactions: Implications for effective implementation of REDD*

I propose to investigate the relationship between forest contributions to livelihood, other perceived values and carbon sequestration by smallholders within rural tropical landscapes. This topic remains unclear but is of critical importance for the successful implementation of forest based climate change mitigation strategies as such smallholders are potentially going to function as the principal agents within this climate change mitigation approach. In particular I focus on new payment for environmental service programs aiming to reduce emissions from deforestation and forest degradation (REDD). Such activities account for as much as 25% of all anthropogenic CO2 emissions. I will couple detailed socio-economic questionnaires and fine-scale spatial geographic information system data on human-forest interactions with multi-temporal land cover change analyses through Landsat imagery analysis. Spatial dynamics of human-forest interactions will be analyzed in the context of new forest structure and biomass maps available from airborne mapping methods fusing discrete LiDAR (Light Detection and Ranging) data with hyperspectral sensors. Results from this research will both improve existing theory on REDD while providing concrete data for integration within developing REDD proposals throughout Central and South America.
Faculty hosts: William Clark, Theodore Bestor

Liliana Botcheva-Andonova
Giorgio Ruffolo Mid-career Fellow (Fall only)
Current position: Associate Professor, Graduate Institute of International and Development Studies
PhD, Political Science, Harvard University (2001)
Dissertation: Transnational politics of the environment
SSP Project: *Entrepreneurs of governance innovation for sustainability*

Global problems such as climate change, loss of biodiversity, access to health, clean water and energy are characterized by unenviable complexity. Addressing such issues requires coordination across multiple jurisdiction and scales to manage the interplay between natural and social systems. As a consequence, intergovernmental action for sustainability has often been hindered by classic collective action problems associated with the coordination of large number of actors, distributive issues, temptation to free ride, short-term horizons and difficulty of assuring credible commitments. Along with intergovernmental efforts, a growing number of innovative, voluntary governance initiatives have emerged in response to global sustainability problems. This project proposes to examine the collective action logic of institutional innovation for sustainability, and in particular on the role governance entrepreneurs and sustainability knowledge in facilitating and diffusing such innovations. The theoretical perspective on entrepreneurship and conditions for innovation will inform a

systematic empirical study of the drivers, diffusion and impacts of governance innovations for clean energy and climate change.
Faculty hosts: William Clark, Merilee Grindle, Calestous Juma, John Ruggie

Eben Broadbent
Post-doctoral Fellow
Current position: Doctoral student
PhD, Biology, Stanford University (expected 2011)
Dissertation: Forest structure, disturbance and recovery: Linking field measurements, remote sensing and modeling at multiple scales
SSP project: *Optimization of tropical forest resource use across environmental gradients: Multi-scale analyses through waveform LiDAR and hyperspectral remote sensing*

This research addresses interactions between forest structure, specifically the three-dimensional distribution of photosynthetic biomass, with water and nutrient availability, seasonal climate differences and herbivory. While efforts have been made to understand the fundamental question of: "why are leaves located where they are?" advances have been limited by the difficulty of addressing questions at forest stand scales. Answers to this question require understanding abiotic factors located both above- and below-ground as well as biotic drivers. The Carnegie AToM (Airborne Taxonomic Mapping) system, to be launched spring 2011 and based at the Smithsonian Tropical Research Institute (STRI), provides a unique opportunity to address questions of forest resource use and efficiency at the forest stand scale and across environmental gradients. The AToMS integrates high fidelity hyperspectral imaging with full waveform laser imaging and range finding (LiDAR) sensors. Using this data I will develop new models to derive detailed leaf area density (LAD) profiles using waveform extinction rates and radiative transfer models. 3D maps of leaf area distribution will be coupled with detailed field measurements of foliar gas exchange and functional traits, including carbon and nitrogen isotopes, rates of herbivory, and soil fertility to gain insight into their feedbacks and interactions. This study will take advantage of naturally occurring gradients in soil fertility across Barro Colorado Island (BCI), a well established tropical research site located in central Panama, and the seasonal variation in diffuse/direct photosynthetic active radiation (PAR) and moisture availability to understand environmental factors modulating resource use. An improved knowledge of these interactions is crucial given the changing global climate, variation in tropical forest structure related to anthropogenic disturbance and regeneration, and the critical role of tropical forests in the global carbon cycles. This project is interdisciplinary, involving: ecophysiology, including gas exchange, functional traits, sap flow and herbivory; soil science, including soil fertility, water balance, and isotope patterns; and remote sensing, through the development of new approaches to model microclimate and forest productivity.
Faculty host: N. Michele Holbrook

Gabriel Chan
Giorgio Ruffolo Doctoral Fellow
Current position: Doctoral student
PhD, Public Policy, Harvard University (expected 2014)
Dissertation: Policy for high risk, high reward innovation in the U.S. energy sector
SSP Project: *High risk, high reward innovation grants, the case of ARPA-E*

Deployment of low-carbon technologies at relevant scale and in relevant time to stabilize atmospheric concentrations of greenhouse gases will require the acceleration of innovation in many sectors of the economy. My research will contribute to the academic literature on the economics and policy of technical change by identifying the causal mechanisms through which government policy affects the incentives for private innovators and private financiers of innovation in the energy sector. The applied question my research will address is how the government can more effectively stimulate innovation of the "breakthrough" technologies that have the biggest impact on sustainability. I also hope to shed light on the causal mechanism by which government policy can be leveraged to overcome barriers to investment due to uncertainty in feasibility, cost, and impact of technologies. My research agenda will begin by focusing on the Advanced Research Project Agency - Energy (ARPA-E), a government program funded for the first time in 2009 to stimulate high risk, high reward energy

innovation projects. Using quantitative social science methodologies and incorporating knowledge from the science and technology community, I will test the hypothesis that receiving an ARPA-E grant stimulates additional follow-on investment by private sector investors that would not have occurred otherwise. If this effect is large, my results would suggest that government grants redirect additional capital (beyond the awarded funding) to targeted firms, thus proving more effective in financing innovation than alternative policies that do no induce follow-on investment.
Faculty hosts: William Clark, Venkatesh Narayanamurti

Brian Dillon
Giorgio Ruffolo Doctoral Fellow
Current position: Doctoral student
PhD, Economics, Cornell University (expected 2011)
Dissertation: Production and investment under uncertainty: The measurement, estimation and analysis of subjective expectations
SSP Project: *Information, uncertainty and farmer choice: Evidence from two field projects in Tanzania*

The research treats as empirical issues the effects of perceived price and climate uncertainty on farmer choice, and the benefits of broad-based information services on a wide range of outcomes for the rural poor. Using a high frequency panel data set of Tanzanian cotton farmers' production choices and subjective expectations over price and climatic uncertainty, I model the effect of increasing uncertainty on input choices, output and earnings. By matching farmers' subjective assessments of recent rainfall patterns to Normalized Density Vegetation Index and rainfall data over the same period, I am able to directly value the effect of increased rainfall variability on the welfare of African farmers, without relying on assumptions about the expectations processes. I propose novel theoretical work on trade on networks, which provides testable hypotheses for a field experiment in rural Tanzania. Although the global spread of mobile telephony is perhaps the most rapid and ubiquitous instance of technology transfer in human history, I hypothesize that because mobile phones are not accompanied by a linked information source about other phone users, the benefits of proliferation accrue disproportionately to those with strong pre-existing networks. The field experiment involves the assembly and distribution of a business telephone directory to rural villagers. This intervention is accompanied by baseline and follow-up surveys to determine the effect on a wide range of outcomes. The key factor that distinguishes this from existing NGO services is that I make no attempt to control the content or direction of information flow.
Faculty hosts: Michael Kremer, Rohini Pande, Chris Barrett (joint with Cornell University)

Ram Fishman
Giorgio Ruffolo Post-doctoral Fellow
Current position: Doctoral student
PhD, Sustainable Development, Columbia University (expected 2011)
Dissertation: Heterogenous discounting and environmental policy
SSP Project: *Technology adoption for sustainable and efficient water use in Indian agriculture*

The excessive exploitation of groundwater is emerging as a worldwide problem, but it is nowhere as dramatic and consequential as it is in India. Lack of regulation, the tragedy of the commons, and the provision of subsidized energy for pumping (at flat, low rates) result in a vicious political-hydrological cycle of over-exploitation. Falling water tables across the country are now posing a grave threat to rural development and agricultural growth. Despite the growing scarcity, water and energy use efficiency in Indian agriculture is very low, and a key to a more sustainable irrigation economy is the adoption of efficient technologies and irrigation practices by the tens of millions of well-owners. Over the last year, I have been involved in the design of two pioneering field experiments on the means to trigger such adoption by addressing the two issues of collective action and the lack of marginal cost incentives. In the state of Gujarat, well owners will be compensated for voluntary reductions in energy use (from the associated savings by the government), creating a marginal opportunity cost on the use of energy (and thus water). In the state of Punjab, reductions in irrigation frequency by using a simple soil moisture probe are being promoted through an awareness campaign on social responsibility and groundwater, and using social networks and the leadership of prominent farmers. I propose to use randomized

evaluations of these two interventions to test their performance in terms of changes in irrigation practice, water tables, agricultural production and equity.
Faculty hosts: Michael Kremer, Venkatesh Narayanamurti, Rohini Pande

Erin Frey
Norberg-Bohm Doctoral Fellow
Current position: Doctoral student
PhD, Public Policy, Harvard University (expected 2015)
Dissertation: TBD
SSP Project: *Sustainable psychology: The cognitive determinants of environmental decisions, policies and behaviors*
Recent advances in psychology and neurosciences indicate that human judgment, decision-making, and behaviors are the products of interactions between at least two cognitive subsystems: an automatic system and a deliberate system. However, this general understanding of decision processes does little to explain how people make environmental decisions and how people choose to engage in (or not engage in) sustainable behaviors. Of vital importance to sustainability is the question of whether the dominance of one cognitive system leads to more sustainable decisions, behaviors, and outcomes. If so, can we structure decision situations in a way that takes advantage of these mental systems? I intend to investigate these questions through both laboratory and field experiments of environmental decision-making behavior. Specifically, I will study decision and judgment processes in simulated and real participatory environmental management settings in order to identify and understand the conditions that prompt sustainable decision-making for each cognitive subsystem.
Faculty host: William Clark

Tara Grillos
Giorgio Ruffolo Doctoral Fellow
Current position: Doctoral student
PhD, Public Policy, Harvard University (expected 2014)
Dissertation: TBD
SSP Project: *Beneficiary participation and development outcomes in water management projects*
This research explores the relationship between varying levels and methods of community participation and the effectiveness of development projects, particularly those related to water management. Participatory processes have received considerable attention in recent years among development practitioners, both as a form of empowerment and as a method for improving project outcomes. While such processes may hold some inherent value, there is as yet no clear consensus as to how participation affects outcomes. As these processes also incur costs, there are trade-offs implicit in the concept of beneficiary participation, which may be particularly significant in projects aimed at the provision of basic needs. Even if we implicitly accept the value of beneficiary participation in water provision, there remain the questions of what forms of participation and under what circumstances are appropriate. Resolving these issues could have important implications for improving the efficiency and efficacy of community development practice.
Faculty hosts: Ryan Sheely, William Clark, Richard Zeckhauser

Nazia Habib-Mintz
Giorgio Ruffolo Post-doctoral Fellow
Current position: Doctoral student
PhD, Development Economics, Cambridge University (expected 2011)
SSP Project: *Biofuels and biofoods: To what extent can genetically modified crops help with food, fuel and environment security?*
This research investigates the extent to which agricultural biotechnology can provide sustainable solutions to food and energy security in the context of climate change in developing countries. Genetically modified (GM) food, feed and biofuel crops are examined through comparative case studies of Tanzania, Bangladesh and Malaysia using a novel multidisciplinary framework. The question is to what extent the global market, national

regulatory framework and localized human agency are capable to move beyond contemporary uncertainty and transform food, fuel and environmental insecurity with the help agro-biotechnology? The intellectual contribution of this research project will be a rich analysis followed by policy proposals for each country. Another output is an open-source, user-friendly software to help policymakers visualize institutional strengths and weaknesses as they enter into the global GM value chain as a producer, supplier or consumer.
Faculty host: William Clark, Calestous Juma, Brian Heap (joint with Cambridge University)

Guangyou Hao
Giorgio Ruffolo Post-doctoral Fellow
Ph.D., Ecology, Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences (2009)
Ph.D., Biology, University of Miami (2010)
Dissertation: Water relations and carbon economy of hemiepiphytic and terrestrial Ficus species in Southwest China
SSP project: *Physiological basis for water and nitrogen use efficiency in grasses: Optimizing resource utilization at community and landscape scales for sustainability*

Water is one of the most important environmental factors influencing plant functioning and the productivity of ecosystems. This is particularly true of plants expressing C3 versus C4 photosynthetic pathways, which exhibit significant differences in water use efficiencies (Kocacinar and Sage 2003; Kocacinar and Sage 2004; Kocacinar et al. 2008). Due to the significant differences in physiology between C3 and C4 plants, global change impacts such as widespread aridification may favor C4 species over C3 species resulting in significant alterations to global ecosystems (Sage and Kubien 2003). Physiological studies comparing resource utilization of C3 and C4 species is thus critical for modeling long-term ecosystem dynamics under the influence of global environmental change. The grass family (Poaceae or Gramineae) contains about 4500 species with C4 grasses accounting for more than half of all known C4 species worldwide. Annual grassland, with a high diversity of small short-lived plants (both C3 and C4 grasses), is thus an attractive model system for studying global change impacts as mediated by photosynthetic pathways. By parameterizing ecosystem models for grasslands using data based on physiological studies, we will be able to look at the impact of different grasses on water and nitrogen cycles in both natural and human modified ecosystems. This study will permit a better assessment of potential impacts of global change on the functioning of grass dominated ecosystems as well as provide guidance for grassland management practices in arid and semi-arid regions.
Faculty host: Noel Michele Holbrook

Alicia Harley
Norberg-Bohm Doctoral Fellow
PhD, Public Policy, Harvard University (expected 2015)
Dissertation: TBA
SSP Project: *Technology transfer in agriculture and food systems for sustainable development*

This project explores the current debate surrounding global food systems, food security and agriculture development and tries to understand how the political, social and economic dynamics of technology transfer in food and agriculture systems impacts outcomes in the effectiveness of agriculture development schemes. The global food crises of 2007-2008 put food security and agriculture development back on the forefront of policy agendas within countries, international organizations, private industries and investment companies. As technical experts, international agencies, private companies and local governments scale up their investments into agriculture and food systems development, it is an opportune time to better understand the process of research and innovation as well as process of transfer from laboratory to field of these efforts. In the beginning phases of this study, I am exploring the process of technology transfer in agriculture development through an initial set of case studies. Through these case studies, I hope to identify a set of hypotheses that I can test in future research.
Faculty host: William Clark
Email: harley@post.harvard.edu

Daniele Lantagne
Giorgio Ruffolo Mid-career Fellow
Current position: Public Health Engineer, Centers for Disease Control and Prevention
PhD, Infectious Tropical Diseases, London School of Hygiene & Tropical Medicine (expected 2011)
Dissertation: Point-of-use water treatment in emergencies
SSP project: *Overcoming barriers to scaling up water treatment in developing countries*

Household water treatment options such as chlorination and filtration are proven to reduce diarrheal disease reduction and improve the microbiological quality of water quality, however, few examples of at-scale programming in developing countries. Current distribution and behavior change strategies have not been effective at achieving greater than 14% nationwide adoption without significant subsidies. This research is to identify and overcome barriers to scaling up water treatment in order to reduce morbidity and mortality associated with diarrheal disease incidence by investigating: 1) barriers to scale of existing HWT options, including, but not limited to: technical barriers, program replication, and quality control; and, 2) innovative models for scaling up water treatment, including community-based treatment options such as dispensers and in-line chlorinators. To fully realize the potential of household and community level water treatment, scaling up is required.
Faculty host: Michael Kremer

Robyn Meeks
Doctoral Fellow
Current position: Doctoral student
PhD, Public Policy, Harvard University (expected 2012)
Dissertation: TBD
SSP Projects: *Impacts of shared piped water systems in rural Kyrgyzstan* and
Economics of a light bulb: Experimental evidence on CFCs and end-use behavior in Peru
Robyn Meeks is primarily working on two projects during her time with the Sustainability Science Program. One uses a regression discontinuity design to investigate the impacts of shared piped water systems in rural Kyrgyzstan. Outcome measures include the incidence of water-related disease, health-related expenditures, and changes in household time use. This fills a gap in the existing literature by rigorously examining this type of infrastructure that is common through the decentralization of public services and can provide households with piped water at a much cheaper cost than providing individual household connections. The second project, which is in collaboration with fellow student, Eliana Carranza, is a randomized experiment to assess the purchase decisions and use of compact fluorescent light bulbs (CFLs). This project, which was piloted in Lima, Peru this past fall, uses an experimental design to better understand the willingness to pay for CFLs, impediments to take-up of energy efficient technologies, and behavior of households related to household lighting.
Faculty host: Rohini Pande

Francisco Mello
Giorgio Ruffolo Doctoral Fellow
Current position: Doctoral student
PhD, Center of Nuclear Energy on Agriculture, University of São Paulo (expected 2012)
Dissertation: Sugarcane production in Brazil: greenhouse gases emissions and bioenergy production
SSP Project: *Sugarcane production in Brazil: greenhouse gases emissions and bioenergy production*

Energy crops have expanded significantly in Brazil. Between 2000 and 2009 nearly three million hectares of sugar cane were incorporated into the existing production system, transforming it into the main source of renewable energy. It is estimated that another 11 million ha are necessary to achieve the Brazilian projections of production, consumption and exports of ethanol by 2020. Considering the greenhouse gases (GHG) balance, the use of sugar cane ethanol shows reductions of up to 80% when compared to fossil fuels. However, when direct

land use change (LUC) emissions are accounted, sugar cane expansion can promote the "carbon debt", transforming it from a mitigation agent to a GHG emission source. Concerns about expansion of energy crops over high carbon stocks areas, biodiversity and food land resulted in certification agencies for biofuel uses as a GHG mitigation agent. These factors can modify sugarcane expansion dynamics which occurs at a higher intensity over low productive pastures trough South-Center Brazil. Assessments of LUC impact on soil organic matter (SOM) can result in GHG emissions or even carbon sequestration as show several scientific studies. In this respect we can report that little efforts have been researched specifically to sugar cane production. Thus, the main objective of this research project is to assess the impacts of sugar cane cultivation on SOM and its results in GHG emissions, or carbon sequestration and also consider land use process to implement a life cycle assessment to sugarcane ethanol in Brazil.
Faculty hosts: Noel Michele Holbrook, Paul Moorcroft, Steve Wofsy, Anne Pringle

Ameet Morjaria
Doctoral Fellow
Current position: Giorgio Ruffolo Doctoral Fellow in Sustainability Science
PhD, Economics, London School of Economics (2010)
Dissertation: Empirical essays on Sub-Saharan Africa: natural resources, infrastructure and non-traditional agriculture
SSP project: *Is democracy detrimental for the environment in developing countries? Micro-evidence from Kenya*
Water resource degradation, climate change and deforestation are part of the core environmental agenda. Sustainable management of forests lies at the intersection of these issues. Forests provide global public goods as well as contribute to the local economy, via providing water supply. In the Kenyan context, the UN rates it as having one of the lowest natural water replenishment rates in the world and it is also vulnerable to rainfall variability classifying it as a chronically water-scarce country. This has large repercussions to the economy. In this research the wave of democratization which swept Sub-Saharan Africa in the 1990s is studied. In particular, after Kenya introduced democracy in 1992, deforestation in its closed canopy forests intensified. Under the constitution, forests are classified as government property and may have become a resource to vote-buy. The causal effect of the rise in political competition on deforestation is investigated. The introduction of democracy as a quasi-natural experiment is used. Pre- and post-1992 the same leader was in power and laws governing forest remained unchanged. A panel data set of forest cover at the constituency-year level is created by using remote sensing and GIS on Landsat satellite images from 1972-2007. To understand the mechanism, an assembled panel data set of government notices will inform the purpose of encroachment. Using empirical strategies on innovative data sources will lead to an evidence based recommendation for promoting sustainable use of natural resources in Kenya and beyond.
Faculty hosts: Rohini Pande, James Robinson, and Ryan Sheely

Andrew Mude
Giorgio Ruffolo Mid-career Fellow (Fall only)
Current position: Economist, Targeting and Innovations Theme, International Livestock Research Institute, Kenya
PhD, Economics, Cornell University (2006)
Dissertation: Catalyst or constraint? On the complex role of social capital in transitioning rural economies
SSP Project: *Investigating the impact of livestock insurance on herd management behaviour and the rangelands*
Index-based livestock insurance (IBLI) has recently been offered to the pastoralists of Northern Kenya as a promising solution to the problem of widespread drought-related livestock losses that renders the pastoral livelihood very vulnerable to climactic extremes. I plan to use rich panel data we collected as part of an impact evaluation study of IBLI to test how the provision of insurance may change herd management behaviour in terms of livestock holdings, herd distribution and spatial distribution and how this affects the condition of the rangelands. There are three credible hypotheses on the behavioural response to the introduction of IBLI that I propose to test; each with a different range ecology implication. 1. Indemnity payments may allow herds to regenerate faster and ultimately grow larger thereby intensifying pressure on grazing lands. 2. If herders

accumulate large herds and hold onto them even in the face of impending drought for the purpose of 'precautionary savings', then IBLI should negate the need to self-insure on the hoof. Pastoralists should then increase managed offtake, with herd sizes decreasing and grazing pressure reduced; the ecological resilience of the rangelands should therefore improve. 3. IBLI may increase herd sizes but given the apparent herd size threshold in migration, increased herds could induce increased migration and spatial redistribution of animals. The impact on grazing lands is unclear as increasing herds should intensify grazing but spreading animals across space better may reduce rangeland overexploitation.
Faculty hosts: William Clark, Shawn Cole

Annalidia Pansini
Giorgio Ruffolo Mid-career Fellow (Spring only)
Current position: Consultant, Department for Sustainable Development, Climate Change and Energy, Italy's Ministry for the Environment, Land and Sea
PhD, Business Management, University of Rome "La Sapienza" (expected 2013)
Dissertation: The legal entity of non profit organizations in the Italian legislative system
SSP Project: *The role of the renewable energy sources towards the establishment of a Euro-Mediterranean energy cooperation partnership: potential and regulatory framework*

The necessity to sustain the market development of clean energy technologies is clear both for European and Southern-Eastern Mediterranean Countries. Continuing "Business-As-Usual" policies will not result in a desirable energy future for the Region. In order to increase the renewable energy share in the energy production, rules have to become quite clear and reasonably favourable and the regulatory and institutional framework needs to be adequate. Such a strategy will also help to mitigate the effects of climate change in the area. The Mediterranean Region offers a suitable context to achieve this objective becoming a "taste-case" to implement a new "global approach" at regional scale. The European Union needs to strengthen energy cooperation with Neighbouring Regions (in the same way the United States cooperates within Asian Pacific Partnership) in order to share energy sources and infrastructures. To this end the research project is focused on the elaboration of an "Action Plan" on short and medium-term measures needed to strengthen the energy cooperation and support the development of a renewable energies market in the Mediterranean Region, including identification of "innovative" mechanisms to support investments and facilitate the technology and know-how transfer from North to South. The research pays a particular attention to Tunisia which is expected in the coming years, together with Morocco and Egypt, to reach the highest growth in renewable energies as a consequence of the favourable framework. The "taste-case" of this approach is an impacts analysis of the grid interconnection project between Italy and Tunisia.
Faculty hosts: Henry Lee, Meghan O'Sullivan

Salla Rantala
Fulbright Research Fellow
Current position: Consultant, Center for International Forestry Research
PhD, Tropical Silviculture, University of Helsinki (expected 2012)
Dissertation: TBA
SSP project: *Knowledge and boundary organizations in climate change policymaking: A policy networks analysis of the case of Tanzania*

This study aims to answer the question of how the work of boundary organizations could be improved to more effectively catalyze equitable policy processes and outcomes related to climate change and sustainable natural resource governance in the developing tropics. Reduced Emissions from Deforestation and Forest Degradation (REDD) is an increasingly supported mechanism for mitigating the threats of global climate change by halting tropical deforestation, one of the major sources of anthropogenic greenhouse gas emissions. At the same time, there is concern over the associated restrictions on multiple uses of forests and over the distribution of the considerable funds directed at REDD. The volume of scientific and policy debate concerning mechanisms to achieve effective, efficient and equitable REDD is growing by the day. As various countries are preparing their national REDD strategies, balancing different types of knowledge and interests at stake in REDD has become a primary, pressing challenge. The proposed study is based on the premise that the effectiveness, efficiency, and

equity outcomes of REDD national strategies are conditioned by existence of mechanisms to learn from research and Current policy experiences. Yet, the linear model of scientific knowledge production and application in policymaking is likely to be challenged in politicized
bargaining processes between the different actors involved, from forest-dependent communities to government organizations, civil society organizations, and international NGOs, all of which differ in their resources and capacity to influence policy outcomes. “Boundary organizations”—institutions at the interface of science and policy—have the potential to act as impartial brokers of information and to reduce power disparities between different policy actors, hence increasing the equity and legitimacy of policy processes and outcomes.
Faculty host: Bill Clark

Anant Sudarshan
Giorgio Ruffolo Post-doctoral Fellow
Current position: Doctoral student
PhD, Management Science and Engineering, Stanford University (expected 2011)
Dissertation: Deconstructing the `Rosenfeld Curve': Why is per capita energy consumption in California so low?
SSP Project: *Emissions trading in India*

Emissions trading has brought enormous gains in the United States by achieving environmental goals at low cost. The potential gains to emissions trading systems in developing countries are likely even greater, as recent evidence shows that the prevailing high levels of particulate matter in developing countries drastically shorten lifespans. Prof. Pande will discuss a study that will implement a pilot emissions trading system for local air pollutants in India and measure its effects on source-level emissions and abatement costs using a randomized-controlled trial. This rigorous design will provide extremely reliable estimates of the effects of the pilot trading scheme and help build public support for market-based environmental regulation. By increasing monitoring and transparency in a regulatory framework that fixes clear goals, emissions trading may also have benefits for the political economy of regulation. Finally, a robust trading scheme can attract climate change financing to developing countries by demonstrating reliable verification of total emissions.
Faculty hosts: Rohini Pande, Robert Stavins, Michael Greenstone (joint with Jameel Poverty Action Lab)

Annalisa Zezza Sorrentino
Giorgio Ruffolo Mid-career Fellow (Fall only)
Current position: Senior Researcher, National Institute of Agriculture Economics, Italy
PhD, Agricultural Economics, University of Naples (1987)
Dissertation: Product supply and factor demand in italian agriculture: A quantitative analysis
SSP Project: *Creating a sustainable market for biofuel production: The role of public and private standards*

The objective of proposed research project is to analyze the implication of the implementation of sustainability schemes for biofuels with the main focus on some governance issues. Setting standards for biofuels, as well as for other goods (as is the case for food safety standards), involves a specification of what outcomes should be achieved, setting rules on the production process, and implies a governance structure of certification and enforcement. The regulatory process of a sustainability standard requires public and private actions where public action is needed because of the presence of market failures in delivering the level of environmental and social impact required to satisfy public goals. The study will provide a comparative analysis of the two certification schemes on biofuels applied in the EU and in the US discussing some issues such as the problem of setting and enforcing the standards, issues related to success of the schemes, the potential competition with other related certification schemes. Analysis will address the role of public and private institutions in establishing and enforcing these systems. One of the key questions in this debate the relationship between private and social benefits and costs, and in particular distributional concerns, and the level of democracy in the dialogue between parties. Attention will then be dedicated to the emergence of new economic governance regimes, combining elements of markets, associations, hierarchies, and States or other more informal ones such as communities, networks and round tables.
Faculty hosts: Henry Lee