

Perspectives on Watershed-Based Payments for Ecosystem Services

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Prologue

The University of Guelph, with the support of the Canadian International Development Agency and assistance from other partners, is in the process of carrying out a project entitled *Building Institutional Capacity for Sustainable Rural Development: Tools from Best Practice and Analytical Thinking*. The project has included a series of workshops on Sustainable Livelihoods and Ecosystem Health approaches and a number of policy discussions on current and future rural development issues. This background document has been prepared in connection with the eighth of the policy discussions in the series, being hosted jointly by the International Institute for Sustainable Development (IISD) and University of Guelph, entitled "Using Payments for Ecosystem Services to Promote Watershed-based Natural Resources Management: New Opportunities and New Urgencies for Canada".

At previous events in the course of the project, a few themes have repeatedly emerged, among them the value of organizing rural development policy and programming along bio-regional lines, especially on a watershed basis. In the fifth policy discussion in particular, watershed-based approaches were identified as a way of breaking down sectoral barriers and forcing stakeholders, especially government agencies, to work in an integrated fashion. A watershed-based approach was seen as a way of engaging in rural development in a way that takes the complexity of social-ecological systems seriously. The *Building Institutional Capacity* project and IISD therefore decided to focus the eighth of the policy discussions in this series on watershed management.

Executive Summary

In recent years, there has been a growing body of experience with making direct payments to communities and landowners for particular land management practices and the ecosystem services that these practices provide, including watershed services. Some of these experiences relate to systematic, ongoing programs of payments for ecosystem services (PES). Two PES programs that merit particular attention from Canadian stakeholders are the Alternative Land Use Services program and the Clean Development

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Mechanism.

There exists the potential for a valuable synergy between watershed management and programs of payments for ecosystem services (PES), with potential benefits including the possibility of ready-made markets for ecosystem services, steady flows of funds for watershed management bodies, and an impetus for more ecosystem-oriented governance. There is, furthermore, the potential for multiple co-benefits including provision of income to rural communities, local economic development, and enhanced climate change adaptation. Nevertheless, an examination of watershed-based PES from other theoretical perspectives points to a number of questions and concerns to be addressed. A Sustainable Livelihoods perspective suggests, for example, that one must take care that in operationalizing a PES policy livelihood options for rural people are not closed off. An Ecosystem Health perspective draws attention to threshold effects and the difficulty of knowing how to value ecosystem services, especially if the ecosystem is in danger of a “flip”. It also reminds us that PES are not a substitute for collective analysis and planning for the social-ecological system. Lastly, a perspective from community-based natural resource management highlights the need to pay attention to the intricacies of local land tenure arrangements and power relations, and suggests that implementing PES in a way that does not allow for elite capture of common property resources may be difficult. Despite these concerns, watershed-based PES strategies hold much promise, including for Canadian stakeholders working both domestically and internationally. There is the possibility of mutual learning and cross-fertilization between experiences being gained in developing countries and here at home.

The project, *Building Institutional Capacity for Sustainable Rural Development: Tools from Best Practice and Analytical Thinking* is being executed by the University of Guelph in partnership with the Canadian International Development Agency and other organizations such as IISD.

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Perspectives on Watershed-Based Payments for Ecosystem Services¹

Ecosystem Services and Watershed Management

Payments for Ecosystem Services

Ecosystem services are, simply, the benefits that people receive from ecosystems (Millennium Ecosystem Assessment 2003). Various systems of categorization of these services have been put forward. The Millennium Ecosystem Assessment (2003) suggests four categories: provisioning services, regulating services, cultural services and supporting services (see Table 1). For the most part, the value of these ecosystem services to human beings is not captured in markets or in national accounts, and typically, they end up being undervalued or even completely ignored. It has been estimated that the total global value of ecosystem services, most of which are outside any markets, is between US\$16 trillion and US\$54 trillion (Costanza et al. 1997).

TABLE 1: ECOSYSTEM SERVICES

<p style="text-align: center;">Provisioning Services</p> <p style="text-align: center;">Products Obtained from Ecosystems</p> <ul style="list-style-type: none"> • Food • Fresh water • Fuelwood • Fiber • Biochemicals • Genetic resources 	<p style="text-align: center;">Regulating Services</p> <p style="text-align: center;">Benefits Obtained from Regulation of Ecosystem Processes</p> <ul style="list-style-type: none"> • Climate regulation • Disease regulation • Water regulation • Water purification • Pollination 	<p style="text-align: center;">Cultural Services</p> <p style="text-align: center;">Nonmaterial benefits obtained from ecosystems</p> <ul style="list-style-type: none"> • Spiritual and religious • Recreation and tourism • Aesthetic • Inspirational • Educational • Sense of place • Cultural heritage
<p>Supporting Services</p> <p>Services necessary for the production of all other ecosystem services</p> <ul style="list-style-type: none"> • Soil formation • Nutrient cycling • Primary production 		

(Source: Millennium Ecosystem Assessment 2003)

While there is a substantial and growing body of literature around valuing ecosystem services (E.g., Costanza et al. 1997; Rodriguez et al. in press; Viglizzo and Frank in press), much of it does not focus on direct payments to landowners or other stakeholders, but rather on economic valuation as a means of incorporating environmental values into

¹ Robinson, L.W. and H.D. Venema. 2006. Perspectives on Watershed-Based Payments for Ecosystem Services. Livelihoods and Ecosystems Project Technical Report #2.

national accounts and into decision-making mechanisms, such as cost-benefit analysis, used by various levels government. Nevertheless, in recent years, there has been a growing body of practical experience not simply with *valuing* ecosystem services for incorporation into cost-benefit analysis, but with making direct payments to communities and landowners in exchange for particular land management practices and the ecosystem services that these practices provide. For example, in the 1990s New York City negotiated agreements with landowners and municipalities in the Catskill-Delaware watershed where its drinking water originates. By making these investments in ecosystem services, the city avoided the need for a massive investment in end-of-the-pipe technology, and is thereby saving in the order of hundreds of millions of dollars (Postel and Thompson 2005). Buyers of ecosystem services have also included large development and conservation organizations. For instance, six environmental organizations are working together in Mexico to pay for conservation of habitat for the Western Thick-Billed Parrot (Gullison et al. 2000), and World Bank projects in the Dominican Republic and El Salvador are paying for watershed services (World Bank 2006).

There are some particular synergies that can be expected by linking payments for ecosystem services (PES) and watershed management. With many ecosystem services, the primary human beneficiaries are very diffuse, namely, society as a whole. With watershed ecosystem services, however, the main beneficiaries are typically a very distinct and easily identifiable subset of the population as a whole—usually living or making use of the water downstream. Having an identifiable group of stakeholders who are receiving direct benefits from conservation practices upstream is likely to make a PES policy more politically robust. The fact that there are direct, usually downstream, beneficiaries also means that in some cases, such as with New York City, a potential market is readymade. PES are, furthermore, a potential source of funds for watershed management bodies. Indeed, watershed management may be the ideal context for PES policies, and PES, conversely, may help impel more ecosystem-oriented governance.

This suggests that PES, linked to watershed management, should be supported by systematic and ongoing policy, and not be left to emerge on a case-by-case, as with the examples cited above. Examples of systematic, ongoing PES policies and programs include:

- In the United States, the Conservation Reserve Program (Wu and Babcock 1996; Cooper and Osborn 1998), Water Quality Incentive Projects and the Wetlands Reserve Program (Wu and Babcock 1996);

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- In Costa Rica, the National Forestry Financing Fund (Ortiz Malavasi 2002; Sierra and Russman in press);
- In Guyana, Conservation International's program of purchasing conservation concessions (Rice 2002); and
- In Kenya, the Kitengla Lease Program, which pays landowners to allow wildlife to use their land as corridors (Gichohi 2002).

There are two PES programs that deserve particular attention from Canadian stakeholders, especially policymakers in the fields of agriculture and of international development. The first of these is the Alternative Land Use Services (ALUS) program. Organizations championing this program, such as Delta Waterfowl and Keystone Agricultural Producers, have made a convincing argument for ALUS as being both desirable and entirely feasible (Keystone Agricultural Producers 2005). The program proposes making use of existing facilities such as Crop Insurance Corporations as the conduit through which farmers would be paid for clearly defined conservation measures. The program is expected to contribute to soil quality, carbon sequestration, habitat protection/rehabilitation, enhanced agricultural income, and more sustainable rural communities. Pilot projects are now in the planning stages across Canada (Marion 2004).

The second PES instrument that deserves special attention is the Clean Development Mechanism (CDM). The CDM allows parties to the Kyoto Protocol such as Canada to purchase credits from projects in developing countries that offset greenhouse gas emissions. The recently concluded UN Climate Change conference in Montreal also established *adaptation* to climate change impacts as an urgent development priority, particularly in dryland regions of the world characterized by subsistence agriculture, food and water insecurity, and endemic rural poverty. Aligning Canadian CDM investments with rural watershed development would produce multiple co-benefits for climate change mitigation and adaptation, and poverty alleviation.

Direct Environmental and Economic Benefits

The list of environmental benefits that might be sought from a watershed-based PES policy is long and includes, for example, soil conservation, groundwater recharge, water purification, water regulation/flood control, and provision of habitat. These environmental benefits overlap with benefits of improved economic efficiency, which can be described as having three dimensions:

- *Production efficiency.* Environmental resources are properly valued, thereby leading to a more rational mix of resources in production.

- *Allocative efficiency.* The mix of goods that society consumes shifts towards those that require relatively less use of environmental resources.
- *Dynamic efficiency.* Incentives are created for the development and/or diffusion of technologies that conserve those environmental resources that are under-valued.

(Tilton 1995; Venema et al. 2002)

These environmental and economic benefits can be substantial, as is witnessed by the case of New York City, described briefly above. There is also great potential for similar sorts of benefits on smaller scales. A World Bank funded watershed protection project in Lajeado São José, Brazil, for example, improved water quality so much that the reduction in water treatment costs for the downstream city of Chapecó yielded cost-savings sufficient to have paid for the entire project in only four years (Postel and Thompson 2005). The efficiency of the PES approach can similarly be seen in relation to carbon sequestration for example—the FAO has estimated that carbon sequestration by afforestation will cost between \$2 and \$ 10 per ton, whereas the cost of switching to alternative fuels typically costs \$137 per tonne (Sun and Chen 2000). While this discrepancy may be overstated—carbon credits have recently been trading for around US\$25 per tonne—there is a great, untapped potential for carbon sequestration through afforestation and other ecosystem-based practices. The benefits of PES approaches stand in contrast to the impact of regulatory approaches to environmental protection. With regulatory approaches, there is no incentive for conservation beyond the minimum standard set by the regulation. It has also been argued that PES are superior to regulatory approaches in that regulatory approaches can produce perverse incentives, as with those rural landowners in the United States who destroy habitat in order to avoid restrictions on land use that might accompany the presence of protected species (Langpap in press).

The Potential for Multiple Co-Benefits

As well as the direct environmental and efficiency benefits that can be expected from systematic implementation of a PES policy linked to watershed management, there is also potential for a number of co-benefits. One set of potential co-benefits relates to social and economic development. Firstly, PES could provide a steady stream of income for rural communities. Secondly, the changes in land use practices encouraged by a PES strategy need not be practices that only provide benefits to people living downstream or to society as a whole—instead, a PES policy that aims for maximum leverage could put special emphasis on those investments and changes in practice that add to local natural capital and to the

potential for the development of new businesses. With sufficient foresight and coordination, a PES policy could contribute to economic diversification by targeting, based on context-specific conditions, those ecosystem services that can contribute to ecotourism, sportfishing and hunting, agroforestry, or crop diversification.

A third potential co-benefit is enhanced resilience and adaptability on the part of local communities, and in particular, climate change adaptation. While PES are more commonly associated with climate change *mitigation* than *adaptation*—via the Clean Development Mechanism—PES could be used as a policy tool to encourage water management and agricultural practices that provide greater buffers to droughts, floods, and other stresses and shocks. The original conception of the Clean Development Mechanism promised sustainable development. This was necessary to ensure developing country participation in the Kyoto Protocol. Unfortunately, that promise has remained mostly unfulfilled, as the quest for low cost emissions reductions has focused CDM project development efforts on technologies for improving efficiency in the conventional energy sector with few development benefits (Michaelowa and Michaelowa 2005). Nevertheless, in November 2005, the CDM Executive Board approved in principle a reforestation project in the Pearl River Basin in P.R. China—the first ever project in the afforestation/reforestation category. The project aims at restoring forests in small watershed areas in Southern China and is part of the CDM portfolio of the World Bank. The project objectives are four-fold:

- to sequester CO₂ through forest restoration in small watershed areas;
- to enhance biodiversity conservation;
- to improve soil and water erosion control;
- and to generate income for local communities.

The Pearl River Basin project establishes important methodological precedents, providing a model for other potential CDM projects that link carbon sequestration, livelihoods activities, and landscape and watershed rehabilitation—thus simultaneously mitigating climate change and reducing vulnerabilities to climate change impacts.

There are also potential co-benefits for watershed management. Watershed management bodies, because their boundaries cut across the boundaries of long-established jurisdictions, because they seldom fit easily within existing constitutional distribution of authority, and because they may be perceived as potential threats to the authority of existing jurisdictions, are difficult to fund. PES, whether made by downstream beneficiaries as in the case of New York City, by central government, or by both, could be a

means of funding watershed management bodies. However, it is perhaps unwise to assume that PES alone could adequately fund watershed management bodies, especially at the early stages when a great deal of investment into capacity building is needed.

On the other hand, there are existing pools of funds that could be redirected to PES. For example, in many parts of the world existing expenditures on agricultural subsidies and crop insurance are huge. In Saskatchewan, the crop insurance program paid out \$331.5 million in 2001, \$1.07 billion in 2002, and \$345 million in 2003 (Saskatchewan Crop Insurance 2004). Canada-wide, federal and provincial programs paid a combined total of \$3.7 billion in farm income Safety Net programs in 2001 (Goodale 2002). Redirecting even a small percentage of these funds into PES would provide an incentive for more environmentally friendly farm practices, and, if structured on a watershed basis, could potentially provide a stream of funds for locally-controlled watershed management bodies. The existing program of "Equivalent Environmental Farm Plans", which encourages Canadian farmers to form groups for the execution of collective plans based on beneficial management practices, provides some of the institutional building blocks for the creation of the watershed management bodies through which PES could be funneled. Existing pools of funding in developing countries are not nearly as large as those associated with agricultural insurance and subsidies in developed countries; nevertheless, the need for finding "new" money could be reduced by facilitating arrangements between urban water suppliers and rural communities upstream.

Watershed-Based PES Examined Through Other Lenses

A Sustainable Livelihoods Perspective

Any policy that aims to have an impact on agriculture, watershed management, economic incentives, and sustainability will, perforce, be operating in a complex social-ecological environment. In order to avoid too narrow an assessment of the potential second and third order impacts of such a policy, a systemic analysis must be made. As a tentative contribution to such systemic analyses, the possibility of a coupled PES-watershed management policy is briefly examined here through three sets of "lenses": Sustainable Livelihoods, Ecosystem Health, and community-based natural resource management. This examination is not meant to give the final word on watershed-based PES, but rather to identify concerns and questions that need to be addressed.

The origin of the Sustainable Livelihoods (SL) approach is generally attributed to Robert Chambers and Gordon Conway and their 1992 discussion paper. The approach outlined was both descriptive and normative. It was, on the one hand, a social theory about how poor people, especially rural poor people, draw on a complex variety of capabilities, assets and entitlements to create a livelihood, and, on the other, a prescriptive framework for development practitioners to plan and act in recognition of that complexity². Although initially elaborated with developing countries in mind, it has also been applied in countries such as Canada (E.g., Fuller et al. 2000).

One of the insights of the SL approach is that people draw upon a diversity of assets in the process of creating a livelihood. These assets are typically described as falling into five categories of capital: financial, physical, social, human, and natural. Making investments in natural capital can be particularly problematic, especially for the poorest members of a community. A PES policy has the benefit of providing incentives for investment in natural capital, which may be particularly important when rural landowners are constrained by debt, fluctuating prices and other factors and are impelled to focus on short-term survival and solubility rather than on investing in the future. The SL approach also encourages looking at the complete *set* of assets that people draw upon, and so for any new policy that is meant to open up opportunities, a question to be asked is, “Do people have the complement of the financial, physical, social, human, and natural capital that they will need in order to take advantage of the new opportunities?” More specifically, if a PES policy is attempting to encourage new farming practices, then we will want to ask whether farmers have the equipment, the know-how, the markets and so on to allow them to successfully undertake these new practices—PES might be only one prong in what would need to be a multi-pronged policy.

The SL approach puts great emphasis on diversity of livelihood strategies and activities. As well as engaging in a diverse array of livelihood activities at any one time, rural households often also have an array of fallback activities in which to engage in times of crisis, and desired activities that they plan to engage in if the necessary assets can be acquired (Robinson et al. 2006). The importance of this diversity for livelihood security should compel policymakers to ask, of any policy, what it does for people’s options.

² Starting points for reading on the SL approach include (Chambers and Conway 1991; Institute for Development Studies 2006; University of Guelph 2006).

Generally, PES appears favorable in this regard: being a voluntary program of financial incentives, the strategy creates new options. The devil, however, is in the detail, and one would also want to ask questions such as, “Will participation in the scheme require landowners to make changes to their landscapes that would not be easily reversed?”, “Is there a minimum amount of land needed to participate in the scheme and how feasible is participation in the scheme for smallholders?”, and “If some land in a local ecosystem is transformed because of the scheme, will there be effects on agroecology on neighboring land?” An assessment of this detail must aim at answering the question of the particular PES policy will open up options or close options off.

An Ecosystem Health Perspective

Ecosystem Health (also called “Ecosystem Sustainability and Health”—either way, *ESH*) emerged in the context of growing recognition of the complexity of ecosystem dynamics and, more broadly, of the complexity of *social-ecological* systems. The use of *health*, as a concept or metaphor, provides us with a way to think about goals without providing predetermined, pat answers that cannot function within the context of complex social-ecological systems. As an analogy and a framework, *health* is useful in that the health sciences ask questions similar to the types of questions that we should be asking about these systems, and the language of health, including the ideas of screening, diagnosis, risk factors, and fitness, is widely understood by the general public and therefore may be particularly appropriate (Waltner-Toews 1996)³. The complexity of social-ecological systems has several implications for working towards ecosystem health:

- Ecosystem Health is a continually re-negotiated outcome, accommodating multiple perspectives and trade-offs
- Power and information are key elements in this negotiation: there is a need for equity and free flow of information
- Ecosystem Health is multi-level. We need to pay attention to cross scale contradictions—individual and community health, population sustainability, ecosystem self-organization
- Ecosystem Health is not stable over time because socioecological systems are not stable over time (“the mirage of health”)
- Achieving Ecosystem Health requires an integration of analysis and management in an adaptive process that fosters self-organization

³ Key readings on ESH include (Waltner-Toews 2004; Network for Ecosystem Sustainability and Health 2006; University of Guelph 2006)

(Robinson et al. 2006)

One of the emphases of ESH is on identifying and understanding feedback mechanisms in the social-ecological system(s) in question. For example, a technique that is commonly used in ESH to make sense of complex social-ecological systems is to develop influence diagrams showing the critical positive and negative feedback loops in the system (Waltner-Toews et al. 2004). A particularly important class of feedback mechanisms is economic incentives, and PES strategies have the benefit of building appropriate incentives into social-ecological systems. However, application of incentives is confounded by the fact that ecosystems do not always exhibit linear behavior: they frequently have buffers that can absorb stresses and shocks up to a certain point, but beyond that point they may undergo a sudden “flip” into a new configuration that is difficult to reverse. For example, lakes can suddenly flip between benthic or pelagic states, and rangelands, once degraded, are often very resilient to attempts at restoration. What this means for economic valuation and incentives is that the value of any particular practice can vary greatly depending on the state of the ecosystem—the value of a restriction on placing straws on a camel’s back depends on how many straws the camel is already carrying, and is problematic when we do not know how many straws the camel can carry. While this is not an insurmountable problem, economic valuations and incentives tend to be linear in nature and less reliable when the ecosystem is in danger of a flip (Limburg et al. 2002). This suggests that the size and nature of incentives in a PES policy must be constantly revisited in light of investigations into the resilience of, and stresses on, the ecosystem that is being targeted. Exactly how to do this—create a PES system that has a role for ecosystem monitoring, that responds to learning and that allows for site-specific approaches—is an interesting policy challenge.

In planning based on the ESH approach it is critical to involve multiple stakeholders and to have their various perspectives contribute to a collective understanding of the social-ecological system that is being planned for. If we accept that a PES strategy is needed and that it can make a valuable contribution to watershed management, there remains the question, then, of who decides which ecosystem services should be paid for. A system of PES does little to help stakeholders understand their social-ecological system and is not a substitute for collective planning for that system. This is not a criticism of the notion of using PES to contribute to watershed management, but simply a recognition that other questions and concerns still exist.

A Community-Based Natural Resource Management Perspective

As mentioned above, one of the strengths of PES is the potential for funneling funds to resource management institutions such as watershed management bodies. But analyzing the difficulties of watershed management as a problem of *common property management* must go deeper than this. There exists large body of *commons* literature, some of which addresses watershed management and does so in very different language than *payments for ecosystem services*. Much of the impetus for the development *commons* scholarship was Garret Hardin's influential paper "The Tragedy of the Commons" (1968). Hardin's work has been thoroughly criticized by the *commons* literature for its assumption that for natural resources only three possibilities exist: private property, strong central government control, or disaster. The bulk of the *commons* literature offers evidence of a fourth possibility—*communal* resource tenure—and emphasizes that communities can and have overcome problems of resource overuse and the "tragedy of the commons" by forming collective institutions to regulate their own behavior. The policy implication has been funding and programming to support community-based natural resource management and co-management, with much of the focus being on creating and/or building the capacity of community-level organizations that engage in natural resources management. Much of the focus has been on the community level, but increasing attention is being paid to multi-scale resources and to resource management that is community-based but multi-scale and appropriate for watershed management (E.g., Ostrom et al. 1999; Lovell et al. 2002; Young 2002; Dietz et al. 2003).

There is some danger that PES strategies may commit the same error that Hardin did. Pearse (1992), for example, contrasts market-based approaches to managing natural resources with regulatory, "command and control" approaches, and, like Hardin, ignores the possibility of community-level management and regulation of natural resources. One of the potential difficulties of PES programs is that the buyer of ecosystem services, typically the government, has less information about a landowner's resource setting and land management practices than the landowner himself, creating the potential for moral hazard and difficulties for enforcement and compliance (Wu and Babcock 1996). Community-based watershed management may be better able to overcome these difficulties than a government-created PES scheme.

Even in cases where community-based management works in tandem with PES, we must ask whether the PES incentives could create a dynamic in which watershed

management bodies become focused exclusively on maximizing financial benefit, thereby reducing the impetus for collective action and for holistic ecosystem management. Although the aim may be to foster healthy, resilient ecosystems in a broad sense, a PES policy would need to target particular ecosystem services and particular land and water management practices—if a PES policy were to be implemented, we would need to be alert to the danger of the indicators being mistaken for the goal and of losing sight of management of the ecosystem as a whole.

Another frequent theme in the commons literature relates to differences in power, differential access to resources, and the importance of common property resources for the poorest (E.g., Moorehead 1989; Béné and Neiland 2004; Johnson 2004). PES programs are usually structured so that payments go to landowners; however, in societies with significant numbers of landless rural people, there is a danger that the program would deepen disparities and, if landowners are induced to take land out of production, potentially reduce the demand for farm labor. Furthermore, in many developing countries, land may be cultivated during the farming season by one person, be governed as common property during the off-season, and ultimately “belong” to the community, the clan or the chief. In such cases, who should be the recipient of PES? If not informed by a sophisticated analysis of land tenure arrangements and power relations, PES policies are likely to contribute to elite capture of resources and a shift from communal tenure to private property.

Conclusion

There is a growing body of Canadian experience in watershed management and dryland soil conservation and restoration. Examples include the South Tobacco Creek Project (Deerwood Soil and Water Management Association 2006, Tobacco Creek Model Watershed 2006), Equivalent Environmental Farm Planning, and the experience of the Prairie Farm Rehabilitation Administration both in Canada and in developing countries. Possibilities now exist to expand that experience and link it with PES through programs such as Alternative Land Use Services and the Clean Development Mechanism. These possibilities are, furthermore, congruent with current directions being emphasized by the Canadian International Development Agency. In its recent International Policy Statement, CIDA (2005) articulated several important principles for defining Canada’s role:

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- Country-driven, community-based approaches to the management of natural resources and ecosystems are an essential element for poverty reduction.
- Canada is also a leader in environmental know-how, including areas in environmental science and natural resource management such as dryland agriculture, soil conservation, watershed management, and sustainable forest management. As such, Canada will invest in environmentally sound technology as well as active adaptive management in developing countries...
- Protecting water supply, including through ecosystem-based approaches to watershed management, is fundamental to providing access to safe water and maintaining a healthy population.
- Canada is committed to capacity building and exploring opportunities that support efforts by least developed countries that offer both mitigation and adaptation benefits, including sustainable agriculture and forestry, watershed management and bioenergy systems.

Linking PES to watershed management and building on existing Canadian expertise in this area is a way to take action on these important principles. PES are not a panacea: perspectives based on Sustainable Livelihoods, Ecosystem Health and community-based natural resource management highlight questions and concerns that would need to be addressed in the implementation of watershed-based PES programs. On the other hand, such programs have great promise for contributing to protection and more sensible use of natural resources.

In addition to the questions and concerns highlighted above, there are a number of issues to consider in working to make watershed-based PES a reality:

- Watershed-based PES strategies will often require capacity and institution building—how can these and other “up-front” investments be financed?
- How can watershed-based PES be implemented in a socially just way in societies where much of the land is common property?
- What possible synergies exist or can be developed between domestic and developing country experiences in these areas?
- What kinds of structures and processes would facilitate learning and sharing of lessons and experiences in watershed-management?

Answering these questions may produce interesting new directions for organizations such as CIDA, IISD, and PFRA.

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