2001-2 BASIS CRSP Project Annual Activity Report
October 2002

I. **Research Project Title:** Rural Markets, Natural Capital and Dynamic Poverty Traps in East Africa

II. **Collaborating Institutions and Researchers:** **Cornell University** (Ithaca, NY): Dr. Chris Barrett(principal investigator), Dr. Larry Blume, Ms. Heidi Hogset, Dr. Bart Minten, Ms. Christine Moser, Mr. Andrew Mude, Dr. Ben Okumu, Dr. Alice Pell, Mr. Amare Teklu; **FOFIFA** (Antananarivo, Madagascar): Mr. Victor Rakotoniaina, Mr. Jean Claude Randrianarisoa, Dr. Jhon Rasambainarivo (co-principal investigator); **International Centre for Research in Agroforestry** (ICRAF, Nairobi, Kenya): Dr. Frank Place (co-principal investigator), Mr. Justine Wangila; **Kenya Agricultural Research Institute** (KARI, Nairobi, Kenya): Dr. Festus Murithi (co-principal investigator), Mr. Collins Obonyo, Mr. Martins Odendo, Ms. Judith Oduol, Mr. James Ouma; **University of Nairobi (Department of Agricultural Economics, Kabete Campus)**: Dr. Willis Oluoch-Kosura, Mr. Paswel Phiri.

III. **Project Dates:** October 1, 2001 – September 30, 2004

IV. **Support:** Core BASIS CRSP funding with matching funds from Cornell University and the Rockefeller Foundation. Supplemental funding (about $35,000 over the coming year) provided by the Rockefeller Foundation and by IDRC (Canada) to the University of Nairobi and by USAID-Madagascar's Ilo project with Cornell for qualitative research and training, and (about $1.688 million over five years) by the National Science Foundation's Biocomplexity in the Environment special competition on the Dynamics of Coupled Natural and Human Systems to Cornell University and ICRAF for biophysical research in three of the Kenya sites and more in depth bioeconomic systems modeling.

V. **Program Overview:** One fifth of the world's population lives on less than a dollar a day, and most of those ultra-poor live in rural areas and work in agriculture. So the poorest populations in the world rely disproportionately on the natural resource base on which agricultural productivity depends. Recent empirical studies using longitudinal data find that a disturbingly large share of these people suffers chronic rather than transitory poverty. Many appear trapped in a state of perpetual food insecurity and vulnerability because their poverty and poor market access preclude efficient investment in or use of productive assets.

Furthermore, those caught in a poverty trap may have strong incentives to degrade natural resources, particularly the lands they cultivate and graze, in the course of their ongoing struggle to survive. Partly as a consequence, nearly two-fifths of the world's agricultural land is seriously degraded and the figure is

highest and growing in poor areas such as Central America and Sub-Saharan Africa. Such degradation exacerbates pre-existing poverty traps, by discouraging capital-strapped smallholders from investing in maintaining, much less improving, the natural resource base on which their and their children's future livelihoods depend. The resulting degradation of the local agroecosystem further lowers agricultural labor productivity, aggravating the structural poverty trap from which smallholders cannot easily escape. These problems feature prominently today in Kenya and Madagascar and in discussions among policy makers, donors, and NGOs as to how best to design poverty reduction strategies.

The project "Rural Markets, Natural Capital and Dynamic Poverty Traps in East Africa," is being undertaken in collaboration with FOFIFA in Madagascar and with KARI, ICRAF and the University of Nairobi in Kenya with the goal of identifying best-bet strategies to help smallholders escape the interrelated problems of dynamic poverty traps and on-farm natural resource depletion. Degradation of soils and access to factor and product markets are the primary foci. Empirical analysis, based on panel data collection and follow-on qualitative (oral history and ethnographic) field work in seven sites, five in Kenya and two in Madagascar, and context-driven simulation modeling will be used to determine the incidence, severity and causal linkages behind poverty traps, as well as to identify the most promising approaches to reducing the incidence and severity of chronic poverty, especially in ways that support agricultural productivity growth and repletion of degraded soils.

The project is engaging in active discussions with policy makers involved in the Poverty Reduction Strategy Program (PRSP) processes in each country, with the most senior levels of the agricultural research communities in each country, and with local communities about practical, science-based strategies for improving access to productive inputs (including soil nutrients) and markets necessary for poor people to be able to improve their livelihoods over time.

VI. **Discussion of Annual Activities:**

A. Specific Activities Undertaken and Related Accomplishments:

1. Household-Level Panel Data Collection (McPeak, Ouma, Oduol, Rasambainarivo, Randrianarisoa, Rakotoniaina, Hogset, Murithi, Place, Wangila, Teklu, Barrett and Okumu): The project work plan called for a new round of household surveys at each of the project's six planned sites, building on pre-existing data to create or expand panel data sets to be used in subsequent project analysis of welfare and resource dynamics. Questionnaires were designed and pre-tested, enumerators trained, and new survey work successfully launched in all sites. At the close of the project year, survey work had concluded and data entry and cleaning was continuing in our Baringo and Marsabit sites in northern Kenya (30 households each) and in our Fianarantsoa and Vakinankaratra sites in

Madagascar (123 and 315 households, respectively). The final module of the survey was in the field in our central and western Kenya sites (due to the timing of harvest following the long rains season).

2. Qualitative Field Work (Oluoch-Kosura, Murithi, Place, Rasambainarivo, Rakotoniaina, Barrett, McPeak): Initial meetings with stakeholders in 2001 highlighted the need to complement the planned quantitative analysis with increased qualitative social science analysis in order to understand better the processes involved in inhibiting or promoting improvements in rural households' welfare and the potentially complex relationships between welfare dynamics and those of soils and other natural capital possessed by rural households. We therefore sought and secured additional funding necessary to undertake qualitative research at community and household levels to complement the survey-based research taking place in six of the project's field sites: Dirib Gumbo (Marsabit), Embu, Madzu (Vihiga), and Ngambo (Baringo) in Kenya and Fianarantsoa and the Vakinankaratra in Madagascar. In Kenya, this work is supported by supplementary grants from IDRC (Canada) and the Rockefeller Foundation to the University of Nairobi, in collaboration with ICRAF and KARI. In Madagascar, this work is supported by Cornell University's Ilo project funded by USAID-Madagascar. The basic design of the qualitative work follows the "sequential mixing" design of integrated qualitative-quantitative poverty analysis, and is described in the general terms of reference reproduced in Appendix 1 to this work plan, around which experienced rural sociologists or anthropologists are being recruited early in FY2003. The field researchers will conduct focus group interviews, followed by in depth case studies/oral histories of households selected from the poverty transition matrices computed from the panel data. This design requires that this social analysis take place following the completion of panel data collection, entry and cleaning in each site and the production by the rest of the BASIS team of the transition matrices necessary for doing the household-level oral histories.

3. Development of Crop, Livestock and Soils in Smallholder Economic Systems (CLASSES) Model (Okumu, Barrett, Blume): A first, conceptual version of the bioeconomic modeling tool was developed using VENSIM systems dynamics software. Parameterization and calibration of the model are FY2003 tasks, but the basic architecture of the model is now in place. This involved regular, extensive meetings within the team and with modelers in related agricultural sciences at Cornell and Wageningen (Netherlands).

4. Bioeconomic Modeling Course, Two-Day Introductory Session and Web Site (Okumu, Barrett, Blume, Rasambainarivo, Rakotoniaina, Randrianarisoa, Wangila, Obonyo, Odendo, Ouma, Phiri, Oduol, Oluoch-

Kosura): The project considers the non-degree training activities of equal importance to degree training. Professional staff at the national agricultural research institutes in each country have had little or no prior training in methods for the analysis of the coupled dynamics of human and natural systems. We have therefore invested heavily in training key staff in FOFIFA and KARI in our new bioeconomic modeling tool, the CLASSES model, in order that they can subsequently help refine the CLASSES model, who can use it for ex ante impact assessment of new technologies or policies at their home institutions, and who can subsequently help train others in use of the CLASSES tool (i.e., training the trainers). The bioeconomic modeling course began during the 2001-2 project year with a 2-day introduction module, held on the ICRAF campus in Nairobi in June, and the subsequent launching of web-based instruction (http://afsnrm.aem.cornell.edu/Bioecon/). This was attended by nine students plus Professor Oluoch-Kosura. Dr. Okumu was the lead instructor, with Barrett lecturing one morning and backstopping Okumu. The project work plan called for training two scientists each from FOFIFA and KARI, but we have managed to cut costs and train three from each institution. This course has also drawn considerable demand from others. The two-week session in Ithaca in October-November 2002, will include three students fully funded by non-BASIS funds, one paid by ICRAF, one from the University of Nairobi on a grant from the Rockefeller Foundation, and one from the USAID-Madagascar Landscapes Development Initiative (LDI). There have been widespread expressions of interest in the course. At least three other scientists in Madagascar (one with LDI and two with the Université d'Antananarivo) attempted to raise the funds necessary to participate in the Ithaca course. The restricted-access course web site, developed in June, has been actively used by enrolled students and a few others who have been authorized access. A course description is attached as appendix 2 and student evaluation of the two-day program in Nairobi is attached as appendix 3.

5. Degree Training (Mude, Hogset, Moser, Teklu, Phiri, Barrett, Oluoch-Kosura): The work plan called for Ph.D. training of one Kenyan (Andrew Mude). Through co-financing from host institutions and other projects, we were able to help support training for five Ph.D. candidates this year. Andrew Mude (Kenya) was mostly funded by BASIS (with co-funding from Cornell) in the Cornell Economics program. Heidi Hogset (Norway) and Christine Moser (USA), both Agricultural Economics Ph.D. candidates at Cornell, were funded for part of the summer by BASIS for work in Kenya and Madagascar, respectively (with co-funding from Cornell). Amare Teklu (Ethiopia), a Ph.D. candidate in Natural Resources at Cornell, received logistical and field data collection support from BASIS, although he was wholly funded from other sources. Finally, the project supported the field

research of Paswel Phiri (Kenya), an Agricultural Economics Ph.D. candidate at the University of Nairobi under the direction of Professor Willis Oluoch-Kosura.

6. Post doctoral training (Okumu, Barrett): Dr. Ben Okumu, the post-doctoral researcher on the BASIS project, is training in empirical methods while playing a lead role in the bioeconomic modeling component of the project. Barrett supervises Okumu's training, which included field visits to Kenya and Madagascar, leading the development of the CLASSES bioeconomic modeling tool and the associated bioeconomic modeling course, preparation of a manuscript submitted to a journal, and presentation at the annual meetings of the American Agricultural Economics Association.

7. Stakeholder Consultations (Place, Murithi, Okumu, Barrett, Obonyo, Ouma, Oduol, Odendo, Minten, McPeak: A national level stakeholder meeting was convened at the University of Nairobi in late November 2001, drawing representatives from the government of Kenya, other research institutions, and various stakeholder groups with an interest in the project. A lively discussion ensued which helped considerably in revising our field work, bioeconomic modeling and outreach strategies in Kenya. A community level stakeholder meeting was held soon thereafter in western Kenya the Maseno Regional Research Centre, at which the project's objectives and methods were likewise presented to and commented upon by local policy groups. The results of these meetings are written up in a report by Frank Place. Stakeholder consultations were held in Embu and Pekerra through the Regional Research Centres in those places, and in the Fianarantsoa and Vakinankaratra sites in August. The purposes of all these stakeholder consultations were to brief them on the purpose and design of the project and to elicit feedback on key concerns and appropriate modalities for communicating results back to end-users. Political turmoil in Madagascar disrupted the scheduled community and national-level stakeholder meetings in early February. Consultations were held with USAID-Kenya and USAID-REDSO in November, January and June, and with USAID-Madagascar in December and May (the latter by telephone with USAID-Madagascar staff evacuated to Washington).

8. Field Visits (Barrett, Mude, Hogset, Okumu): Nov-Dec Okumu trip, Jan-Feb Barrett trip, May-Jul Hogset trip, Jun Barrett and Okumu trips. Okumu traveled to Kenya and Madagascar in November-December 2001 to (i) participate in the national level and western Kenya stakeholders meetings aimed at getting input from a wide range of individuals and institutions in the Kenyan government, local communities and other research groups; (ii) gathering secondary data necessary to parameterize and calibrate the

biophysical components of the CLASSES model; (iii) work with BASIS team members in both Kenya and Madagascar on survey design and methods necessary to recover the welfare and resource dynamics of interest and to insure comparability between data from the different sites.

Mude then traveled to Kenya in December-January to work with BASIS team members on data collection and analysis in the northern Kenya sites, including assembly of a code book and survey description.

Barrett traveled to Kenya in January to convene a Kenya team meeting to discuss data collection and analysis issues and to meet with stakeholders at KARI, USAID-Kenya, USAID-REDSO, ICRAF and other groups. USAID BASIS CTO Lena Heron joined Barrett in Nairobi for some of these meetings. Heron and Barrett planned to travel to Madagascar for national and community-level stakeholder meetings and a Madagascar team meeting. Political turmoil in the country closed the airport, however, and resulted in a travel ban by USAID. So Barrett and Heron had to return to the US earlier than planned.

Hogset spent a bit more than six weeks in the field in Kenya, in our Embu, Baringo and Vihiga field sites, helping KARI-Embu with survey preparations and doing exploratory field site visits for her dissertation work in conjunction with BASIS on social networks, technology adoption and poverty traps in rural Kenya.

9. Policy Briefs (entire team): The workplan called for the release of three briefs in FY02. We only released one, albeit with both English and French language versions. We began preparation of two others in the fourth quarter, but they will not be completed and released until the first quarter of FY03.

10. Project Team Meeting: A team project meeting was held in June, 2002, in Kakamega, near the project's western Kenya sites, to discuss data collection and analysis issues across the various sites, to present the bioeconomic modeling training and work, and to agree on a detailed outreach plan for the coming year. Two team members from Madagascar were able to attend in spite of the ongoing political turmoil there. The Deputy Director of the Kenya Agricultural Research Institute, Dr. Ephraim Mukisira, attended the first day of the team meeting.

B. <u>Additional Activities Not Anticipated in the Work Plan:</u>

1. **Addition of Madzu site (Phiri, Oluoch-Kosura, Place)**: Through the efforts of Oluoch-Kosura, Phiri and Place, the project was able to add a site in western Kenya (Madzu, Vihiga District) in which the University of Nairobi had collected detailed household survey data in 1989 under a World Bank project. The project team managed to track down 89% of the

respondent households 13 years later, creating an unusual low frequency (and low attrition rate) panel data set that will be available early in the coming project year.

2. **Presentation at USAID-Washington (Barrett)**: At the invitation of USAID BASIS CTO Lena Heron, Chris Barrett presented a seminar on the project at USAID-Washington on March 19, 2002, which was subsequently written up and published in the Administrator's weekly newsletter.

C. Problems and Issues: The main problems faced in FY2002 concerned (i) previously unrecognized weaknesses in the existing data set for Embu on which we planned on building and (ii) the political crisis in Madagascar, which caused USAID to impose a travel ban on the country. The Embu data problem necessitated significant revisiting of our objectives and field research strategy in Embu, which delayed the commencement of data collection from March to September. This has set us back about six months in the field work in Embu and reduces our capacity to undertake the full range of welfare dynamics analysis in that one site prior to year three of the project. The political crisis in Madagascar forced the postponement of the community and national-level policymakers workshops scheduled for early February and of the field data collection scheduled for March. The Madagascar team met with the Cornell and Kenya teams in June to work out details on the survey in spite of the crisis. Community level stakeholder meetings were held and data collection began in August, shortly after the political crisis lifted and as road trafficability and fuel availability began to improve considerably in the countryside. Because national policymaker attention is presently focused on post-crisis recovery, we did not convene a new national-level workshop.

VII. Collaboration With Other Projects: In Kenya, we have strong links to three other USAID-funded projects and to a new National Science Foundation research project We share our Baringo and Marsabit sites with the USAID Global Livestock CRSP Pastoral Risk Management (PARIMA) project. PARIMA has enabled us to leverage data collection in our northern Kenya sites significantly, to our mutual benefit, as BASIS funding enabled expanded thematic coverage of the households being surveyed under PARIMA. The BASIS project on "Building Assets for Sustainable Recovery and Food Security" (PI: Peter Little) also works in this same Baringo site. We keep each other informed on efforts there and cooperate in data collection and interpretation. The new USAID Strategies and Analyses for Growth with Access (SAGA) cooperative agreement includes Kenya as a core country in exploring "bottom-up" approaches to growth with access. The consortium of Kenyan collaborators under SAGA includes each of the major economic research institutes in the country (IPAR, KIPPRA and Tegemeo)) and are heavily represented in the KRDS and PRSP advisory processes in the government. The SAGA program in Kenya is pursuing two interrelated projects

that link nicely to our BASIS project, "Reducing Risk and Vulnerability in Rural Kenya" and "Empowering the Rural Poor", and coordination has been explicit between BASIS and SAGA. Our project is most closely linked in Kenya with our team's new 5-year $1.7 million National Science Foundation biocomplexity grant entitled "Homeostasis and Degradation in Fragile Tropical Agroecosystems." The NSF project augments the BASIS social science research with in depth biophysical field research and modeling in our Baringo, Embu, and Vihiga sites to pursue frontier modeling of complex dynamic systems. This project began September 1, 2002, and will involve extensive biophysical field research over four-plus years with involvement of leading animal, atmospheric and soil scientists in addition to sociologists and economists. The NSF project also involves four Kenyan Ph.D. candidates – a GIS specialist, two soil scientists and a rural sociologist - whose programs at Cornell are funded under the Rockefeller Foundation's African Food Security and Natural Resources Management program at Cornell and complement the BASIS project, especially in our Baringo and Vihiga sites. This adds considerable capacity in understanding processes of ecological degradation, squarely addressing one of the concerns raised by the Board.

Our project is also closely linked with two other projects directed by ICRAF. One is a DFID funded project on assessing the impact of agricultural research on the poor, coordinated by IFPRI, with ICRAF directing the case study work in western Kenya, in our Siaya and Vihiga sites. ICRAF has another related DFID-funded project, on Voices of Poor Livestock Farmers in the greater Lake Victoria basin, which likewise includes our western Kenya sites. One of the Rockefeller Foundation Ph.D. fellows at Cornell did extensive fieldwork with that project in Vihiga this past summer.

Linkages to other projects are likewise extremely strong in Madagascar. Cornell is now in the final year of a substantial policy analysis and capacity building project (the Ilo project) funded by USAID-Madagascar. BASIS team member Bart Minten is the Ilo project chief of party in Antananarivo and Barrett, Moser and Randrianarisoa are actively involved in the research under that project. Cornell is also a part of USAID-Madagascar's Landscapes Development Initiative (LDI) project run by Chemonics International, and Madagascar is (like Kenya) one of the seven core countries under the USAID/Washington SAGA cooperative agreement. These projects share complementary interests, in the case of Ilo and SAGA, in welfare dynamics and public policy and in the case of LDI in sustainable agricultural systems for smallholder producers. Ilo has helped fund the social analysis component of BASIS' data collection, while LDI and Ilo have both contributed background data to BASIS analysis of poverty traps and rice technology adoption. SAGA will help integrate BASIS findings into a broader policy dialogue about Madagascar's poverty reduction strategies and into training of economic researchers in the country.

Finally, our BASIS project has been closely linked to initiatives of the Rockefeller Foundation and USAID/AFR/SD in the past year. The Rockefeller Foundation asked Barrett to organize and host a global experts' meeting on "Markets and Policy for Increased Access and Incomes in Rural Africa", held at Cornell University, January 7-8, 2002. This meeting was aimed at guiding the design of a major new Rockefeller Foundation initiative on "Markets to Raise Incomes of Poor Farmers" in Africa and involved BASIS Board of Directors Chair Kanbur, two BASIS PIs (Barrett and Little), and project team members Okumu, Oluoch-Kosura and Moser (BASIS Director Carter was invited but unable to attend) and 14 others from Africa, Europe and the United States. BASIS had considerable input into the design of this new initiative, which was approved by the Foundation's Board this spring. The other major initiative influenced by this BASIS project was the *Nature, Wealth and Power* strategy document released by USAID/AFR/SD for the World Summit on Sustainable Development in Johannesburg in August 2002. Barrett and Moser were invited to coauthor the economics component of *Nature, Wealth and Power* and to participate actively in the discussions that shaped the final content. *Nature, Wealth and Power* is AFR/SD's summary statement of lessons learned about sustainable development in rural Africa, has been widely distributed worldwide, and will be the topic of a major public forum November 15, 2002, featuring the heads of both EGAT and Africa Bureaus.

VIII. Outputs

1. BASIS Publications Series: This year we published one policy brief, with versions in both English and French:
    a. "Poverty Traps and Resource Degradation",BASIS Brief Number 6, January 2002, by Christopher B. Barrett, Lawrence E. Blume, John G. McPeak, Bart Minten, Festus Murithi, Bernard N. Okumu, Alice Pell, Frank Place, Jean Claude Randrianarisoa, and Jhon Rasambainarivo, 4 pages.
    b. "Le piège de pauvreté et la dégradation des resources", BASIS Brief Numéro 6-F, par Christopher B. Barrett, Lawrence E. Blume, John G. McPeak, Bart Minten, Festus Murithi, Bernard N. Okumu, Alice Pell, Frank Place, Jean Claude Randrianarisoa, and Jhon Rasambainarivo, 4 pages.

2. Other Print Outputs: In FY2002, the project produced five trip reports, chapters, articles, workshop presentations, trip reports, proposals, etc. (NRMAA), January memo from CBB, Justine memo on GPS

    a. Okumu, B.N., "International Trip Report: Kenya and Madagascar, 17 November – 20 December 2001", 17 pages.

b. Place, F., "BASIS CRSP Poverty Traps Project Summary of Discussions with Stakeholders in Kenya, 26 November – 4 December 2001," 13 pages.
c. Barrett, C.B., "Thoughts on data collection and analysis", 22 January 2002, 12 pages. (Discussion of methods of analysis of welfare and resource dynamics and the implications for data collection design and methods.)
d. Mude, A.G., "International Trip Report: Kenya, 8 December 2001 – 21 January 2002", 2 pages.
e. Barrett, C.B., "International Trip Report: Kenya and Madagascar, 26 January – 4 February 2002", 12 pages.
f. Barrett, C.B., "International Trip Report: Kenya, 3-19 June 2002," 28 pages.
g. Hogset, H., "Diary From Pre-Dissertation Field Visit to Kenya, May 18 – July 1, 2002," 14 pages.
h. J. Wangila, "Global Positioning System (GPS) Data collection in the BASIS CRSP 'Dynamic Poverty Traps' Research Project", August 2002, 6 pages. (Discussion of methods and relevance of GPS measurement to survey data collection efforts.)
i. B.N. Okumu, N. Russell, M.A. Jabbar, D. Colman, M A Mohamed Saleem and J. Pender, "Technology And Policy Impacts On Economic Performance, Nutrient Flows and Soil Erosion At Watershed Level: The Case of Ginchi in Ethiopia," August 2002, submitted to *World Bank Economic Review*.
j. Moser, C.M., "Les limites du systeme de riziculture intensif et les leçons apprises pour la promotion de technologies agricoles a Madagascar", Cahier d'études et de recherches en economie et sciences sociales, no. 4, FOFIFA, August 2002, 25 pages. (Report on the limits to adoption of the system of rice intensification and lessons learned for agricultural technology promotion in Madagascar. Research sponsored by USAID-Madagascar projects Ilo and LDI, by the Cornell International Institute for Food, Agriculture and Development and by the BASIS CRSP).
k. Ouma, J.O., J. Oduol and F.M.Murithi, "Briefing Report on Embu survey, July-August 2002", 2 pages.
l. Moser, C.M. and C.B. Barrett, "The Complex Dynamics of Smallholder Technology Adoption: The Case of SRI in Madagascar," August 2002, pending submission to *American Journal of Agricultural Economics.*

3. Non-Print Outputs: The project launched a substantial web site, ran a two-day short course on bioeconomic modeling, initiated a web-based extension

of the bioeconomic modeling course, and made three presentations at conferences and seminars.

a. B.N. Okumu presentation of "Applications Of System Dynamics To Modeling Poverty Traps And Land Degradation in East Africa" in organized symposium on " Research Applications of System Dynamics in Agricultural Economics" at the annual meetings of the American Agricultural Economics Association, August 2002, Long Beach, CA.
b. C.M. Moser presentation of "The Complex Dynamics of Smallholder Technology Adoption: The Case of SRI in Madagascar," as selected paper at the annual meetings of the American Agricultural Economics Association, August 2002, Long Beach, CA.
c. Two day bioeconomic modeling short course held at ICRAF Headquarters, Nairobi, Kenya, attended by ten persons plus instructors Ben Okumu (lead instructor) and Chris Barrett. See Appendix 2 for a program description and Appendix 3 for student evaluation results.
d. BASIS CRSP Project Web Site: A project web site was established at Cornell, containing project publications, presentations, photographs, participants' listings, information on the bioeconomic modeling course, and links to other relevant sites. A separate, restricted-access web site was established for the bioeconomic modeling course. From the creation of the site in May through September 30, the course web site had 728 hits from 18 users (the course instruction staff, the nine students enrolled and other students authorized to use the web site). This includes 150 hits from Kenya and 166 hits from Madagascar. Additional authorized users include two students from Ethiopia (one at the University of Wisconsin-Madison, one a visitor at Cornell).
e. Barrett presented a brown bag seminar on the BASIS CRSP project to USAID-Washington on March 19, 2002.

IX. **Key Findings and Results**: The project has just completed its first year, one devoted to data collection and stakeholder consultations. So it is too early to have established many findings. We can offer some preliminary, suggestive evidence that seems material to the issues on which this project is focused.

a. **Education** appears tremendously important to escaping poverty traps, for multiple reasons. First, secondary school completion -- better, a university degree – appears necessary, albeit by no means sufficient, to obtain stable, remunerative non-farm employment. In areas where farm or herd sizes are shrinking due to land scarcity, one needs an alternate pathway to livelihood security. Educational attainment is strongly correlated with both the level and stability of expenditures in our northern Kenya sites. Nonfarm employment enabled by education

also provides steady cash income that can be invested in profitable agricultural intensification. It also provides a superior alternative to unskilled farm labor for households lacking sufficient land or livestock to fully employ their household's labor. We find evidence of these relations repeatedly: in semi-arid and arid sites in northern Kenya, where the educated build up their herds; in central and western Kenya, where education is strongly, positively correlated with adoption of dairy cattle and use of mineral fertilizers; and in Madagascar, where education is positively correlated with capacity to invest in and propensity to adopt improved rice cultivation practices. Financing education is a serious constraint, however, especially in the wake of policy reforms aimed at "cost recovery" in education. In western Kenya, for example, secondary level school fees have increased tenfold in the past 13 years, to more than 200% of the average annual income of households in the poorest quartile. We find as well that although households espouse interhousehold transfers and loans to pay for education, remarkably little such informal financing of education takes place.

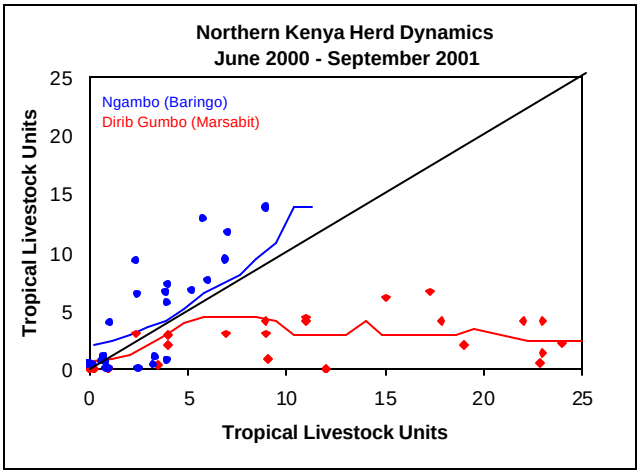
b. **Output market structure** has a profound effect on input market access and resulting welfare dynamics where seasonal financing constraints arise due to imperfect rural financial markets. Vertically integrated systems wherein the processor contracts forward for sale of a commodity, providing key inputs (e.g., mineral fertilizer, improved seed, tea bushes) on credit, extension advice, and sometimes even invests in local road improvements, enable small farmers to transition to more remunerative livelihoods involving high value commodities. These farms appear to exhibit greater improvements in soil quality and in household income than households that do not take advantage of such opportunities. There seem to be other, positive spillover benefits for other subsectors as well due to improved soil quality, improved road infrastructure and increased farmer experience with marketing. For example, road improvements increase dairy farmers' abililty to transport milk to the selling points during the rainy season.

A fascinating difference exists between tea and coffee in post-liberalization central Kenya. It seems that the credit-in-kind system of input provision has broken down considerably in coffee now that the parastatal no longer has legal monopsony power, while the need to process tea leaves quickly creates a sort of natural monopsony for local tea processing plants, so that the input provision (seasonal-credit-in-kind) system remains in place, helping tea farmers to obtain and use fertilizers and to thereby keep productivity and soil quality up. Farmers who have the ability have shifted from coffee to dairy and

horticultural production (e.g. tomatoes, kales, or fruits such as bananas and mangoes). However, there remains a high proportion of coffee farmers who have not been able to shift to other enterprises, probably due to the initial cash investment required and lack of the necessary know-how. Similar seasonal credit-in-kind schemes exist with the Kenya Tea Development Authority and private sugar companies in western Kenya and with barley, wheat and dairy production under contract farming schemes with processors in the Vakinankaratra region of Madagascar's central highlands.

c. **Size matters** to farmers' ability to take advantage of emerging opportunities for agricultural commercialization. Processors look for reasonably large consignments so as to reduce contracting and other transactions costs. Larger farmers therefore enjoy better access to vertically integrated markets in high value tea, dairy and sugar production in central and western Kenya and in high value barley, wheat, dairy and fruit production in Madagascar's central highlands. In the sites with good market access (Vakinankaratra, Embu, Baringo), we see a positive correlation between farm size, the range of agricultural enterprises undertaken, and farm profitability. In the Vakinankaratra and in central and western Kenya, those households that have been able to invest in dairy cattle have been able to use the steady cash income to purchase more inputs, hire labor as needed on a timely basis, and have enjoyed productivity benefits due to increased nutrient content and organic matter in the soils, which has been especially beneficial for high value horticultural products.

d. **Resource access** is key in places where crucial inputs cannot be obtained through markets. In the extensive grazing systems of northern Kenya, we find markedly different herd dynamics between our Baringo and Marsabit sites. In Baringo (Ngambo), year-round availability of surface water from the Pekerra River, the Pekerra irrigation scheme, and Lake Baringo and the swamps along its shores reduces households' need to migrate in search of forage and water for their livestock. In Marsabit (Dirib Gumbo), Boran herders live on the northern slopes of Marsabit mountain and thus need to



migrate seasonally to lowlands where their herds can find forage and water. In 2000-1, they were unable to negotiate access to grazing areas and watering points, or even rights of way through the lands of neighboring, hostile ethnic groups. As a consequence, they suffered massive herd die-offs. The Ngambo and Dirib Gumbo sites had similar rainfall over the period, but as the accompanying graphic shows, they experienced quite different wealth dynamics, with the Baringo herds growing, on average, and the Marsabit herds falling sharply.

X. Photos, Illustrations, or Other Graphics: Under separate cover, the project is submitting photos from its annual team meeting in Kakamega, Kenya. The following pages also include a few digital photos from our Baringo and Vihiga sites in Kenya.

Two young boys playing outside their home in Ngambo Location, Baringo District, Kenya (photo by Chris Barrett)

School children gathered in the courtyard of Labor Primary School, Ngambo Location, Baringo District, Kenya (photo by Chris Barrett)

Young girl standing on the edge of her grandfather's tea fields in Madzu Location, Vihiga District, Kenya (photo by Chris Barrett)

Retired school headmaster describing his profitable investment in tea cultivation in Madzu Location, Vihiga District, Kenya (photo by Chris Barrett)

Appendix 1

Social Aspects of Dynamic Poverty Traps: Complementary Studies to Survey Analysis

General Terms of Reference

Background

Cornell University, the International Centre for Research in Agroforestry (ICRAF), the Kenya Agricultural Research Institute (KARI) the University of Nairobi (UoN), and FOFIFA of Madagascar have recently been funded by the Broadening Access and Strengthening of Input Systems (BASIS) Collaborative Research Support Program (CRSP) of USAID to undertake a study of rural poverty traps in East Africa. The research intends to build on existing quantitative datasets to undertake econometric analyses of the determinants of poverty traps and to build simulation models to assess the impacts of alternative technological and policy interventions on alleviating poverty. Initial meetings with stakeholders and potential clients have highlighted the need for increased social analysis in order to understand better the processes involved in inhibiting or promoting welfare enhancement by rural households.

The project has secured additional funding necessary to undertake qualitative research at community and household levels to complement the survey-based research taking place in six of the project's field sites: Dirib Gumbo (Marsabit), Embu, Madzu (Vihiga), and Ngambo (Baringo) in Kenya and Fianarantsoa and the Vakinankaratra in Madagascar. In Kenya, this work is supported by supplementary grants from IDRC (Canada) and the Rockefeller Foundation to ICRAF and the University of Nairobi, respectively. In Madagascar, this work is supported by Cornell University's Ilo project from USAID-Madagascar.

Objectives

The principle objectives of this social component of the project are:
1. To characterize, identify, and analyze dynamic poverty processes using social and historical methods, with particular attention being given to the effects of shocks on welfare dynamics and the relationship between natural resources management practices, changes in natural capital (soils, forests, water) and human welfare dynamics.
2. To identify existing and potential strategies for households to escape from poverty traps and to understand the constraints in employing them.

These objectives are highly similar to those in the rest of the BASIS project, contributing both to the understanding of poverty traps and the simulation of the impacts of potential beneficial interventions.

Activities

The activities will involve qualitative techniques, beginning with focus group consultations to understand the range of important concepts related to poverty processes. This will be followed by case studies of selected households to construct social-historical profiles of distinct household types and by key informant interviews to corroborate and expand upon key issues and details emerging from the focus group and household interviews. The data to be analyzed include that on household livelihoods, vulnerability to economic and health risks (including HIV-AIDS), risk coping mechanisms, management of assets, investment strategies, gender relations, social capital and networks, natural resources management practices (especially regarding soil fertility and soil and water conservation) and the role of off-farm activities. Particular attention will be paid to understanding the historical context that underpin household strategies to improve their welfare. Following preliminary analyses of the case studies, focus group consultations will once again be held to discuss analyses and confirm the opportunities and limitations of strategies for poverty reduction.

(1) The work in each community should begin with community-level focus group interviews. Questions to be asked include, but should not be limited to:

- What defines poverty in this community and what are therefore the best indicators as to who is poor? Where does the poverty line lie in this community? The objective of this particular line of questioning is to establish local conceptualizations of poverty, identify appropriate variables measured in the surveys and the threshold point(s) at which one transitions from being poor to not poor. Then do a wealth ranking to establish which households are poor and nonpoor (as a check against the survey-generated transition matrix).
- Do you think a greater, smaller or the same share of people in this community live in poverty today as compared to ten years ago? Why? Twenty years ago? Why?
- Are poor people treated better, worse, or the same by others in the community relative to how they were treated ten years ago? Why? Twenty years ago? Why?
- Do you think a greater, smaller or the same share of people in this community are wealthy today as compared to ten years ago? Why? Twenty years ago? Why?
- In the past, how did the poor escape poverty, or did they escape it at all? Are those strategies still accessible to the poor here today? If not, why not? Have new strategies become available in the past ten years for the poor for escape poverty?
- When people become poor today, does it take them less time, more time, or about the same to pull themselves out of poverty? Why?
- What are the primary risks that threaten to cast people who are not poor presently into poverty? Have these risks changed over the past ten or twenty years?
- What mechanisms exist for avoiding these risks before one suffers a shock? Have these changed in availability or effectiveness over the past ten or twenty years? Who has access to these risk avoidance mechanisms?
- What methods exist to cope with shocks after they occur? Have these changed in availability or effectiveness over the past ten or twenty years? Who has access to these risk coping strategies?
- How have land use patterns changed over the past ten years? Why? What effect, if any, has this had on agricultural production patterns (crop choice, cultivation practices and productivity)? What effect, if any, has this had on livestock production patterns (species choice, husbandry methods, and productivity)?
- What are the most popular natural resources management practices today? Why? Has this changed over the past ten to twenty years? If so, why? Are there past practices that were effective but that are no longer feasible or desirable for some households? Explain.
- What sort of informal self-help, marketing, credit, natural resources management or other such groups exist in the community? How do these originate? Who can participate in the group(s), who cannot and why?
- What sort of formal self-help, marketing, credit, natural resources management or other such groups exist in the community? How do these originate, in particular did these arise within the community independent of outside interventions or were they created or encouraged or even financially supported by an outside development agency? Who can participate in the group(s), who cannot and why? Which ones have been effective, which have not, and why? Which groups previously existed but have disbanded (especially if they disbanded due to failure) and why?

(2) The second activity, following the community-level focus group discussions, is household-specific interviews to explore household-specific histories of welfare and NRM dynamics. Two households are to be selected from each of the four cells of the transition matrix to be constructed from the project survey data prior to the start of the qualitative work. That is, select two households from the "poor before, poor now" category, two from the "poor before, not poor now" group, two from the "not poor before, but poor now" cell, and finally get two households from the "not poor before or now" group. There's no need for random sampling. Select households with whom you feel you can get good and truthful information that will help explain the quantitative data, offer key insights on the root causes of poverty traps or paths out of poverty, or both. Ask the same questions as found for the community-level focus group interviews, but now with an emphasis on the respondent household. Emphasize, however, the following household-specific questions.

- Have you ever been poor?
    - If yes, what caused you to be or become poor? Were most of your clan or neighbors in a similar situation or was your situation different from others'?
    - If yes, were you able to climb out of poverty?
        - If yes, how long did it take you to climb out of poverty? How did you do it? What were the essential opportunities or forms of assistance you had? Were others in similar circumstances able to climb out of poverty faster or slower than you and why?
        - If no, how long have you been poor? Were others in similar circumstances able to climb out of poverty and why or why not?
    - If no, how have you managed to avoid becoming poor? What have been the key strategies, opportunities, or forms of assistance that have enabled you to stay out of poverty?

(3) Finally, interview key informants (local elders, extension agents, agricultural traders, mission or development group officials) to check into the answers given in the household-level and community-focus group interviews. A key objective in the key informant interviews is to get a sense of what interventions have been tried in an area previously, which were successful, which might have proved successful with a slightly different design or management (and explain what changes would have been necessary), and which were failures from which one can learn.

The local investigators will be provided with a camera for use, either a borrowed digital camera or a disposable camera. They are to take photos of all respondent households under activity 2 and of focus group meetings under activity 1.

Outputs

The outputs of this activity will consist of two written products. The first is a detailed report on each site describing the social dimensions of poverty processes at household and community level, with explicit attention given to whether welfare dynamics relate to changing natural resource conditions and, if so, how. These outputs will subsequently be synthesized across the project sites in Kenya and Madagascar in collaboration with the BASIS project leaders. The outputs of this activity will also have important intermediate impacts on the project's econometric and computer simulation work.

The second output, from activity (2), the household-level oral histories, will be a brief (1-2 page) narrative on a single family from each site in the style of the *Voices* series put out by the CGIAR's Alternatives to Slash and Burn (ASB) program (copies of which are available through ICRAF).

Timeline

The social analysis will take place following the completion of the quantitative surveys in each site and the production by the rest of the BASIS team of the transition matrices necessary for doing the household-level oral histories. In most sites, this will be November 2002 – March 2003. A report will be written by the team and submitted to Cornell, ICRAF, KARI, FOFIFA and the University of Nairobi by May 15, 2003.

Budget

To be established separately for each site.

Appendix 2

BIO-ECONOMIC MODELING COURSE

Cornell University Dept. of Applied Economics and Management in conjunction with USAID BASIS CRSP project "Rural Markets, Natural Capital and Dynamic Poverty Traps in East Africa"

Course description

This course is being offered for scientists at FOFIFA, ICRAF and KARI who have responsibilities for policy and technology analysis. Students will be trained in principles of systems dynamics analysis, and in the design and use of the Crop, Livestock and Soils in Smallholder Economic Systems (CLASSES) integrated bioeconomic model of east African rural systems dynamics being developed under the USAID BASIS CRSP project "Rural Markets, Natural Capital and Dynamic Poverty Traps in East Africa." The course consists of two sessions of classical instruction – a two-day session in Kenya in June 2002 followed by a two-week session in the United States in October 2002 – and electronic consultation between the students and course staff prior to and following the first session, culminating in each student's design, calibration, validation and sensitivity analysis of a variant of the CLASSES model. Students will be provided with their own copies of two core texts and a license for the VENSIM software used in the course.

Course outline

TWO DAY COURSE IN NAIROBI (June 2002)

Day 1

1. Basic principles of system dynamics
2. Review of system dynamic models and their application
3. Introduction to system dynamics simulation software

Day 2

4. Review of basic mathematical concepts
5. Units of measurement and their importance in building meaningful models
6. Experimentation and building of simple simulation models

TWO WEEK COURSE AT CORNELL (October 2002)

Week 1

1. Day 1: Introduction to the CLASSES bio-economic model - (structure and content)
2. Day 2: Building a simple bio-economic model
3. Days 3, 4, and 5: Adding behavioral and interdisciplinary features to the simple model, incorporating the human decision making component

Week 2

1. Days 1 to 2: Review of Course material covered in Week 1. Students embark on and complete a bio-economic modeling project
2. Day 3: Evaluation and discussion of individual modeling projects
3. Day 4: Model testing, calibration and validation. Running sensitivity analyses
4. Day 5: Conclusion of the course and award of certificates

COURSE OBJECTIVES

The objectives of this course are to:

- Impart skills to students that will enable effective use and modification of the integrated bio-economic CLASSES model for policy analysis. These skills will enhance students' understanding of how the structure of rural systems affects system performance in the wake of various interventions, equip students to adapt the model structure in order to simulate unique features of their specific environment, and facilitate more accurate and sophisticated ex ante impact assessment.
- Stimulate systems thinking by the students in order for them to better appreciate the complexity of most systems that arise not from the complex subunits but rather from their intricate linkages. Such systems thinking helps policy analysts anticipate how interventions in one part of a complex system commonly result in responses from the other parts of the system, thereby helping to mitigate undesirable unanticipated consequences of policy and project interventions.

COURSE REQUIREMENTS

Students must possess

a) a minimum of a bachelors degree in agricultural science, biology, statistics, mathematics, or social sciences (economics, sociology, anthropology etc.), with significant post-degree research experience. A masters degree is strongly preferred.
b) strong quantitative and analytical skills
c) proficiency in English (all instruction and applications are in English)
d) significant experience with quantitative microcomputer applications such as spreadsheets, relational databases, econometric or mathematical programming packages, or basic computer programming languages (e.g., C+, BASIC, FORTRAN).
e) experience in policy simulation and management of agricultural systems is highly desirable but not prerequisite.

COURSE STAFF:

Dr. Bernard N. Okumu, (lead instructor)
Dr. Christopher B. Barrett (project director)
Dr. Lawrence E. Blume

DETAILED SYLLABUS

TWO DAY INTRODUCTORY SESSION IN NAIROBI, KENYA

Day	Morning topics	Afternoon topics and homework assignments	Readings
1	1. A highlight of the system dynamics concepts, debates and evolution. Their usefulness and application to real life problems 2. Understanding patterns of growth, the law of unintended consequences and counterintuitive behaviour of social systems 3. Causes of policy resistance 4. Why simulation is essential 5. Principles and steps for successful use of system dynamics	1. Common modes of behaviour in dynamic systems (exponential, goal seeking, S-shaped growth, oscillation, growth overshoot and collapse) 2. Understanding the forces behind common modes of behaviour Attempt exercises in Ford Ch. 1 p 12. No. 1,2 and 3 Challenges in Sterman Ch. 1- 4	- Ford Ch. 1, 2 and 3; - Sterman Ch. 1, 2, 3 and 4; (Students would be expected to have read and comprehended these chapters prior to attending the course)
2	1. Introduction to system dynamics simulation software 2. Review of mathematical concepts 3. Incorporating units of measurement	1. Demonstration of system dynamics modeling package 2. Designing and running of simple system dynamics models Undertake model building exercises in Ford chapters 3 and 4 and follow up examples in the system dynamics software user manual.	- Ford appendix A & B - System Dynamics simulation software manual - Sterman appendix A

TWO WEEK SESSION IN ITHACA, NEW YORK, USA

Day	Morning topics and discussion	Afternoon topics and homework assignments	Further Readings
Mon	1. Introduction to bio-economic models - structure and art of formulation 2. Illustration of the	Exercises in problem articulation, hypothesis formulation and defining model boundaries based on model objective(s) or	1. Relevant examples from the Ford text 2. Sterman Ch.3 parts 3.4 to 3.6

	CLASSES bio-economic model especially integration of various disciplinary components 3. Key steps in building bio-economic models	purpose (use Sterman tables 3-1 and 3-2 on page 86 and 97 respectfully as reference)	
Tue	1. Building a simple bio-economic model with a few stocks, flows and feedback loops 2. Introducing the dynamics of growth inherent in the CLASSES model both linear and nonlinear and using both analytical and numerical approaches	1. Experimentation with different types of causal loops and nonlinear relationships based on exercises and material in Sterman Chs. 4 and 8 (S-shaped, exponential and oscillatory growth patterns) 2. Application of knowledge gained so far in modeling or adding behavioral features to the simple bio-economic model built earlier on in class	1. Sterman chs. 4, 8 and 14 2 Also refer to figure 7-6 in Sterman 3 Ford ch. 4 (Modeling the Mono lake basin), ch. 15 (The Kaibab deer population) 4 Read the CLASSES model documentation material
Wed	1. Expanding the simple model to include fairly complex, disciplinary based biophysical components of the system (e.g. fertilizer, manure) – crop yield response functions, herd dynamics, animal mobility, animal nutrition, soil erosion and HIV epidemic issues etc.	1. Attempts to model the static version of the CNCPS model, the EPIC (erosion potential impact calculator) or the USLE (universal soil loss equation) model and the SIR model(i.e. susceptible population, infectious population and the recovered population model)	1. CNCPS documentation material 2. Printouts of relevant soil, animal science and human health material 3. Sterman ch. 9 sections 9.2 more specifically 9.2.7
Thur	1. Introducing the human decision making procedures (bounded rationality), delays, market structures and the conditioning economic, social and policy environments 2. Introducing human response to risk and uncertainty	1. Group discussions to come up with observed human behavior in specific localities 2. Attempt to model such human behaviors 3. Optional: attempt Sterman exercises/ challenges in ch. 13 4. Attempt ch. 15 challenge on policy design in the market growth model parts 1, 2, 3 and 4.	1. Sterman ch. 13: - Finding formulation flaws - Goal formation with external and internal inputs - Modeling floating goals - Resource allocation 2. Sterman ch. 15: - Modeling habit, routines and rules of thumb in human decision making processes 3. CLASSES model documentation material on human decisions

Fri	Review course material covered so far Hand out of project topic and material for the following week	1. Revision of topics not well understood by most or some of the students	Read project material for the area to be modeled Review material already covered in the course
Sat - Sun	(Cultural visit, shopping, etc)		
Mon - Wed	Hands on class project begins for the next three days Students are allowed to ask questions and seek help as they see fit . Further review of problem areas may be done in the course of the project period	1. Students given further references based on their specific areas of need	Relevant chapters in Sterman and Ford as well as documented material on existing bio-economic models
Thurs	-Collection and evaluation of each individual's project model - Students are given another chance to firm up on areas of interest	1. Students with persistent problems are given extra tutorials	- Reference to selective reading material based on individual needs
Fri	Model testing, calibration and validation Sensitivity analysis and wrap up and consolidation of the training course Agree on areas for further follow up when away from Cornell	1. General discussion with students on their modeling experience and on how they would benefit further from the course through distance learning	
Sat	Conclusion of the course	Award of certificates	

Appendix 3
June Bio-Economic Modelling Short Course Evaluation Summaries

Q 1. Would you consider your background in statistics/ maths coming into this course…

- Unsatisfactory?	0%	(0)
- Barely satisfactory?	0%	(0)
- Satisfactory?	75%	(6)
- More than satisfactory?	25%	(2)
-		

Q2. Would you consider your background in policy analysis coming into this course…

- Unsatisfactory?	0	(0)
- Barely satisfactory?	12.5%	(1)
- Satisfactory?	75 %	(6)
- More than satisfactory?	12.5%	(1)
-		

Q3. Are you taking this course because …

- It is required by your employer?	12.5%	(1 out of 8)
- Want to learn the subject?	100%	(8 out of 8)
- Heard it was a good course?	0%	(0 out of 8)
-		

Q4. What portion of the assigned readings did you do?

- All (100%)	0 %	(0)
- Most (75 – 100%)	0 %	(0)
- More than half (50 – 75%)	50 %	(4)
- Less than half (0 – 50%)	50 %	(4)
-		

Q5. What portion of the lectures did you attend?

- Almost all (90 –100%)	100%	(8)
- Most (75-90%)		
- More than half (50-75%)		
- Less than half (0 –50%)		
-		

Q6. Has the material covered in this course so far been…

- too complex to understand?		
- Complex but can grasp with home study?	75%	(6)
- Straightforward with home study	25%	(2)
- Too easy?		
-		

Q7. Are we covering material in this course…

- too slowly to keep you interested?	12.5%	(1)
- A bit more slowly than you would like?	37.5%	(3)
- Quickly but you can keep up?	50%	(4)
- Too quickly to keep up	0%	(0)

Q8. What balance of in – class activities would best facilitate your learning this material? Please recognize that checking more for some activity requires checking less for another

	More	Stay Same	Less
Review of concepts from readings[1]	50% (4)	25% (2)	12.5% (1)
Discussion of real-world applications	100% (8)		
Solving problems from text [2]	75% (6)	12.5% (2)	0%

[1] One respondent did not check any of the choices
[2] One respondent did not check any of the choices

Q9. Do you find the discussion of concepts and methods in class…

- Clear 100% (8 out of 8)
- Well paced 12.5% (1 out of 8)
- Too slow 0% (0 out of 8)
- Too abstract 0% (0 out of 8)
- Just about right 0% (0 out of 8)
- Confusing 0% (0 out of 8)
- Too quick
- Insufficiently participative
- Over simplified
-

Q 10. If you have made use of any other material, person(s) outside this course, have you found them useful? [3]

- Haven't consulted any person(s) and or material outside this course 62.5% (5)
- Not very helpful
- Modestly helpful 12.5% (1)
- Very helpful 12.5% (1)

Q 11. Overall, are you finding this course…

- Challenging and useful 100% (8)
- Challenging and not very useful
- Easy but still useful
- Neither challenging nor useful

Q12. Overall, how would you rate the quality of this course design, materials and instruction? (Poor = 1, Excellent = 10)

	Mean rating
Course structure	8.0
Text	9.0
Non text readings study guide	9.0
Instruction	9.0
Instructor availability	10.0

COMMENTS ON ANY ASPECT OF THIS COURSE:

1. Too Compact, spread the course out to three days

2. Time is not enough for practices. I need more exercises and I will keep contact with trainers. I need that trainers send us all their presentation. It is helpful to us. Thank you so much

[3] One respondent filled a N/A perhaps to imply that use of outside material was not applicable i.e. the first option in question 10