

P.O. Box 11214  
Hatfield, 0028  
Pretoria  
SOUTH AFRICA

Phone: +27(0) 12 431 7900  
Fax: +27(0) 12 431 7910



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# Exploring the Link between PES and Poverty Alleviation

**Author:** Xolani Sibande

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## Glossary

**Biodiversity:** The variety of life forms within a given ecosystem, biome or the entire Earth ([www.wikipedia.org](http://www.wikipedia.org)).

**Carbon Sequestration:** is a technique for the long term storage of carbon dioxide and other forms of carbon, for the mitigation of global warming ([www.wikipedia.org](http://www.wikipedia.org)).

**Environmental Services:** is defined as conservation effort that either leads to the reduction of negative environmental externalities or provision of additional positive environmental externalities (Zilberman et al., 2008).

**Government Financed Programs:** Payments for Environmental Service programs in which the service buyers are a third party (typically government). Government financed programs are typically voluntary on the environmental service provider side. Programs are financed through user fees and the fees are mandatory (Wunder et al., 2008).

**Invasive Alien Species:** plants, animals and microbes that are introduced into countries, and then out-compete the indigenous species ([www.dwaf.gov.za](http://www.dwaf.gov.za)).

**Land Diversion Program:** PES program where land use is diverted from agricultural production to other land uses -presumably other land uses that create positive environmental externalities - (Zilberman et al., 2008).

**Payment for Environmental Services:** is defined by five main characteristics a) a voluntary transaction, b) where a well defined environmental service or land use, (c) is 'bought' by a service buyer (minimum one), (d) from a service provider (minimum one), and (e) if and only if the service provider secures provision of the environmental service (Wunder, 2008).

**User Financed Programs:** Payments for Environmental Service programs in which environmental service buyers are the actual environmental service users (Wunder et al., 2008). User Financed Programs are typically single user and single buyer arrangements.

**Watershed services:** Can include the PES programs that reduce floods, protect watersheds, improve water quality, reduce soil erosion, improve water supply, and improve recreation ([www.wikipedia.org](http://www.wikipedia.org)).

# 1. Introduction

Increasingly natural capital is becoming the limiting factor in economic activity. Terms such as *sustainable growth* and *green economy* have been used to describe an economic growth path that does not lead to the destruction of the environment. Governments have used what is described by Bulte, Lipper, Stringer, and Zilberman (2008) as command control intervention based on the ‘polluter pays’ principle. Command control interventions include the application of carbon taxes and cap and trade which can be difficult to implement for political and legal reasons. Challenges to implementation include high transaction costs and lack of cheaply available information on the value of environmental services. According to Bulte et al. (2008:246):

“Economist realise that generating positive environmental externalities, as well as managing public environmental goods, generally necessitates public policy intervention of various forms. Until now, governments’ attempts to correct environmental externality problems have primarily be through the use of command control and other forms of direct intervention, which are fairly easy to implement, but can be quite inefficient.”

Payment for Environmental Services (PES) is an evolution from the command control intervention and the ‘polluter pays’ principle. PES is a facilitation vehicle that introduces economic market forces to environmental conservation. PES seeks to introduce market efficiencies to the management of scarce environmental services (ES). Therefore PES provides a framework within which the free rider problem can be addressed by creating a market for ES. Furthermore PES is fundamentally an environmental conservation vehicle and any other benefits that may accrue to it are secondary.

In addition PES provides can provide a platform through which poverty alleviation initiatives can be based. According to Wunder (2008:279):

“At a time when overseas development assistance has become increasingly focused on poverty reduction it is no surprise that innovative management tools like ... [PES] are also scrutinized for their potential to contribute to this goal. Much hope exists that poor providers of environmental services (ES), such as remote upland farmers, can raise their incomes by receiving PES form allegedly richer ES buyers, such as urban water users or global carbon- sequestration buyers.”

The potential benefits of PES provide an opportunity for governments in developing nations to facilitate the implementation of PES as one of the mechanism through which governments reduce poverty – especially among rural communities who are custodians of ES in their regions.

Evidence suggests that PES had positive results in the provision of ES (S’Anchez-Azofeifa *et al.* 2007; Redondo, 2005; Sierra & Russman, 2006; Jourdain *et al.*, 2009). Specifically, although

evidence is limited PES had positive results in contributing to poverty alleviation initiatives,<sup>1</sup> and theoretical links between poverty alleviation and PES have been established<sup>2</sup>.

PES can be a significant tool to poverty alleviation initiatives. However PES is fundamentally an environmental conservation strategy and not a poverty alleviation strategy. Poverty alleviation is a secondary goal in PES. Indeed, whilst “PES is not a magic bullet for poverty alleviation, there can be important synergies when program design is well thought out and local conditions are favourable” (Pagiola *et al.*, 2005:248). “Synergies” referred to secondary effects (poverty alleviation) of positive environmental externalities that flow in the presence of proper program (conservation with poverty alleviation in mind) design and local conditions (emphasising the role of government).

Redondo (2005) demonstrated that for PES to be successful as an environmental conservation strategy it needed to be followed by secondary poverty alleviation benefits, using carbon sequestration PES. The author emphasised the need for proper measurement measures (such as biomass estimators which measures the effectiveness of plants to sequester carbon) in measuring PES’ success or failure. The above suggests that proper conservation strategy supersedes any poverty alleviation ambitions in PES initiatives. This should be noted because without the realisation of positive environmental externalities, poverty alleviation flowing from PES is only a “pipe dream”.

Wunder (2008) further cautioned against the use of *multiple side objectives* in PES programs can reduce the efficiency of PES. Multiple side objectives involve using PES for objectives that are not directly related to PES such as health and education initiatives for poor PES participants. This does not mean that PES is contradictory to other poverty alleviation initiatives and that information from PES initiatives could not be used in poverty alleviation initiatives. The objectives of PES must be centred on delivering positive environmental externalities, and therefore on benefits from this contributing to poverty alleviation; PES must however fundamentally not be seen as a poverty alleviation strategy at its core (Pagiola *et al.*, 2005).

In South Africa, PES is experiencing limited scope of implementation and the most prominent example of PES is the Working for Water (WfW) programme in the Department of Water Affairs ([www.dwarf.gov.za](http://www.dwarf.gov.za)). Extensive natural restoration efforts which can, to some extent, be classified as PES, are currently underway in South Africa.<sup>3</sup>

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<sup>1</sup> See Franco-Maass, Nava-Bernal, Endara-Agramont & González-Esquivel (2009); Kosoy, Corbera, & Brown, (2008); Locatelli, Rojas & Salinas (2008); Pagiola, Arcenas, & Platais (2005) and Suyanto, Noviana, & Leimona (2007).

<sup>2</sup> See Bulte *et al.* (2008); Zilberman, Lipper, & McCarthy (2008) and Wunder (2008) for instance.

<sup>3</sup> See Blignaut, Marais, Rouget and Tregurtha (2009) and Mills, Blignaut, Cowling and Skwomo (2009) amongst others.

PES in South Africa is experiencing limited scope of implementation as a result of limited government participation and therefore funding (Blignaut *et al.*, 2009). There are limited institutional mechanisms for the implementation of PES flowing from limited government participation in PES. Blignaut *et al.* (2009) propose that PES could be implemented in conjunction with government sponsored poverty alleviation programmes such as the Community Works Programme which is part of the wider Second Economy Strategy as a method of demonstrating the potential of PES in contributing towards poverty alleviation.

It is the contention of this paper that the implementation of PES is constrained by the limited understanding of the link between PES and poverty alleviation. As such the purpose of this note is to contribute towards improving understanding of the PES and poverty alleviation link by identifying relevant international experience on such link and to draw some lessons from international experience for South Africa.

This paper is organised as followed: following this introduction, attention shifts to a discussion that establishes the theoretical framework of the link between PES and poverty alleviation. Next, a discussion into the PES experience in South Africa is set out followed by a discussion into the major PES programmes internationally. The paper then concludes.

## **2. Theoretical framework for linking PES with poverty alleviation**

The question of when could PES contribute towards poverty alleviation or when could PES benefits contribute towards poverty alleviation is dependent on the type of PES program implemented, persisting local conditions, and PES participants involved. Zilberman *et al.* (2008), Leimona *et al.* (2009), and Wunder (2008) offered theoretical frameworks under which PES can produce ES with pro poor characteristics. We discuss these next.

### **2.1. Distributional impacts with land diversion**

Zilberman *et al.* (2008) investigated the conditions under which land diversion (PES programme) could benefit the poor under a neoclassical framework. The framework *inter alia* consisted of two goods (agricultural good and ES), three actors (rural landowners, rural landless and urban consumers who are the beneficiaries of ES), the assumption that ES is generated from diverting land from agriculture to other services, the assumption that PES which results in improvement of urban environmental quality without financial compensating the farmers would not provide any ES, two markets (the goods and labour markets) and full employment of labour. In this framework under neoclassical maximisation conditions the introduction of PES has the following impacts on the production of agricultural output and labour supply):

- Land diversion can reduce the amount of agricultural output, along with land allocation to agriculture but also increase the agricultural output price;

- Land diversion will reduce the wage rate of the labour force if the demand for agricultural output is sufficiently elastic but when demand for agricultural output is inelastic the wage rate increases (Wage is traditionally paid to labor in neoclassical models, other actors receive some sort of rent or profit; wages are likely to be inelastic when access to international markets is costly.)

The above suggest that the distributional impacts for the poor are not clear cut, that is, there is an interaction of economic variables which creates tradeoffs. The situation is theoretically set out as follows:

For the urban poor: 
$$\Delta W^U = -\Delta pQ + \phi Z^u \tag{1}$$

where  $\Delta W^U$  is the change in the welfare of the urban poor due to the introduction of land diversion PES program;  $-\Delta pQ$  is the negative impact of an increase in the price of agricultural output as result of the land diversion PES program;  $+\phi Z^u$  is the positive impact of improved environmental quality (ES) to the urban poor due to the introduction of land diversion PES program.

For the landless poor: 
$$\Delta W^{LP} = -\Delta pQ + \Delta w \tag{2}$$

where  $\Delta W^{LP}$  is the change in the welfare of the landless poor due to the introduction of land diversion PES program;  $-\Delta pQ$  is the negative impact of an increase in the price of agricultural output as result of the land diversion PES program;  $\Delta w$  is the positive impact of increased wage rate due to the introduction of the introduction of land diversion PES program.

For the poor landowners:

$$\begin{aligned} \Delta W_n^{PL} &= l_n \{ \sigma_n(p, w, v) [v\delta_n - p\alpha_n f(x_n^*) + wx_n^*] \\ \Delta W_n^{PL} &= l_n \{ \sigma_n(p, w, v) [v\delta_n - p\alpha_n f(x_n^*) + wx_n^*] \\ &\quad + \Delta w(1 - x^*l_n) + \Delta p[\alpha_n f(x_n^*)l_n - Q] \\ &\quad + \Delta w(1 - x^*l_n) + \Delta p[\alpha_n f(x_n^*)l_n - Q] \end{aligned} \tag{3}$$

where  $\Delta W_n^{PL}$  is the change in the welfare of farm holders.

$l_n$  is the land area of landowner n (n is an indicator of income since larger farm holders are able to produce at higher output assuming full employment).

$\sigma_n(p, w, v)$  is an indicator function for participation (a function of prices ( $p$ ), wages ( $w$ ), and the price of the environmental benefit per unit of land ( $v$ )), 1 means that benefits -

$(v_{1n})$ :  $b_{1n}$  is the environmental benefit per unit of land - from land diversion PES are greater than benefits -  $p\alpha_{1n} f(x_{1n}^1) + wx_{1n}^1$  .

$x_n^*$  is the agricultural input good at maximum for land type n from agriculture before introduction of PES at maximisation;  $\alpha_n$  is a technology factor.

$\Delta w(1 - x^0 l_n)$  is the wage rate effect due to the introduction of land diversion PES program ( $x^0$  is the initial input good).

$+\Delta p[\alpha_{1n} x_{1n}^1 + f(x_{1n}^1 0)] l_{1n} - Q$  is a price effect on consumption with  $-\Delta p Q$  likely to reduce welfare.

The effects of an introduction of a Land Diversion programme can be complicated and therefore require careful design and implementation of such programs. Table 1 summarises the distributional outcomes of such programme.

**Table 1: Summary of distributional impacts of land diversion PES**

<i>Economic sector</i>	<i>Potential positive impacts</i>	<i>Potential negative impacts</i>	<i>Conditions for positive impact on poverty reduction</i>
Urban consumers	Consumption of ES	Increase in food prices where PES has significant impact on supply, demand is inelastic	PES benefits high (e.g. flood protection, water quality) PES has small impact on food supply, demand is relatively elastic
Rural landless	Increase in wage rates where PES leads to higher labor demand	Increase in food prices Drop in wage rates if PES results in release of labor	Increased wages offset potential negative impacts of higher expenditures on food
Landowners	Increase in land rent: 1. From PES payment 2. From increase in agricultural output prices Increased agricultural wages, for net sellers of labor	Increase in food prices, for net purchasers of food Increased agricultural wage rates, net purchasers of labor	Price elasticity of demand for agricultural output is inelastic; but product has a low share in consumption budget and household is net seller of labor or PES has little impact on agricultural output supply, prices, and wages. PES impact is mainly through increased rents to land from PES themselves

Source: Zilberman, Lipper & McCarthy (2008:246, Table 1).

## 2.2. Distributional impacts with watershed services and climate mitigation

Leimona and Joshi (2009) postulated a scenario where upstream population provide watershed to the benefit of downstream population.<sup>4</sup> Therefore this upstream population (usually rural poor) provides an ES to the benefit of the downstream population (usually relatively more affluent urban people) that is willing to pay for the environmental service. They demonstrated the conditions required for upstream populations to benefit in this scenario by setting up this proposition: only under certain circumstances will cash from payment for environmental services contribute substantially to increasing disposable income and thus poverty alleviation of environmental service providers. Leimona and Joshi (2009) developed a model based on the willingness to pay of downstream beneficiaries (to pay upstream service providers) in the context of watershed services. :

A PES scheme based on the willingness to pay of downstream services generates a total volume of payments downstream per day:

$$TP_d = A_d P_d I_d B_d \quad (4)$$

where  $TP_d$  is total volume of payments downstream (measured in \$ per day);  $A_d$  is the area downstream (per hectare);  $P_d$  population density downstream (per hectare);  $I_d$  per capita income downstream (in \$ per day);  $B_d$  fraction of income that is potentially available for such payments (also in \$ per day).

As for the per capita benefits expressed as a fraction of the upstream income that can be generated upstream, it can be expressed as:

$$RR_u = TP_d (1 - T) (1 - \alpha_u) (A_u I_u R_u)^{-1} \quad (5)$$

where  $T$  is the fraction of downstream payments needed to cover transaction costs - transaction costs traditionally refer to any cost incurred to facilitate this process - for example the costs of collecting downstream payments -;  $\alpha_u$  is that fraction of what upstream population receives that is offsetting the opportunity costs of alternative uses that might more income but provide less environmental services;  $A_u$  area upstream;  $I_u$  per capita income upstream;  $R_u$  population density upstream.

Substituting (4) into (5), we obtain:

$$RR_u = [A_d A_u^{-1}] (I_d I_u^{-1}) (P_d R_u^{-1}) B_d (1 - \alpha_u) (1 - T) \quad (6)$$

<sup>4</sup> The terms *downstream* and *upstream* can be taken literally in the case of watershed services and more abstractly in the case of climate mitigation (Pagiola *et al.*, 2005).

where Equation (6) represents the per capita benefits as function of dimensionless ratios of land, income and population. This can be used with criterion; for example, Leimona *et al.* (2009) use a criterion of 5% of annual disposable income of upstream rural households as a meaningful contribution to poverty reduction. Incorporating the role of government as an intermediary and government as a source of funds (as is mostly the case in developing countries) into this scenario can produce a framework for evaluating in absolute terms the benefits of poor upstream service providers from watershed services and climate mitigation PES.

### 3. PES in South Africa

In South Africa, PES is experiencing limited scope of implementation and the most prominent example of PES is the WfW programme in the Department of Water Affairs. Extensive natural restoration efforts which to some extent can be classified as PES are currently underway in South Africa. What follows is a discussion of the major points of the WfW program.

The WfW program aims to remove invasive alien plants that pose a direct threat to South Africa's biological diversity, water security, and the functioning of natural systems and the productive use of land. The WfW was established in 1995 to link environmental and developmental goals through the removal of high water consuming invasive alien plants with poor rural employment opportunities (Hope, 2006). The program has evolved into a public agency under the jurisdiction of the Department of Water Affairs, and has a budget of R400 million with the majority of the funding generated through the Reconstruction and Development Program and the Special Public Works Program which became the Expanded Public Works Program. The WfW program is further sanctioned by the legislative requirement that the Catchment Management be established (Turpie, Marais, & Blignaut, 2008). The WfW currently runs over 300 projects in all nine provinces in South Africa using a range on methods such as mechanical methods (felling, removing and burning), chemical methods (using environmentally friendly herbicides), biological methods (using species-specific insects and disease from country of origin), and integrated method (a combination of mechanical, chemical, and biological methods) ([www.dwarf.gov.za](http://www.dwarf.gov.za)).

The WfW program is distinct from international PES experiences (discussed below) in that service providers are previously unemployed individuals that tender for contracts to restore public or private lands, rather than the landowners themselves.

It is generally accepted that PES has exceedingly met its environmental objectives.<sup>5</sup> However it is not clear the extent to which poverty relief objectives have been met. To date 24000 jobs

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<sup>5</sup> See Turpie *et al.* (2008) and Hope (2006) for instance.

have been created, 52% of which were for women from direct participation and further income through value adding industries was generated. According to a study by Hope (2006:139) of three WfW sites, 1) poverty targeting in the WfW was weak, 2) a minor proportion of catchment households benefit from the highly valued employment opportunities, 3) high variability in monthly employment causes financial difficulties for labourers, and 4) program efficiency in proportional allocation of cash flow to non management wage labour. Improvements in understanding the impact of the WfW program is necessary for continued funding of PES, in the backdrop of competing poverty alleviation programs.

## 4. International experience

International experiences with PES have proven difficult to analyse and compare in a meaningful manner. Wunder, Engel, and Pagiola (2008) synthesised PES programs from different countries. Furthermore, the synthesis covered user financed schemes such as the Los Nigros in Bolivia and Pimampiro in Ecuador, government financed schemes such as the Sloping Land Conversion Program in China and Payment for Environmental Services in Costa Rica, and PES like programs such as the Working for Water Program in South Africa. The majority of the programs covered were government financed schemes (eight government financed schemes compared to four user financed schemes). Wunder *et al.* (2008:834) found that there were significant differences between user financed programs and government financed programs:

“The user financed programs in our sample were better targeted, and more closely tailored to local conditions and needs than government financed programs, had better monitoring and greater willingness to enforce conditionality, and had fewer confounding side objectives than government financed programs.”

Wunder *et al.* (2008:850) concluded that PES can be considered an important supply side innovation of directly ‘buying conservation’. This is in the sense that conservation activities are often unattractive to farmers, loggers, fishers and others who manage ecosystems directly and PES is a mechanism of incentives to conserve valuable ecosystems. PES is particular a valuable tool in meeting the increasing need for improved environmental conservation. I present in what follows international PES experiences relevant to South Africa. The cases present evidence that directly “buying conservation” can be beneficial for conservation and the society in general.

### 4.1. Experiences from Costa Rica

Costa Rica has pioneered market based conservation initiatives since the 1970s. The 1979 Forestry Law introduced tax based incentives to landowners to encourage reforestation; 1986 saw the introduction of tax exemptions during the first five years of reforestation. The latter failed however due to the fact that these favoured plantations over natural forests (which were proven to be more environmentally more effective) (Sierra & Russman, 2008). Consequently the current PSA (*Pago por Servicios Ambientales* or PES) was introduced with 1996 Forestry Law

(7575) which sought 1) to mitigate greenhouse gases; 2) protect water sources for urban and rural and hydroelectric purposes; 3) protect ecosystems, life forms, scenic beauty for tourism and scientific purposes (Barton, Faith, Rusch, Acevedo, Paniagua, & Castro, 2009). Costa Rica possessed the legislative framework to encourage continued implementation of PES.

Costa Rica's PSA makes payments to land owners directly to encourage particular land management practice to promote the conservation of specific physical resources (Sierra & Russman, 2008). The financing of PSA in Costa Rica is by means of the National Forestry Financing Fund (FONAFIFO) for reforestation; a 5% tax on gasoline, the sale of certifiable tradable offsets to foreign investors, and private sector contributions for carbon sequestration projects; amongst other sources.

According to Redondo (2005:20), "[t]he use of government incentives in Costa Rica has increased the number of tree plantations in the last two decades, especially in small and medium-sized farms in rural areas." Furthermore carbon projects in Costa Rica promote agro forestry, small scale plantations and natural forest regeneration and preservation.<sup>6</sup>

The impact of payment for environmental services on local development in northern Costa Rica was evaluated by Locatelli *et al.* (2008). Locatelli *et al.* (2008:275) summarised this as follows - a sentiment shared by Wunder *et al.* (2008:849):

"The impacts of the PSA applied to reforestation are positive; negative economic impacts are balanced by positive institutional and cultural impacts. In most dimensions, the impact on the poorest landowners are notably positive and generally higher than for upper class landowners. However, the short term incomes of the poorest land owners decrease as a consequence of reforestation. This problem may engender negative outcomes, and reduce the participation of the poorest landowners in the PSA. Positive impacts were stronger for landowners applying to the PSA through a local nongovernmental organization."

## **4.2. Experiences from Mexico**

This section is based on Kosoy *et al.* (2008). Mexico is one of the world's leading advocates of PES, along with Costa Rica. In October 2003 the Mexican government established a 5 year program to provide economic incentives in order to preserve forest ecosystems located in critical watersheds known as PSAH (Payments for Hydrological Services Program). The PSAH is financed by 2% transfer from the National Water Commission-Article 223 in Mexican Law of Rights. The Mexican Forestry Fund was established in 2004 to distribute the funds. In 2004 The PSA-CABSA (Payment for biodiversity, conservation, carbon fixation, and agro forestry services) was set up by the Mexican government to develop markets for biodiversity, conservation, carbon fixation, and agro forestry services. Funds for PSA-CABSA are negotiated every year at the Mexican Congress and CONAFOR (the Mexican National Forestry

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<sup>6</sup> Particular plant species such as Batarrama (*Vochysia ferruginea*) and Chancho Mayo (*Vochysia gautemalensis*) have proven to be the best options for fast growth in carbon sequestration projects.

Commission) acts as an intermediary and principal ecosystem user. CONAFOR encourages service providers to sell their ecosystem services to national and international investors. It monitors and enforces contractual agreements. Environmental professionals help providers write PES application, design projects, facilitate knowledge transfer, build local capacities, and deliver project progress reports to CONAFOR.

It is however early to evaluate impact on poverty alleviation and participation is essential to continued success the program. Box 1 gives an indication of the Mexican experience with a pseudo PES program.

Box 1: Nevado de Toluca National Park, Mexico - A National Park under pressure

The Nevado de Toluca National Park in Mexico was established in 1936 to preserve 51000 ha area around Nevardo de Toluca volcano. The volcano is a natural heritage site of central Mexico and performs important environmental functions including the capture of atmospheric carbon and regulation of hydrological cycle and climate of the Valley of Toluca. The park faces complex problems such as more than half of the original tree biomass has been lost due to populations around the area carrying out agricultural and livestock activities, and illegal wood and firewood and soil extraction has increased.

PES has been proposed by the Technical Advisory Commission for the Ecological Recovery of the Nevado de Toluca National Park in order to preservation of the Park's natural resources among local population and guarantee that the protected area continues to supply environmental services such as carbon sequestration and hydrological regulation.

However, an analysis has revealed that the current national regulations do not allow for payments of more than one environmental service at a time on a single plot and although forest cover can contribute to hydrological regulation and, at the same time, to capturing carbon and maintain biodiversity - as needed -, the current national regulations actually discourages the conservation of natural resources by not allowing for payments of more than one environmental service at a time on a single plot.

Source: Franco-Maass, S., Nava- Bernal, G., Endara-Argramont, A., Gonzalez-Esquivel, C. (2008). "Payments for Environmental Services: An Alternative for Sustainable Rural Development? The Case of a National Park in the Central Highlands of Mexico". *Mountain Research and Development*, 28(1):23-25.

### **4.3. Experiences from Indonesia**

Indonesia is a relatively poor country with 16.6% of the population living below the poverty line in 2004. Also, 76% of the poor live in rural areas. The country is affected by a series of challenges. These include natural disasters, disease outbreaks and unsustainable resource use that degrade the environment. Upland communities in Indonesia tended to be unequal in terms of income, education and land holding with the majority not having adequate levels of neither.

The Rewarding Upland Poor Environmental Service Providers (RUPES) aims to reward poor upland communities who manage landscapes (state owned) that provide environmental service to outside beneficiaries (downstream beneficiaries, or communities that benefit from the environmental service from upstream communities), and the services include biodiversity protection and the provision of clean and abundant water supplies from watersheds (Suyanto *et al.*, 2007). The RUPES program was set up in 2002 by the International Fund for Agricultural Development (IFAD) and is coordinated by the World Agro forestry Centre, and involves participants from 9 countries (such as China, Sri Lanka) to facilitate the exchange of information about similar experiences (Van Noordwijk, 2005).

According to (Suyanto *et al.*, 2007, 13) the RUPES program has had positive impacts:

“...that state forest land in Lampung Province, Indonesia, not only provides important income for poor farmers but also leads to a more equitable distribution of income and land holdings. These farmers have also successfully rehabilitated degraded land by establishing coffee based agro forestry....coffee based agro forestry can perform watershed services functions similar to those of natural undisturbed forests. This supports the argument that poor farmers who provide environmental services through their activities in state owned forests should be rewarded with land rights as a policy to alleviate poverty.”

The Indonesian experience identified PES as a catalysed towards equitable distribution of land and income in a rural setting.

#### **4.4. Experiences from China**

The Grain for Green program is the largest PES program in the developing world (Uchida, Rozelle, Xu, 2009). The program, which began as a pilot in 2010, seeks to restore China's forest and grasslands to prevent soil erosion. It is a quasi voluntary program.

The program aims at converting 14.67 million hectares of cropland to forest by 2010 (4.4 million of which is land on slopes greater than 25 degrees). This will represent 10-20% increase in China's national forest sector and a 10% decrease in current levels of cultivated land (Bennet, 2008:699).

Early evidence suggests that the Grain for Green program has had a positive impact on the rural poor in China. Income from livestock activities and asset holding of the participants in the program increased more than those of non participants (Uchida, Xu, Rozelle, 2007). The results also suggested that households' labour preferences began to move from on farm to off farm sectors. Uchida *et al.* (2009:70) note:

“...participating households are increasingly shifting their labour endowment from on farm to off farm labour market. However, the effects vary depending on the initial level of human and physical capital. The results support the view that one reason why participants are more likely to find off-farm employment is because the program is relaxing households' liquidity constraints.”

Although the Grain for Green program in China marked a move away from 'business as usual', some of challenges identified include the following according to Bennet (2008:699):

- Shortfall in the amount of subsidies delivered to the poor;
- Lack of respect for the principle of volunteerism;
- Insufficient technical knowledge and budgeting for local implementation costs.

Overall, however, progress in the program is encouraging and signs are that if the program continues it will have significant impact on poverty because it is adequately targeted on the poor (Bennet, 2008; Uchida *et al.*, 2009). Improved sensitivity to vulnerable households, additional support (such as job training) for such households, further understanding of the contract structure, and principle of volunteering are significant challenges to continued implementation of the Grain for Green program.

## 5. Conclusion

What lessons can South Africa draw from international experience and from new theoretical PES studies emerging? On the one hand, PES-Poverty alleviation experiences from the rest of the world are limited in the sense that either programs have not been ongoing long enough to determine their impacts, or that the PES-Poverty alleviation link is not strong enough due to the limited evidence available. The fact that it is only recently that the theoretical void in terms of when PES can lead to poverty alleviation has been filled, attests to this. The sense is that the environmental viability of PES has been established and that the poverty alleviation phase is only at its infancy. However this does not imply that strong evidence does not exist that the PES-Poverty alleviation link certainly exists as illustrated in this paper.

On the other hand, international experience has shown that countries that commit to PES at a legislative level and not only at a practical level have proven more successful. Political commitment to the successful implementation of PES is apparent. This implies that the environmental objectives have proven important enough to galvanise this political commitment. Not surprising in the context of global climate change. Unlike international experience continued benefits from PES require scaling up of implementation (including improved participation), improved design, planning, and implementation of PES programs.

Unlike the rest of the world, the South African WfW program has poverty alleviation at its heart and it is on this basis that funding has been attained (although environmental objectives have been met). Improved returns in terms of poverty alleviation determine and will continue to determine the WfW's success. However in the context of a *green economy* and *water concerns* in South Africa this warrants scope for revision of poverty alleviation stance as the most important justification for funding. Scope for revisiting the founding principles of PES exists at a practical and legislative level.

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