



**Land Tenure Center Spring Forum**  
**“Designing Pro-poor Rewards for Ecosystem Services<sup>1</sup>”**

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<sup>1</sup> See also the forum website for selected presentations, papers, audio files and biographies:  
<http://www.nelson.wisc.edu/ltc/springforum.htm>

## Keynote

## Lisa Naughton, Director, Land Tenure Center

We are here to discuss the promise of RES/PES to give economic value to natural ecosystems, enhance livelihoods, and spur stewardship of natural ecosystems. However, these strategies present problems, particularly where land tenure is insecure or where the rules governing resource use are particularly complex. We will face these issues over the next two days.

We will...

- Try to learn just how direct incentives are being used and adapted to local socioeconomic conditions.
- Try to learn from the lengthy history of strategies in North America. We want to be better able to discern from which context direct incentive approaches may be most effective and to identify research/training priorities to determine how these efforts can be most effective.
- Learn where these projects are working well.

About the Land Tenure Center (LTC):

- We've been working for over 40 years on issues of resource access and trying to understand the nexus between tenure, property rights, and economic development.
- Three years ago, the Land Tenure Center moved into the Nelson Institute and began to focus on environmental outcomes as part of research on governance.

Thank you to donors:

- USAID-TransLinks: a 5-year consortium effort led by Dr. David Wilkie from WCS delving into issues of poverty and PES.
- CABS-LTC Partnership: The LTC is delighted to have a partnership with Conservation International's Center for Applied Biodiversity Sciences (CABS) for looking at the human dimensions of biodiversity.
- Support from a BASIS project led by Michael Carter of the Department of Agricultural and Applied Economics (AAE). Also thank you to Dr. Brad Barham of AAE for leading a session during the LTC Forum.
- Area studies programs: Thanks to our prestigious Latin American Studies and African Studies programs.
- Thank you to the research centers World Affairs and the Global Economy (WAGE) and the joining use leading a session; privileged to have support from prestigious area studies programs (LA Studies, African studies) ; finally, thank s for the research center for world affairs and the global economy (WAGE) and the Center for Sustainability and the Global Environment.
- We are finally most grateful to the Nelson Institute, our umbrella institution.

## Dan Bromley      **Incentive-Compatible Institutional Design: Who's in Charge Here?**

There is no such thing as land: just land tenure. You don't know what nature is until you know what purpose it serves. The title of my talk has something to do with incentive compatibility, institutional arrangements in which all game participants know they will maximize their well being if they honestly respond to any information request inherent in—and implied by—the game. To design programs for RES/PES as incentive-compatible assumes that participants will honestly be an auctioneer who pays the minimum necessary to achieve behavioral change within an individual and that the auctioneer can trust that individual. If any of you have fallen into the perverse habit of paying your kids for good grades, you'll notice the unpleasant nature of the process in which you negotiate price with your kids.

Key Issues:

- *Principle-Agent Games*: Any program that hopes to alter behavior is a realm of unequal power: parent/child, boss/worker, donor/recipient, and so on. You want to be sure that the agent is honest, and the challenge for the principal is to not pay more than is absolutely necessary.
- *Financial Inducements and Unequal Power*: Programs from the outside offer financial inducements: these represent a game of unequal power. We from the outside are able to take our offer to a large number of recipients; those on the ground must accept or refuse, and the poorer are most likely to accept. I alluded to "habituated behavior". There is a presumption that when an outsider looks in on a community is that each day's behavior is based on a calculation of gains or losses, but human behavior is deeply habituated in long patterns. Only when things are going really wrong do they assess why.
- *Taking Change for Granted*: The notion that agents on the ground can dislodge participants from ongoing natural management practices is quite taken for granted. There is something about pro-poor RES that brings about a rather warm glow: all we want is different behavior, all they want is financial consideration. Those who announce tax breaks tend to be those who favor paying the poor. This concept is central to abiding logic and political support.
- *Transaction Costs*: Recall Coates' notion of transaction costs—the cost of gaining information, learning what contracting opportunities there are, the cost of enforcing contracts and observing change. How much biodiversity preservation is being sought? What is more versus less biodiversity?
- *Measurement*: Feasible programs require that the greatest attention be paid on which status quo success is measured against. The GEF has struggled with the severe conceptual/empirical problems of incremental costs related to social learning and associated behaviors.
- *Financial Sustainability/Legitimacy*: Rewards with respect to nature will alter habituated behavior, but if funds dry up, we face the possibility that desired behavior will return to an earlier stage and payments will lose their sense of legitimacy.
- *Need for Facilitative Policies*: With facilitative policies for changes which are consistent with long-run interests but not short-run interests, particular barriers or hurdles stand

- in the way. Namely, short-term liquidity problems may be addressed with a small amount of financial assistance. However, inducements don't always need to be in terms of cash: they may be subsidized credit. People become locked into patterns of interaction by an inability to deal with the hurdle problem. Risk adversity is not the issue: you cannot move if you can only stand still! We need facilitative policies. By inducing policies, it is possible to create institutional changes where the interest of the agent and the principals don't converge: we need to address a future divergence problem. Change must not be facilitated but induced.
- *We don't know the future:* We must be clear that financial incentives are not good to induce behavioral change: we cannot design incentive-compatible institutions into the future because we don't know the future. Any inducing policies must constantly be updated and modified, locking principles and agents into a continual game. The more dynamic the co-evolution of natural system, the more difficult the challenge of design, and efforts to alter behavior.
  - *PES vs. Regulations:* "Regulatory policies" introduce compulsive policies, but a history of compulsion in the developing world is problematic. Weak states [to call states "failed" is condescending] are those unable to take the necessary steps. Programs here represent different epistemological stories: the story that nature is natural and the intrusion of humans into this realm is not natural; and the creation story that humans were put here and told to multiply and manage God's commons. It would be wonderful if the effort to link ecosystem services and livelihoods could bring these groups together.
  - *Property:* One complicating issue is that the most plausible factor in degradation rests not in the people who lie by it. We may be missing the target. For four decades we've been engaged in a protracted discussion of common property regimes. A number of academics engaged in the community argue that resource degradation is potentially associated with flawed property regimes. The answer back then was to introduce "private property". We see de Soto reassure us that one defeats poverty by formalizing title. It is too much because empirical evidence does not demonstrate this.
  - *Misplaced Rewards:* In my forthcoming paper in the Journal of Environmental and Development Economics, I develop a simple model that, with a few plausible assumptions, we can project negative implications based on flaws in the larger economy in which these people's lives are embedded, with nothing to do with their motives.

In sum, those whose behavior we seek to modify are being used by us, turning them into instruments of our desire. The issue here is between the rich north and poor south. The World Bank and other institutions are not solving this problem; otherwise, forty years of work would have succeeded. If success is to come, it will involve thick, durable collaborative arrangements.

**Q/A**

**Question:** Could you expand on your discussion of collaborative arrangements?

**Response:** Principle/agent games are rarely collaborative. We need to converse with collaborators as to why we've valorized their homestead and discuss the penetration of the market into the bush. There have to be conversations about why we find wildlife so compelling.

**Comment:** For example, a donor needs a beneficiary to convince their constituencies to provide funding. This situation binds the donor to the agent, suggesting an accountability regime bound up in ways the principle-agent idea does not account for.

**Response:** We need to take this simple model and nest it. Many of you start at the top level. Take a simple principle-agent model and elaborate on it.

It is an honor to be here today: a lot of you have worked on these issues more than I, but I'm going to talk to you about biophysical and scientific issues. I entitle this talk "Navigating a Changing Biosphere" because we live in a rapidly changing planet today. The biggest thing we have done relates to land use (larger than climate change): it is the gorilla in the room. We see a repeating pattern of the natural systems continuum toward "frontier clearing" followed by industrialized farming with heavy inputs, the rise of large urban centers, and protected areas/recreational lands.

The results at the scale of the planet are enormous:

- *Land Clearing*: 40% of the land on earth has been cleared for agriculture. An everyday American will say the biggest problem is sprawl, but urban areas cover 3% of land area. Agriculture has the biggest footprint, covering 40% of ice-free land, with converted land representing one third of the planet's photosynthesis. Croplands, rangelands, and pasture comprise a huge part of our biosphere.
- *Water Use*: Water use tripled in 50 years, mainly for growing food. We all know the consequences: we've heard the story of the Aral Sea being turned into a desert to grow cotton. Lake Chad, which has experienced natural drought for millennia, is collapsing partially due to irrigation. In Niger, only five percent of the lake remains from what it was in the 1960s.
- *Chemical Use*: Another big transformation has been the use of chemicals, particularly those involved in nutrients. We have doubled flows of nitrogen and phosphorous with no sign of slowing down. We can see the consequences: the eutrophic Lake Mendota, dead (hypoxic) zones, fertilizers from the corn belt traveling down the Mississippi River creating dead zones in the Gulf of Mexico. This is not the only place this is happening: the Black and North Seas are other examples connecting how we use the land and water.

I would make the argument that the greatest harm we'll ever do was the invention of agriculture: that story is the paradox of the 21<sup>st</sup> century, especially when we're dealing with climate. Land use is critical, but how well do we understand it? [SAGE] creates maps of cropland (herbaceous matter that is not trees), using country-level data collected on the ground, harmonized with satellite data.

Results:

- The most productive region in the US is the Southwest (with irrigated corn).
- Soybean yields on the fringes of the Amazon are astounding. Agricultural productivity looks nothing like natural ecosystems: in agriculture the most productive places are the Netherlands and the Columbia River Basin, because of intensive management; see also Malaysia. Management using fertilizers on plantations can dramatically alter most productive places in the world.
- See also the diversity of landscapes: the forty percent of land in agriculture has biodiversity, too, in the diversity of the crops we grow and in landscape diversity. Places like the Mediterranean, the Andes, and China have the highest crop diversity. This is now changing dramatically. We are losing agricultural biodiversity as we simplify and commodify. Much of this change is due because of the production of animal feeds.

What are some of the recent trends?

- *Intensification*: We've seen irrigation and fertilizer increase. We need to monitor the extent of land used but also the management of land we already have. What we will see are big shifts with biofuels, whose demand will be outstripped by increasing demand for animal feed. All of our old assumptions about land use and tenure are about to change.
- *Land Use and Climate Change [See World Resources Institute map]*: This map by shows human activities we may recognize: transport, land use change, energy, deforestation, agriculture, waste, and so on. Methane and nitrous oxides from fertilizers equal the warming potential of CO<sub>2</sub>. If you add deforestation and the practice of agriculture on existing lands, these two comprise one third of all greenhouse gas emissions. Clearing and farming the land contribute more than all the world's electricity and heat put together. Our land use is contributing to global warming more than anything. Changes in water and energy use as we change the land's surface alter regional climates. A highly degraded landscape warms temperatures alone but not in terms of humidity. Climate regulation is not just carbon.
- *Watersheds*: Water flows show how deforestation can dramatically change flooding. Water can go to watersheds across the Midwest and predict nitrate concentration if we know how much of the watershed grows corn.
- *Human Health*: There are also connections to human health: Jonathan Patz has demonstrated links between deforestation and health. He has conducted a very interesting study on malaria vectors in the Peruvian Amazon, showing that deforestation has a major impact on the likelihood of getting malaria. The likelihood of being bitten by malaria-carrying mosquitoes increases 300 times if you go into landscapes that are 20% or more deforested. Land use happens for a reason, the most important one related to water and energy. Land use offers resources to combat poverty, provide jobs and income, and so on, but the problem is that we have to worry about ecosystem services.

Ecological science will be able to weigh the tradeoffs. From an ecological point of view, ecosystem services may look like a flower, optimizing the way of producing food on landscapes. The ecology is easy; it is harder to make ecosystem services economically and socially viable. When evaluating resilience, we see that all monocultures will fail. We need a different kind of diversity, landscape diversity and practice.

- In sum:
- 1) Land use is a major, major planetary force.
  - 2) We should not just worry about the clearing of land but what is happening on what has already been cleared.
  - 3) We should be making informed decisions about ecosystem services. To quote Stuart Brand: "We are as gods, but we might as well get good at it."

## Mike Jenkins      The State of Markets for Ecosystem Payments

Dr. Foley is mapping the biophysical world we live in. I will try to overlay the biophysical map with one of the market forces driving change. There has been a lot of movement in the markets for PES in the last year, with more investment. The simplest of these markets, carbon is not a hard one to measure. Water markets will not be there forever. They are different in scope and scale from carbon markets, focusing mainly on the local/regional scale. We are hearing a little about metrics for water quality, and trying to get a handle on it. Carlos Munoz will talk about a cool set of markets/payments designed in Mexico to create water quality markets. Biodiversity and conservation markets are hardest to crack: they occur locally, but there are global interests.

**Carbon Markets.** There is not a single carbon market but a range of different markets in carbon space. CDM is part of the Kyoto protocol, but there are other interesting markets. In New South Wales, the first of the carbon markets, has resulted in land use change. For the EU, carbon cannot be traded in the nuclear and forestry sectors. The 2006 assessment of carbon markets—of \$200 million—is projected to triple or quadruple. There is a whole new set of resources moving in as investors take interest, tripling the number of investment groups, entities, and private investment funds (e.g., The World Bank). The relationship to land use change is generally complicated, and there has been a very vocal environmental constituency who wanted forestry out of exchange, but since Bali we have seen an opening of doors. Forestry has become a major player, but we face the challenge of measurement: how do you value standing forests? The US may be behind, but there is movement (CCX, RGGI, California, Oregon, Washington, the Southwest), particularly in the voluntary sector. California has the most stringent emissions standards in the world; I believe there will be explosive growth there. We need presidential leadership on this issue. Whoever becomes president will have to move aggressively on this issue.

*Four Types of Carbon Markets:*

- 1) *Kyoto*
- 2) *Non-Kyoto*
- 3) *Voluntary:* If you were to go back and look at the European Trading Scheme (ETS), you'd find the carbon market to be the largest commodity in the world. 36% of voluntary markets are in forestry, investing in a quality product. It is interesting to view voluntary markets in terms of setting the stage for regulated markets.
- 4) *Developing:* innovative markets to shape the future of carbon markets. In the United States, Western states are coming up with state-level initiatives feeding into a national standard to feed into a post-Kyoto regime.

**Water Markets.** Water markets are the next carbon, for both water quality and quantity. Water quality is likely to come first (such as nutrient trading): science and application are easier. Quantity is very hard to estimate. There are 200 dead zones around the world, but this is quite reversible. If we could focus, we could turn around nutrient services. Nutrient pollution is a more immediate problem than climate change. Hopefully, we can apply creative solutions to address water issues. This is going to be at a watershed scale, making the scope of the market different. Some watersheds such as the Ganges and the Chesapeake Bay are very big markets in their own right. A voluntary nutrient trading market is being launched in June related to non-point sources of pollution from agriculture. Watersheds and basins do not follow political boundaries: the idea of markets is to provide the catalytic force.



**Biodiversity Markets.** Biodiversity is an anticommodity and very hard to figure out. Scale is an issue, as biodiversity exists on the genetic level, the species level, and the ecosystem level. There are a lot of challenges in considering biodiversity markets, but today we have wetland banking, conservation banking, voluntary biodiversity offsets, and government payments for biodiversity. ForestTrends has launched a project outside the US looking at biodiversity offsets, employing an unusual portfolio approach working with very large companies. How can we design a system that is the best we know in science, more palatable, with voluntary markets? We want to sit down and talk about it; we will sit in a biodiversity-constrained world. Mapping species banks around the US is an example where information is a very powerful tool and can demonstrate a market. When considering the biodiversity market universe, there are 24 different payment types. Attributes of those markets include how much money is transacted, what the opportunity is, the market's infrastructure, the market's future. ForestTrends is now looking for partnerships and collaborators in ways it hasn't in the past. For biodiversity, we are in a moment where we have opportunity to help develop markets, influence the way markets develop and ensure there are benefits to local communities. The challenge is to continue defining the market in a way to relate to the buyer, defining the service in a way to enter the market. How do we give confidence in that market? Interfaces and interconnections between the rural village and urban center is driving this, which strikes me to rethink the way we have done conservation. We are not place based; we do a lot of work with a lot of different projects. Place-based activity is nested in economic activity.

Challenges:

- *Scope:* We are in a new wave of environmental markets where we need to invest in natural infrastructure as much as our built infrastructure. We need to think about linkages with very, very powerful partners. In the past, forests have been fiber farms, but now we are bringing in values for non-timber forest products. We need to make forests more valuable than oil palm.
- *Scale:* What are the real costs? What is the scale of investment? The Government of Ecuador is offering to "not explore for oil" at the price of \$500 million, which is way beyond the means of foundations. We really need to capture the opportunity we have NOW.
- *Pace:* This is a challenge to all of us. We work by semester or foundation grant cycle: we are completely off and have to work at the pace of business. We need to readjust institutions to be more nimble.

ForestTrends has been asked to participate in a voluntary carbon standard: this is an exciting opportunity to bring in land use change. We have to accomplish this in three months: it is difficult to go back to foundations in this time period. To set the standard for forest carbon, we need to be able to be much more nimble.

## James Murombedzi    A View from Sub-Saharan Africa

*Introduction: James Murombedzi was one of the architects of a project that has become emblematic of RES: CAMPFIRE, involving the auctioning of rights for hunting. The political climate was critically important for political negotiations and plans. Dr. Murombedzi is the Director for the IUCN Office of Southern Africa. He worked to decentralize management and decision-making to regional offices. He is now working in Liberia on post-conflict forest management, working on community involvement and betterment of forestry practices. He is an author of critical academic matters in Africa and was faculty with the University of Zimbabwe.*

I am very honored to have the opportunity to be here. I will talk about the underlying conditions around policy innovations that have occurred within southern Africa around resource management, focusing on the development of various government systems, particularly wildlife systems. By way of background, the context is Southern Africa, where you know that natural resource dependence accounts for over half of the GDP. In the very primary sectors of agriculture, forestry, wildlife, and tourism, the region is well endowed with natural resources. The capacity to transform natural capital to goods and services is characterized by significant rates of degradation. This is one of the most innovative regions in environmental management policy. The causes of degradation are varied and related to the policy context in the region. First are the usual problems of population growth; then the land use system in the region and the problem of agricultural expansion. This agricultural expansion is occurring in the context of declining productivity, characterized by gross inequality in resource distribution and the effects of political problems in Zimbabwe. Many of these problems have their origins in the historical distribution in access to natural resources. Today, issues of interest include the developing relationships between South Africa and industry, markets in industry and China, land degradation affected by climate change, political corruption, and so on. In Southern Africa, the bulk of the population is related to subsistence agriculture, of very low productivity and characterized by low levels of added inputs, little access to credit, limited access to water, and insecure land and resource tenure. Subsistence agriculture occurs in marginal agroecological zones as a result of historical trends in resource/land allocation.

**Expansion of Agriculture.** Since 1994, the total area of land tilled has increased as a result of some industrial development, regional population growth, demand for export cash crops (e.g., cotton), and growth in grain production (e.g., maize). The expansion of agriculture has gone into marginal ecological zones, with generally negative consequences. It is important to note that wild land under cultivation has been increasing. In terms of resource use, institutions developed to manage natural resource use in the region, but many resources are subject to some degree of unregulated or unsustainable use. Although there has been recent development in policies to ensure more effective management, institutions are extremely weak, and the region is characterized by resource challenges. With limited personnel and logistical resources, enforcement of existing provisions is difficult. There is also the problem of some countries in the region going through recent protracted conflict, especially in Angola and the DRC. Here, the incidence of unregulated resource use is higher, the chance of becoming demilitarized is greater, and these countries are highly endowed with natural resources (and are hence vulnerable to conflict).

It is interesting to note that if you look at the ecosystem well being index of 2001, eight of the top ten countries are in Africa. If you look at the 2005 HDI, of the bottom 33 countries, only two were

not in Africa. These countries are not able convert natural resources into major contributions to well being.

**Maximizing Ecosystem Goods and Services.** We need to improve the governance of natural resources, increase investment in ecosystem services, and adopt technological innovations. When you look at the development of conservation in Africa, it tends to entrench poverty in different ways and is largely based on expatriate initiatives. Reduced access to natural resources has contributed new threats to livelihoods. The actual development of conservation has been associated with political mechanisms designed to control poor people, maintained using state mechanisms. Most conservation and development initiatives that were alright in the pre-independence period have been continued through after independence. These policies have compounded issues of land distribution. One of the biggest innovations was piloted by the CAMPFIRE program in Zimbabwe, involving the devolution of control of natural resources (particularly wildlife) to local communities. Putatively, the express purpose of devolution is that local communities benefit from the management of natural resources. Policies without exploitation have been largely unsuccessful. The real cause of failure may have been the focus rather than the structure of policies, largely because the focus or immediate challenges of these policies do not address the challenges of local communities.

**Devolution.** The motive of devolution is usually historical, matching attempts to solve the problem of integrating local into national economies. Policies have tended to focus on land tenure, ownership, local participation, and governance. Specifically, policies have introduced decentralization of local government into new forms of resource tenure across, with benefit-sharing. There is a new focus on micro-macro political dynamics, particularly the creation of local communities participating in policies themselves. However, devolutionary policies are characterized significantly by environmental insecurity. Claims to resources are embedded in local boundaries, but there is a significant degree of conflict in Southern Africa over the division of rights to land. One of the major conflicts has been in Zimbabwe and reported candidly in the global press: the government is appropriating white-owned land. Also, devolution is occurring in the context of declining authority: new opposition to the state from civil society groups, the application of extra-economic regulations that render agriculture inefficient (particularly on customary land). This is occurring in the absence of land tenure or ownership context. As long as there is no clear attempt to define communities as legal entities, they will continue to be tenants on communal land and will not have the proper institutional strength to undertake natural resource management. Now there are multiple authority structures over communal lands and local enforcement. Also, most devolutionary processes are minimal, implemented in a context of devolved property rights. These imply attempts to create new mechanisms for communal lands without resolving resource problems. Devolution is implemented in communal areas with xxx land tenure systems and degraded natural resources. These constitute meaningful contributions to local livelihoods, but most of the devolutionary projects are devoid of context. There are managerial rather than political initiatives, devolved to local communities without consideration of how communities will exercise those rights. They typically don't become real because communities don't have capacity. In short, most devolutionary processes in southern Africa involve unsustainable resource use related to other issues and causes, such as trade, institutional failures, etc., implying that resources are situated in a broad context that completely ignore local policies.

**Conclusions.** Under weak proprietorship, financial benefits from resource use need to exceed agricultural income, which is controlled by individuals. This is so regardless of how minute incomes are; they are still greater than those of natural resource use. If we cannot improve natural resource use, the best option is to eliminate natural resource use and encourage agriculture.

In financial terms, the contest between natural resources and agriculture reflects a contest between conservation and livelihoods of poor farmers. The disjunction of incomes of people intimately tie to biodiversity resources from the market value of those resources means that these people have little or nothing to gain from sustaining the stocks of these resources.

### **Questions and Answers:**

**Question:** Agriculture is a private good. Natural resources are public goods, so we cannot be sure labor will result in income. This is not likely unless there is a valuable commodity in nature.

**Answer:** Yes, this is the point we are making in the policies of Southern Africa. Most of the devolution of natural resource management is to create mechanisms for people to manage resources without resolving issues of ownership with communal lands undefined.

**Question:** East Africa is behind in devolution. The point here is about delivering rather than having is demanded. Why in Southern Africa aren't people demanding power? What is preventing that, and why aren't people demanding devolution?

**Answer:** In cases where resources have become valuable or more valuable, larger powers have tended to re-appropriate resources. CAMPFIRE devolved wildlife to local communities: most revenue was appropriated by local governments. Now they sell elephants to pay for administration. To continue CAMPFIRE, we are now supporting re-centralization. This is not happening because of the inability of communities to protect communal property.

**Question:** What about the Water Works "working for water" program?

**Answer:** It has given a core message about how two political strategies work. Land ownership is essential. As in a public works project, there must be lessons that will offer next steps forward. South Africa is critically short of water: 80% of its water comes from outside the country, mainly in the Lesotho Highlands. South Africa is devising broader parts of its policy strategy for tenure resources, working for water, water-inefficient alien and invasive species, using local labor to subsequently manage the watershed. It has been very successful and able to manage local participation, mobilize small-scale investment, and convert alien species. In that regard the project has improved local incomes. I hasn't necessarily been a long-term payment for ecosystem services project.

## Carlos Munoz    Targeting the Poorest Communities for Hydrological PES in Mexico

Let me tell you about the panorama of activity in Mexico. One political party is dominating the political scene. At the time I was involved in creating a diagnostic of the economic costs of deforestation when the minister of environment asked me to join. The problem of economics is an enforcement problem of trying to avoid land use. The challenge is to approach it in a different way, and there's an opportunity cost to avoid deforestation for poor land-owners or forest owners who want to generate more income from their forest. This is the story of how this was designed and how to target forest owners:

- **Mexican Forests.** Tropical forest cover in Mexico is about 50 million hectares, with a 1% annual deforestation rate in the 1990s, one of the highest in the year. In addition to forests, we lost also natural grasslands and wetlands, all eaten by the expansion of cattle ranching. We not only have the problem of market signals but of very high corn prices. There is not a level playing field, and there are two things that characterize the forest: 80% of the land belongs either to individuals or communities below the poverty line, and much of it is communal property following the Mexican Revolution, with land use decided by a group of 50 to 150 individuals in an *ejido*. This is now a story of market failure. If we could close the loop on cattle ranching, we can give incentives for conservation. We are looking at environmental services, such as water/hydrology in Mexico. Currently, Mexico is overexploiting all its aquifers, exploiting double to triple the amount of rainfall per year recharged into aquifers. (Consider if you had a bank account from which you withdrew double what you had.) If we lost the forest in the catchment areas, we will have less per year based on the same extraction rates. Consider having a bank account that withdraws double what it holds. If we lost the forest in the catchment areas, we will have less water per year. Despite what we saw during the 1990s—one of the best examples supporting community forestry with community-run sawmill startups integrating vertically and adding value—projects experienced market failure in that they didn't pay for environmental services.
- **Poverty.** To give an idea of poverty in Mexico, 1/5 of households live below the poverty line, with 1/4 of individuals living in extreme poverty (defined as not enough nutrition). Poverty is higher in rural areas, and each dot is a community classified as high or very high marginality. There is household poverty as well as lack of infrastructure.

**Policy Niche:** We mapped the forests. Commercial forestry continues to support forestry with plantations. Degraded forests have reforestation programs, some paying for people to plant small trees, others using volunteers. Forests that were not commercial but were in important hydrological areas have no program in place and would have the highest rate of deforestation. We decided that PES would work in this niche. The objective was to pay the opportunity costs for forest owners in keystone areas for water (water quality, natural resource conservation). What the project did was very simple: if there are people or businesses benefiting from hydrological services, we charge them money which is paid to forest owners (in the form of a 2.5% tax to ratepayers in municipalities and large firms, not individual households). We get the money and put it in a trust fund, allocated to a service. The present party is alright with the scheme, the green party loved environmental taxes, and we convinced the left. A large majority of hectares had to be renewed every year, which has happened since 2003. We were also recently given \$30 million, and

the president promoted us on his campaign, pledging to continue the PES project and allocating money from the general budget.

**Where is the money going?** The idea is to generate clients for the forest in the forms of cities and industry. Since we are providing all environmental services, with preference for the poor, the question arises of how much we should pay, the value of the service or the opportunity costs? We chose the clearing price: the price that would clear the market. To collect our data, we had to make sure data was from agricultural products being financed by agricultural funds and profits. Note, much of corn is generating very little money, with some areas devoted to corn being less profitable.

### **Questions and Answers:**

**Question:** What are the factors contributing to corn prices in Mexico? Are peasants being an offered an unfair price, or is the price low in general?

**Answer:** High end export crops are driving deforestation. To get the price, we go for low cost forests first. This will use our budget perfectly, but peasant organizations that owned the forest wanted more. We have negotiated and paid more (\$37 and \$28 per hectare); cloud forests are more valuable. Another issue is sovereignty: if you enroll as part of the program for five years, you deal with local government. If you sign up in 2006, and remain in the program, you recruit more forest plus more revenue. This eventually becomes a gray area, with the budget coming from national fees. However, from 2006 to the present, we still have a lot of money in the program.

**Question:** Has this changed land values?

**Answer:** So far, we have 1,900 communities participating and \$100 million spent. This is one of the challenges we were predicting. If you increase the price/demands for participation, if you go for 40 dollars/ha, you can pick up the best forest for the money. Prices are sticky. We will measure targeting and working on what the foremost important things are regarding the type of environmental service and risk of deforestation. This is a voluntary program with a lot of self-selection. If you look at the opportunity cost, what type of forest do you think we got in the first year or so of the program? We got the lowest opportunity cost forests.

**Question:** How transparent are you when targeting communities? Has this spurred any efforts for communities to organize, engage in conservation, etc.? Do you offer support?

**Answer:** This is the story of the targeting system. We have a research/policy design agency and let the operating agency take over from the National Forestry Commission. After lobbying for introduction, the fee is sent back. We will evaluate and see how well you're doing, even if you do not like us. In 2003, we had no priority criteria or ways for handling long lines of forest. Yesterday, I was talking in Arizona about the corruption problem. There is low governance, but in truth people are in high spirits and morally against corruption. The people from the opposition coming into power are against corruption; we are on a honeymoon of well-meaning people carefully watching each other. We give money to all places for support. We have a system of "brownie points maximization": we developed a point-based system to grade every application. The problem was that nobody promoted the program or change in agency leadership. We were not reaching out to communities and could thus not launch the pilot project. We looked for an opportunity and lobbied hard to write the point-system into the regulation. This is the girding system.

Please support us in the generation of a general support system and in generating hydrological values. In 2006, we mapped poverty and hydrology and saw the problem with deforestation. We could see if an aquifer was being overexploited looking at past deforestation to project the future. We got data from the 1990s, and looked at the pixels along with factors that increase the likelihood of deforestation. The model had good explanatory power: 75% of pixels in the 1990s were predicted by the model. In 2007, we got in trouble when we found that the Forest Department was paying for areas not threatened by deforestation. We came under a lot of pressure then. Initially, 0% of funds were going to overexploited areas; after the point system we introduced 27% from areas of more hydrological importance. For targeting the poor, we selected those at high marginality (see map). The pattern is that north of Mexico has high areas of its population in poverty. First, within the 80% of forests in areas of high marginality, we gave a free publication about the program. For targeting, 80% of the funds are reaching high-marginality areas. There may be a problem in the difference between those of high and very high marginality. At the national level, 70% of forests are owned by the very poor. Payments are actually going to the least poor of the poor, and we find that the poorest communities don't have the frequency of contact with the forest agency or capacity. They do not have much contact with bureaucrats, and the contact problem is generated by a lack of power. We then started giving more weight to the extremely poor: 26 to 36% receiving payments jumped to 50% in 2007. 2007 looks more balanced in favoring the poor.

**Question:** Have you observed migration between the categories?

**Answer:** We wanted to maximize value and modify behavior. Professors in Mexico are looking at poverty and deforestation. All models are wrong but some are useful: we can see how deforestation rates fall: more than 20% of areas 15 minutes out of town are deforested in a decade. A logarithmic equation shows how conservation and regeneration increases with distance and the ecological footprint falls. The first 15 minutes area is very different from the rest of the land. For the area around parks, the value of the ecosystem service can move people toward generating public goods. The model includes land slope, distance to the market, poverty, and natural protected area status.

**Also:**

With NAFTA, the price of agricultural products went down, with more people working for subsistence because the price of corn declined. Given competition with cheap subsidized corn from the U.S., peasants in areas in far away areas no longer grew it. Many abandoned land and migrated. If we can enforce the contracts, we can end deforestation fast and resolve marginality, overexploited aquifers, and water scarcity. You can see how the program jumped with President Fox's support in overexploited areas. There is a higher proportion of people joining the program. Recall the story of 2007: we were giving a third of the money to areas with a high risk of deforestation and high marginality. We are trying to make the best of the taxpayers' money.

## Breakout I: Poverty and PES

### Ian Coxhead      **Economic Development, Watershed Development, and Ameliorative Policies**

I'm a little conflicted about what to talk to: my interest in environmental matters derived from interest in economic development. Paradoxically, I spent a lot of work in environmental issues in developing countries in Southeast Asia. If you're an environmental specialist, you'll go away dissatisfied. This talk is about what it takes to create an environment in which you can implement site-specific policies for environmental change, with casual references to empirical data.

***Watersheds in developing countries.*** The historical story is familiar in an era of early modern economic growth. There is not much aggregate economic growth but a lot of population growth through demographic transition. This followed with a spillover into frontier lands where resources combined with labor to produce income. The early era of modern economic growth was a story of increasing pressure along the land frontier. The second part had countries experiencing rising rates of economic growth, accompanied by the issue of reversing population flow with another set of environmental implications. A lot of watersheds are at the political/governance frontier in a sequence of institutional arrangements. In the early modern period, customary law was becoming threatened by the assertion of state control and immigration of difference people with different values. This is a period of "disorder and destruction", with no real control over what happens to the land. This period was contemporaneous with a shift in intensification of population pressure on the land in the form of land use change and movement from subsistence agriculture toward commercial agriculture. The process of globalization is one that drives the transition away from local markets with non-traded activities, and the concentration of global markets is important to land use and environmental damage in watersheds of Southeast Asia.

**Globalization and Land Use.** Globalization meant resource-rich countries pursuing comparative advantage, natural resources production and labor-intensive manufacturing production. The size of the market is bigger with incentives for expanded production. With the shift from subsistence to commercial production, opportunities to specialize become greater and you get substantial changes in land use. The manifestations of a globalizing natural resources economy has been upstream losses of soil, erosion, increases in variability of stream flow, loss of the sustaining headwater system in watersheds, and complete drying up of rivers. How do we fix this? Reduce the intensity of ecosystem use using the standard policy of command and control or one of bribes and incentives. There are problems with incentives for addressing the externalities of consumption. In developing countries issues are highly constrained, and it is very difficult to ask for reduced intensity of land use. The PES theory of incentive-based inducements is based on differential evaluation; paying polluters in theory will work if payments are greater than opportunity costs, benefits are greater than payments made, and payment for ES is in the interest of both parties.

**Why is PES not widely adopted?** There is not much influence a PES system can exert over land use decisions when households are unsure whether markets will deliver. There are lots of constraints on land use in places of insecure tenure: who should the beneficiaries be and who has the right to make land use change decisions? Enforceability is very hard; therefore, most PES systems are at a very small scale. PES schemes have not been able to significantly change behavior, and every site/population is different.



PES has to be re-designed and re-implemented, and this is why PES has not operated very effectively, at least in Southeast Asian countries.

This is a quick assessment of PES: it can achieve goals under the very best conditions, but poverty alleviation may not fit. We are trying to target beneficiaries under normal circumstances in addition to the poor. A lot of the really poor (and really all participants) may have no control over land use conditions. In kind of a narrow system, the probability of achieving a significant goal is small; we should look for other things that may be competitive with this.

**Globalization and Jobs.** Policy reforms that induced globalization have not operated for every sector. Protectionism has increased in some places, and the WTO is very lenient on agricultural development policy in developing countries with markets increasing over time. Corn protection in the Philippines increased in the context of the global economy, and costs continue to rise. This is the set of conditions into which global integration occurs, with land degradation activities. The other side of globalization is that it pulls people away from farms. Both in the Philippines and Vietnam, people are getting jobs in factories, etc., reducing the costs of conservation decisions, and the opportunity costs of conservation. To assert that globalization is good for the environment is to say that it makes conservation cheaper.

PES *can* fit, but its role is probably very limited. There is a huge unresolved property rights story confronting designers of local environmental schemes for poverty alleviation and environmental protection. The domain of possible poverty solutions is more than geographical area: it is between PES at the local scale and the macro-economic scale. National policy changes should be complementary to local design policies.

In conclusion, for any developing country, the fastest way to reduce poverty is to open up to the global economy. Globalization increases new pressures, such as rewards for using land more intensely, but it also creates opportunities for labor rich countries in supplying non-farm opportunities. Globalization is not going to solve poverty. PES schemes and other direct interventions alone are not sufficient. None of this stuff will work if you don't have adequate control over land.

## **Ann Koontz      Directing Local Tax Revenues and Specialized Brand Marketing into Pro-poor Payments for Biodiversity Conservation**

I am going to take you to a few examples at the ground levels. EWS is part of a consortium of WCS, USAID. Some of you may know us as Appropriate Technology International. We merge volunteers and technical experience, have 40 years of experience, and are an economic development organization. We got into conservation because we found that if environmental services/conservation were not considered, the poor suffered. I will discuss on an annual basis of what is happening to the poor and direct impacts we are achieving in each of the different program areas. We work in the Philippines, Nepal, Guinea, and Kenya. We are trying to make fundamental shifts in nature, wealth, and power. Pro-poor PES is about making fundamental shifts in power/wealth dynamics communally as well as locally, tenure mechanisms around the world, community forestry programs, and wetlands protected. Programs are being expanded into grasslands. Communities often don't have the options to take advantage of new tenure

arrangements/tenure instruments directed toward the poor. There is a shift toward the private sector to green their practices.

My personal opinion is that there are three main categories of PES projects:

1. Grants from donors/foundations/individuals.
2. Local tax revenues/legal rights. (This is a major category that needs more attention.)
3. Product-buying linked to conservation and/or fair trade.

**Importance of outsiders.** I have yet to see a case where a poor community can step in and accept cash revenues. There has to be investment and capacity for the poor to access these categories and mechanisms. We have around the world a push for decentralization in governments, but people in power in the capital are reluctant to give it up, which is a natural reaction in people. In many cases, the legislation allows for communities to make payments. Typically, there has to be an outside push. NGOs are going in and looking at legislation, pushing with community groups.

**EW in The Philippines and Nepal.** Enterprise Works believes that for long-term sustainability of PES, both services and providers need to be valued by their local governments. It is good to have outside assistance and buyers, but until local governments value that, it is very hard to make PES sustainable. When communities have legal rights and technical skills, then governments can see them as valuable partners worthy of tax revenues. In the Philippines, it is relevant that donor investment is organized (e.g., community-based management), for pro-poor community forestry and land tenure rights. We worked in the Philippines to federate 120 land use groups (over 3,000 hectares) and include them in the government tax system. Last year, in 2007, 8 million pesos were transferred in tax revenues. Of that, 100,000 went to 20 groups in one province, and the rest was skewed, with other groups receiving 30,000 each. We will follow up with cases to see if larger chunks get dispersed. It is still a very young field

Nepal has a community forest user group system (CFUGS). Royalties awarded to the government for extraction are now linked to an operational plan with biodiversity. There is a right to directly collect that royalty from the vendor, which flows back into the community. This is one of the most direct payments I've seen. 25% of the money goes toward conservation, with the balance going toward community development. In business plans, extractors understand that they will crash and burn if they overharvest. Types of areas and groups involved, and revenues: smaller hectareage of natural forest brought higher revenues of \$2.5 million, with over 250 eligible products ranging from 10-25% of the royalty. This keeps them competitive.

**Third-Party Certification.** Both projects pursue a suite of activities and investments from donors (for collaboration) and the government (for land tenure, revenues, and the market). Nepal specialized in brand marketing (the forest stewardship council certification). Enterprise Works helped user groups apply for certification, which is expensive but necessary to get people to the market. For the Forest Stewardship Council, buyers were given a high amount of consistency, certification was used as a proxy for other sector PES market, and it provided a general set of standards versus donor-specific criteria.

**Magnitude of the Benefits:** In 2007 we sold close to \$740,000 in products, developed strategic partnerships, and 2 deals are being negotiated (including with large international companies). 32,000 user-group members, including over 10,000 women, received training in FSC, but the importance of this is that there is a pipeline of capacity-building. There is a 10-year horizon to meet

market demand. Products include essential oils (e.g., Aveda), paper (bark), nettle cloth, and mushrooms.

## **Tendro Ramaharitra: View from Madagascar**

I plan to give a more informal discussion, with the context based on my experience. I am a Ph.D. student at UC Berkeley, and I'm here to give a view of what ES is. I was asked by my advisor to think a lot about ecosystem goods and services, working on land use and modeling and how to protect the forest. The idea is to change people's decision-making. The model is looking at the land use trajectory in the future, and we started to include the valuation of ecosystem goods and services. This is a very difficult subject. While focusing a lot on ecosystem services, I can only talk about ecosystem goods, which are primary resources for people. My previous work was a beekeeping project, which started in 2003 around a national park. It was not seen as something that could replace livelihoods, rather, it was more for poverty alleviation. It is growing and we now have at least 3 professional beekeepers. We have 200 villages involved, selling honey in the street and seeing quality and price increases. It has been more or less successful.

My feeling about ecosystem goods and services is that generally the issue is land tenure. We have broken property laws in Madagascar, meaning the government owns everything (since colonization). People acquire land by cutting down the forest. When you talk about ES or PES, it is really confusing over who owns what. The other thing is that ES is not really well-perceived as something you can take from somewhere. In trying to benefit local people, there is the issue of power and gender relations. Women are responsible for getting wood and water, which is not seen as a tangible benefit because the man is still head of the household.

## **Comments: Steve Lawry**

I have some reflections to offer on what the LTC was and a couple of observations to make with respect to the significance of economic analysis. Economics are always important in the field. See Bishop and Hardin's assessment and the array of analyses by economists and social scientists. Research demonstrates an array of assigning individual rights, transaction and other issues, highly differentiated interest in the resource base, and large-holders and smallholders with different capacities with respect to labor to take up prescriptive management improvements. PES is interesting because of the importance of the market in influencing and affecting resource use and behavior. This is important because there are other kinds of discourse in how you manage communities around collective action notions and subsistence regimes, where politics and family are as important as economic incentives. This has fallen to the wayside because the analysis is not as good but also because globalization is providing examples. From our own research, when you have a situation when ½ of income is from remittances, and you don't take this into account, you're missing something very important. The notion that there are certain situations because income is coming from other sources is very important regarding the impact of NAFTA on Mexican maize prices and how it's affected producers.

**Property Rights in Collective Regimes—South Africa.** In South Africa, the African National Congress is an urban-based, worker-based revolutionary movement deferring to traditional interests. The national government doesn't want to have a political fight, but what is at stake is the well-being of resources and poor resource-users. How do we implement a law about tenure security passed in 1988 in ways that would register all kinds of rights, including customary rights?

Traditional authorities liked the notion of ambiguity with respect to ownership. Historically, chiefs had administrative rights to land and asserted that they own the land. A generation of younger successors trained in the West (Britain) tried to do something with them, looking to capture a clearer definition of rights in exploiting resources. They seized up privilege within the context of the customary land tenure system. It is a very complicated situation, and, if I could say, I was keen to hear more about the individual. I am uncomfortable with discussions limited to community.

**Response—Ann Koontz:** In the Philippines, there is an incredible diversity, from migrants to indigenous people. There is not a homogeneous group with respect to community forestry. Projects were set up with a big donor push; USAID has been working hard. In Nepal, people had traditional management structures through committees. The partners negotiated but there was full participation. Instead of equal-access and equitable distribution, there is still the caste system. People with remittances don't need much. This was all negotiated within the community. The CBFM structure involves individual payments. In Nepal, for people who didn't have the money to build a factory, we gave them the opportunity to provide in-kind support (work). If people say "communal", there is still individual household-level work.

### Questions/Answers

**Question:** When you talk about legal rights, are these tradable rights? To what extent does the community have rights?

**Answer:** (Ann Koontz) In Nepal, land rights are pretty stable. They needed outside help negotiating. All things could be enacted in legislation and put into play if one was predicated on timber trade in lower altitudes. NTFP's were allowed to be included, but no operational plan had ever been done with the model. The community needed help, it needed ideas, and translation services. Communities partner with Enterprise Works, with leases. In Nepal, communities had rights over extraction and could sell commercially. In the Philippines, the government suddenly banned NTFP extraction. In India, only subsistence is allowed, but sometimes commercial activity may be more environmentally beneficial. We need to look at each country's institutions.

**Question** (to Ian Coxhead): Do you have an opinion about the post-Bali situation and schemes for Southeast Asia? Please mention how you see Indonesia's insertion into this and big countries like China paying to avoid deforestation.

**Answer:** (Ian Coxhead) On the ground in Southeast Asia, I haven't seen any PES scheme which has the position for broad applicability. Scaling up is very hard, but I also think that any scheme that could be designed would have to be big. Indonesia is a good example. Power is accelerating and vast areas are driven by market forces. Put together defectively, enforcement management schemes for property rights are not complying with agreements. The new director of a Malaysian company for oil palm in a presentation said that palm oil is worth about \$1,000 a ton. In about 60 years, they will buy tropical forest at \$25 a hectare. For PES, my fear is that with the groups that make strides, the government will think of PES as a way to get big money, and will take it away in a heartbeat. Two more warnings are about the market and land-grabbing.

## **Breakout II: PES Amid Uncertain or Collective Land Tenure**

**John Kerr**

### **Property Rights, Collective Action, and RES**

PES affects collective action. Would a group-based PES encourage or discourage collective action? We must work together to gain payment. Cash incentives can crowd out other sources of motivation. I have a graduate student considering PES and property rights, collective action, design, conditionality, transaction costs, types of payments and rewards, and individual versus group payments or rewards. The key feature of PES suggests that payment should be on a regular basis, not just one time, and directly proportional to the level of the service.

**Land Tenure as RES.** The flip side of cash is conditional land tenure security, used on illegally settled land. Eviction results if the service is not delivered. Rewards are indivisible and are useful for group PES systems. This does not facilitate annual payments, and it poses challenges to conditionality: rewards may be difficult to revoke in the long term even if the environmental service is not sustained.

**In-Kind Support.** Questions exist of enforcing conditionality. Could it bring in migration? Can it be revoked? There are ethical concerns about hypothetical bonuses and fines on a local development budget. This is not so hypothetical.

**Group vs. Individual Arrangements.** For individual versus group contracts, there are high transaction costs dealing with many smallholders, low transactions costs for large contracts. Group arrangements are useful for many small landholders and if there are threshold effects. They reduce transaction costs for the buyer but elicit concerns about elite capture. Agglomeration bonuses are useful where there are threshold effects with large landholders and low levels of coordination. You can avoid transaction costs and get a bonus if your neighbor signs up. TIST is an international small group tree planting program with carbon sequestration credits. There are no threshold effects; there are individual contracts, and simple monitoring and payment schemes with annual payment per live tree.

**Luis Suarez**

### **Rewarding Indigenous Communities for Forest Conservation on Communal Land**

The context: This area is a Biodiversity Hotspot, and we work in Tumbes, Choco, and Madlena. There is a high deforestation rate with significant threats of timber extraction and oil palm plantations.

Reserve Characteristics: Conservation is one of the land uses, under the management of communities. Forest protection involves incentives for health, education, etc., not individual payments. Communities budget how they will distribute the funds along main issues, agree upon new uses, create an emergency fund in each community, and so on. The distribution of benefits is still a challenge. Through working in a general assembly, we can make interesting changes, especially with women's enterprise.

We are working on a trust fund, hoping to build \$2 million. We have been successful raising funds inside Conservation International; we just got a small grant from Forest Trends. We will bundle with biodiversity conservation. However, in Hotspots, conservation costs more.

I am here to talk about common property resources and related issues. One thing we should consider is that these programs are paying generally for CO<sub>2</sub>, water quality, and, less commonly, biodiversity. The other thing we need to recognize is that if we start to recognize ecosystem services as tradable, for them to be marketable, they need to be reduced and simplified. Our whole experience with wetland mitigation involves a situation where a developer develops a piece of land and must compensate for lost environmental services. Wetlands have different ecological value that is very particular: the service may not be matched by a created wetlands in a housing development.

**Administration Issues of PES.** There is a tendency to privatize and internalize the costs of tenure. There is a tendency to communalize because the buyer does not wish to deal with every individual landowner. In the creation of the committee, some rights are being claimed in terms of monitoring, of control over private landholdings. I would argue that it would be more common than we'd expect. Sometimes, in terms of the benefits, privatizing land access isn't worth the cost. It costs institutional resources at the local or state level to do a land titling program to formalize land tenure.

**Politics, Poverty and Ecologically Variable Areas.** Another impediment is that areas are highly ecologically variable (in West Africa). To privatize land tenure would be to increase insecurity. People have multiple mechanisms, ecologically, where resources (vegetation) is highly variable because of rainfall. If you carve up that territory into smaller isolated plots, you increase ecological as well as social variability. For common property and the poor, we've always referred to the poor. This conference is referring to pro-poor strategies. We really need to know and have a clear idea who we are actually talking about. Are they rural-based NGOs representing the poor? Are they local communities? Are they the poorest? There are people who are relatively rich by American standards (land rich, cattle-rich). Economic power maps closely to political power. A truly pro-poor strategy is highly political; there are some impediments to directing programs to help the poor, especially if we are looking at the formalization of common property resources. The poor are the most dependent on common property resources, and formalization of rights. Not only privatization but rights can also work against the poor. Sometimes the rich are the most important people whose behavior should be changed. We need to understand the limits of making things equal. Completely equal payment scenarios might work against the goals of PES.

**Monitoring.** For monitoring and enforcement, we can talk about satellite imagery. One of the benefits of working with local communities is the reduced costs of monitoring, affected by how cohesive communities are. Lastly, certain activities are easier to monitor others. It's easier to cut down a tree and enforce that than to enforce grazing and extraction.

#### **Questions/Answers (for all speakers)**

**Question (to Luis Suarez):** I have a governance question. How is the governance of reserve land different from how the community manages other hectares?

**Answer:** Each family is responsible for their own land. Reserve land is managed communally.

**Question:** Are young households or richer communities more likely to participate?

## Responses:

**Mr. Munoz:** In Mexico, we worked on internal compensation to reduce expansion into the commons. In other areas, bureaucracy captured the funds and used it to manage the area.

**Mr. Suarez:** A sense of ownership takes time and needs facilitation. The goal is to leave the community, but we will add another year.

**Mr. Ramaharitra:** Note the effect of changing power structures.

**Mr. Suarez:** We had a long design phase. We spent a year of talking about general assemblies, doing direct implementation, trying to share ideas and look for common ground. It was helpful that reserves were already in the community. Each community planned for a small reserve.

**Mr. Keith Alger:** I am still unconvinced PES will reach opportunity costs in some of the most important areas because the forces at work are much more powerful than any conservation interest or even the sum of all conservation interests. When we rightfully think how our own influences undermine indigenous institutions or local power structures, one thing is, is it legitimate for us to operate an alternative? The suggestion that PES will have a large impact on power relations seems isolated from the real world that influences power relations we can only wish to approach. There is also ambiguity about what a biodiversity service is. If we are going to get PES, we need to say which goal we're going to prioritize.

## **Lisa Curran      From Timber to Palm Oil: Effects of Bornean Land Use Change on Carbon Emissions, Rural Livelihoods and Biodiversity,**

I want to talk about how we link major markets and domineering industries/market forces with institutions and governance within a system. This is a story of "pulp friction". I started looking at oil palm in a positive way. In sustainability science, we are really linking investment in targets of assessment. The problem of policy-driven science is what kind of information do we need to inform what's going on on the ground? One needs to understand the motivations, incentives, actions of community and link with the jurisdictional boundaries of ecosystems. Indonesia is incredibly diverse. It has the largest carbon stocks and highest plant biodiversity stocks. Its high carbon stocks include lowland peat. Indonesia also has the dubious distinction of have the most birds listed in CITES. Most of the population lives on less than \$2 a day; many are poor in the face of resource extraction. We are looking at trying to provide payments. Indonesia is the third highest greenhouse gas emitter because of land use change. It has tremendous potential in terms of carbon if we can keep forests intact.

**Drivers of Change.** The social, economic, and political drivers of land use change are aspatial, multi-sectoral, local-global, and highly dynamic. We are seeing the greatest demand in China's connections for scrap metal. We see it in current meltdown, how do we link and assess misbehaviors and responses with lags? In looking at historical versus current conditions, how far back do we go? Many studies go back 5-10 years; do we go further back on the continuum? How far back are we seeing changes? One of the most important things about resource dynamics are differential power/access/benefits. These dynamics are really in flux with the national government, generating GNP, employment, in the midst of timber tycoon areas which will

transform areas to pulp and palm plantations. Financial incentives operate at different scales. There are asymmetric games, but economists operate under equal information.

In Indonesia, I'm going to give an overview of 2 major problems drawing attention from Bush: illegal logging and biofuels, especially the question of whether biofuels are the panacea.

**Indonesia—From Logging to Oil Palm.** Oil palm fruits rapidly, produces continually, and the yield is tremendously beneficial. Palm oil is one of the largest global vegetable oils in production. Indonesia and Malaysia control over 88% of global export production. In many tropical areas in the world the crop is preferred in aseasonal rainfall regions. It is mostly economies of scale for production, but smallholders are doing quite well with a few acres. In Indonesia, production is projected to go to 10 million hectares.

Initially, Suyanto took all forests and made them part of the state. The land use legacy was a brilliant move for political patronage, providing land to tycoons and officers, and causing outer islands being occupied and producing valuable timber. Across Borneo are 375,000 timber concessions; 80-90% of these areas are lowland forest. Logging here is six to ten times that in the Amazon basin, with more wood-flow out of Borneo. The rent process is really disrupting. Through the use of remote sensing, we conduct detailed case studies to coarse global scales across the country. Many of these are regional studies. We found about 80% of the study island occupied by timber concessions. Instead of shifting cultivation, there were shifting loggers across the landscape. This had an effect on the downstream wood cartel, with wood-based industry downstream; timber companies started to recognize a shortage. There was a major collapse of the industry.

The oil palm industry worked with the government for subsidies, tax breaks, and interest-free loans, and then occupied the former timber concessions part since 1990. There has been a 40-times increase in the clearing of large-scale areas. We witnessed a large-scale clearing, and one of the assessments found tons of carbon being removed. We really tried to itemize the quantitative role of each timber company. Trees were converted to particle board, pulp, and paper. Over 3 million people are affected, without a voice, representation, or input into the process. We worked on oil palm plantations, but had difficulty with access. Areas were being converted without transparency. Politicians want to make Kalimantan the oil palm capital, but they won't release information.

The timeline from timber to palm oil is concurrent with when Indonesia ranked the most corrupt. There was a constellation of factors influencing the proliferation and spread of palm oil, as policies and structural adjustment opened Indonesia to foreign investment.

**Studying aspatial, convergent factors.** Biofuel subsidies and policies that are driving up prices. Oil palm is an edible oil, but it shifting toward biofuels with rising prices. Foreign investment from China and Lalai DFI is causing massive speculation and proliferation. Here, you need a lot of capital to build crude processing facilities. This had a huge boom-bust cycle. The players are the US, EU, China, and diversified conglomerates, including the wood/pulp/oil palm conglomerate. We are now seeing labor migration from China onto the island. We are seeing degradation when looking at timber concessions overlapping plantations. Using MODIS, we found that 68% of lowlands below 500 m have been lost, mostly through burn and large-scale change. 90% of choice areas for oil palm are below 200 m elevation. Using the Carnegie land assessment system, we are looking at change from 1990-2000 at whether the forest state was disturbed or less disturbed. Looking at modeling changes with land cover over time spread to almost all regional lowlands.



In the 1990s, during a time of drought, logging plantations brought roads, which opened areas for fire spread. Increased fuel loading from more drought resulted in feedback loops, with investments and linkages from timber. Have we reached a tipping point? We are seeing droughts, lots of fire annually, and possibly intentional burning and clearing. We are seeing widespread proliferation of annual forest loss, with 60% associated with oil palm coverage within 500 meters of degraded logging land.

**Conservation Work.** The local district manager pressed for convictions of logging brokers. One day they confiscated \$4 million in timber. There has been a lot of re-growth. The EU had a forest law and environmental governance program: this was one of the largest success stories of EU program. It was a lot of the work tracing chain of custody. Ecological Considerations in this area include: how do we focus? Can we work on degraded lands? How can we look to address the definition of degradation? How do we shift the burden of proof to companies and prove that we're doing the right thing (to Cargill, Unilever).

**Sustainable Palm Oil and Poverty.** Once the palm area is a holding, we need to look at sustainable practices. With respect to poverty, can timber and oil palm generate local revenues? Extractors have liquidated natural resources without reinvesting. >35% are living below the poverty level according to a UN Assessment. Resources went to elites in Jakarta. Looking at a large, extended group of village communities, we are trying to make voices and concerns heard. Poverty, health problems, and a lack of electricity occur throughout communities. We are now mapping landholdings via participatory counter-mapping and trying to facilitate renegotiation with companies. The greatest concern for pro-poor oil palm is rapid change through the years with livelihood implications. The community is no longer food self-sufficient. Another challenge is the reinvestment of revenues.