

Upland agriculture as a provider of ecosystem services?¹ (session 9)

I. Session Description

The development of modern agriculture has had a profoundly destructive effect on the environment, significantly reducing the capacity of ecosystems to provide the supporting, provisioning, regulating and cultural functions that sustain human life. Recuperation and/or preservation of these ecosystems functions motivate efforts to curb agricultural expansion and convert agricultural land back to its natural state, usually forest, wetland or páramo.

There is a growing body of evidence, however, that suggests that the impacts of agriculture on ecosystem services may not be uniformly negative. It may not be agriculture per se, but rather specific land management practices within agriculture that are harmful. Many of the practices in so-called sustainable agriculture—ie soil and water conservation, integrated pest management or agroforestry—can, especially if applied over large areas, have significant effects on biodiversity, carbon stocks, and catchment hydrology. Some agricultural systems, such as rice paddies, may also perform some of the services provided by natural systems such as wetlands.

The implications of agriculture as a provider of ecosystems services could be important, especially in developing countries facing difficult tradeoffs between food production, poverty alleviation and environmental conservation. Changes in land management, as opposed to land use, may also be easier and less costly to achieve.

The objective of this session was to assess the potential of agriculture as a provider of ecosystem services, especially but not exclusively those related to water, and to identify priorities for research and development (R&D). Participants were asked to address three major issues:

1) What services can agriculture provide and will they be sufficient to meet the demand?

Agriculture may not provide the same level and quality of some services as other land uses. Further, for those services that agriculture can effect, eg erosion control, evidence from some parts of the world suggests that agriculture is not the main contributor to the problem and therefore may have limited impact on the solution. Are there priority regions or agricultural systems that should be the focus of efforts to increase provision of ES from agriculture? How can we use advances in GIS and modeling to identify these areas?

¹ Organized by Nancy Johnson, Theme 2, CPWF. Former title: Paying for nature.

2) *What mechanisms are most appropriate to facilitate service provision?*

PES schemes can be based on a range of economic incentives, i.e., markets, subsidies, certification and price premiums. Evidence from past studies on adoption and diffusion of eg soil and water conservation practices, however, show that non-economic characteristics such as education or social values also play a significant role in the decision to adopt. It is likely that a combination of market incentives, policies and education will likely be necessary.

3) *Which farmers are likely to benefit and what groups might be harmed?*

The biophysical characteristics of the farms and the watershed, the individual and household characteristics of farmers, and nature of the social and institutional environment in which they are located will all affect the willingness and ability of farmers to become environmental service providers. The possibility of capturing new income streams from environmental service provision may change the relative returns to resources such as land, labor, and capital, which will have implications for those who own or otherwise access those resources.

II. Session Results

Process

Nancy Johnson made a brief overview presentation, and Jorge Rubiano, Sam Fujisaka and Annette Huber-Lee introduced the three issues for discussion.

Groups were formed around issues 1 and 2, and 3 was a cross cutting issue to be addressed by all groups.

Each group was asked to answer two specific questions:

1. What ES are or could be provided by agriculture in the areas where you work
2. What are or might be the main challenges to implementing a pro-poor PES scheme?

The purpose of these questions was to get people talking in groups and sharing experiences as a way to help them move towards answering the larger questions that each group was asked to address.

There were 2 tables (6-8 people per table) dealing with question 1 and 3 tables working on question 2.

Results

1. Examples of PES

The first question was designed to get people thinking and talking about the potential for PES in the areas where they work. We did not expect that people would have direct experience with ongoing agriculture-based PES schemes since few exist. What we wanted was to see whether the concept of ag-based PES would be relevant to the range of environments where the participants were working.

All groups were able to identify land management practices or environmental problems that could form the basis of PES scheme. Some people mentioned setting aside land in upper catchments or planting trees, which while valid in terms of ES generation do not have a clear connection to agriculture. The potential for ag based services included:

a) Land management practices that could generate benefits:

Soil and water conservation (water harvesting– flood control, H₂O storage, more soil cover; conservation agriculture; napier, vines, trees on contour)

Rice paddies contribute to groundwater recharge, flood control, erosion control, water storage.

Organic farming – increases water quality, improves soil quality, improves human health

Integrating fishing into farming was identified but the environmental benefits were not specified

One group identified a clear environmental problem - rich flower farmers polluting lake Naivasha-but did not specify the solutions that would be promoted via PES. Presumably farmers would be compensated for adopting some kind of **low input agricultural practices**.

2. What do we know about services?

The groups that worked on this topic concluded that the information base on which concrete PES schemes could be based is very limited. The relationships that underlie the examples presented above are known to exist, however they are not sufficiently quantified in terms of how much of an ES would be obtained from a given level of change in land management. This problem is complicated by the fact that relationships may vary over spatial and temporal scales. An example was given where something that appears to be positive in the early years could actually end up generating negative impacts over the long term.

In plenary, not everyone agreed with this assessment of the level of existing knowledge. Erosion models, which were the focus of one of the tables, may be especially poor, however in cases like water quality there may be good information out there.

The overall conclusion was that more research is needed, but that we need to make sure it is generating the “right” knowledge. Presumably this means that we need to ask the right questions in the design of the research, and that these will be different from the questions we are currently asking.

3. What do we know about mechanisms for PES provision?

3.1 Mechanisms

In addition to *direct payments*, the following potential mechanisms were identified as ways for promoting provision of environmental services by farmers

Agrotourism (Monteverde in Costa Rica (preserves made for watershed are now tourist destination; IFAGAO terraces in Philippines, but generally better agroecosystems attract more tourists)

Subsidies – (agriculture support fund, provision of alternative crops, exemption from water charges). effective but can be inefficient and unsustainable

Eco-labeling via high value crops – brings in new resources but since the resources come from outside, this mechanism generates changes on farm without changing whole system. Local beneficiaries of services won’t necessarily see the connections. Also, markets for these kinds of products can be unstable.

Multi stakeholder platforms can be a way to achieve the same outcomes as PES via negotiation rather than via a market-based mechanisms. Compensation (financial or non financial) may still occur, as in PES, however this mechanism was thought to promote a better awareness of connectedness among stakeholders.

Philanthropic –rich people buy land for water supply for poor, to build social capital. So the exchange is that the poor get water and the rich get social capital (ie security)?

It was also pointed out that other *policies*, eg conservation, infrastructure, land use, demographic, water, agriculture, property rights, etc often have the same goals as PES. In general, there was resistance in the group to financially-based PES schemes for sustainability, equity and social reasons. The group felt that PES schemes need to complement existing policies, while the tendency is to see PES as the answer, and to look at whether existing policies facilitate PES rather than the other way around.

3.2 Challenges

The group identified five major challenges to implementation of the mechanisms. They are not mechanism specific, but their relative importance will depend on the specific mechanism being considered.

Compliance – How to ensure that farmers actually implement the land use practices that are required to produce the ES, once they have received the payment or other form of compensation. This is a common problem where monitoring is difficult and costly, and where the consequences of non-compliance, especially in the short term, are not visible. In theory, this problem would not be so severe in ag-based PES since the technologies and practices that generate ES also generate productivity benefits for farmers. The difficulty of ensuring compliance also varies by type of mechanism, ie something like agro-tourism would be relatively easy whereas subsidies or eco labeling could be difficult without a certification or monitoring program in place. Where local people are beneficiaries or where benefits rely on community rather than individual compliance, then local or self-monitoring might be an option.

Monitoring –Monitoring can relate to compliance (as above) but the more interesting issue is how to monitor that actual ES are being provided after the land management changes have been implemented. Given the site specificity of the impacts, the actual levels of ES provided for given levels of land use change are not likely to be known with certainty when a PES scheme is implemented. Thus, careful monitoring over time will be necessary to establish the relationships between land use and ES, to confirm that the scheme is working and to make adjustments if necessary.

Matching benefits – As mentioned earlier, it was felt that strict reliance on financial payments was not the best way to think about PES. Rather, integrating PES into other policies, linking it to broader community development benefits, or providing short term subsidies at the community level would be more sustainable and more pro poor. However ensuring participation requires that benefits be greater than costs for the individual as well as the community, and also that those who contribute more receive more in compensation.

Cause and effect not clear – This issue is explained in section 2 and in the monitoring, above.

Leakages – As mentioned under monitoring, in community based schemes there is always the possibility that benefits are obtained by people who do not contribute. Similarly, given that some of the land management practices that promote environmental services also generate benefits for individual farmers, it is possible that they would have been adopted even without additional incentives.

4 Conclusions (this is what was presented in the open forum)

4.1 Policy implications

Potential is there, but PES is hard and in many areas our knowledge base is not strong.

PES must complement—not replace—other policies such as conservation, infrastructure, land use, demographic, agriculture, etc.

4.2 Development implications

Non financial compensation may be more sustainable and more pro-poor (though this is likely to lead to compliance challenges).

Use PES as a base for linking beneficiaries and creating awareness of interdependencies, via things like multi-stakeholder negotiations or participatory monitoring systems.

4.3 Research implications

1. Need to improve understanding of relationships between land management and ecosystems services. Current knowledge may be answering the wrong questions.
2. Results of current erosion models are not good enough to use as basis for interventions
3. How to link economic valuation results to design of policies and incentives?
4. Design of cost-effective monitoring systems