Determinants of Preferences of the Respondents for the Payment for Environmental Services among the Rural Farming Households in Oyo State Nigeria

Abstract

This study attempted to uncover the factors that influence preferences of the poor farming households for the attributes of Payment for environmental services (PES) in the Oyo State farm settlement Nigeria. Educational attainment, age of the respondents, previous knowledge of PES, land tenure, provision of micro credit, number of dependents, marital status and main occupation of the respondents. Dependent variable is preference for PES attributes. A multi-stage sampling technique was employed for this study. This study used exclusively Primary data.Which were collected through the use of a well-structured questionnaires and interview schedule for the literate and non-literate farmers respectively Total sample of 395 out of 547respondents (i.e.72%) were drawn cumulatively. The regression results showed that previous knowledge of PES and provision of microcredit are significant at 5% each, while land ownership right is significant at 10% in the educational poverty group. In the consumption poverty group, previous knowledge of PES is significant at 5%, while land ownership right is positively significant at 1%, respectively. Housing/living standard poverty group; previous knowledge of PES and land ownership rights are significant at 5% each. From the findings of this study, it implies that if micro credit facilities are provided to these poor farming households, they will be willing to conserve the environmental resources (i.e. agricultural land). It therefore suggests that a well thought institutional arrangement with PES in view could be put up to enhance natural resource conservation and by extension reduction of poverty.

1. Introduction

Payment for environmental services (PES) is a market incentive mechanism for the provision of public goods within the field of environmental and resource issues (Derissen and Latacz-Lohmann (2011), This definition can be more explicit, thus: Payment for environmental services (PES) is an incentive-based mechanisms for sustainable resource conservation and management (i.e. it can be used for preservation, restoration, and creating new environmental services-conservation) as well as for poverty alleviation(Adesiyan,2016). There has been the need for a more vibrant resource conservation and management system. PES have been seen by many ecologists, environmental and development economists as a better option in the arena of environmental/ecological conservation (Niesten & Rice, 20 04; Scherr, White & Khare, 2004). Due to many induced human activities on environmental resources (e.g. agricultural land), natural habitat and forest are becoming degraded as the environmental services (ES) previously provided free by nature are becoming increasingly disappearing.The main idea of PES is that external environmental services beneficiaries make direct, contract and conditional payments to local landholders and other users in return for adopting practices that secure environmental/ecosystem conservation and restoration (Wunder, 2009).

This conditional method is quite different from other known conservation methods. Instead of presupposing win-win solutions, this approach explicitly recognizes hard trade-offs especially in landscapes with acute land-use pressures. There are various PES initiatives, of which the rewards could either be in-cash, in-kind assistance, exemption from taxes, skills training, and other types of compensation (Warner, 2000). Latin America PES schemes are characterized by cash type compensation, while in the South-Asia, other compensation means were employed. There are main four PES types that are currently in place.

(i) Carbon sequestration and storage (e.g. Northern electricity company paying farmers in the tropics for planting and maintaining additional trees).

(ii) Biodiversity protection (e.g. conservation donors paying local people for setting aside or naturally restoring areas to create a biological corridor).

(iii) Watershed protection (e.g. downstream water users paying upstream farmers for adopting land uses that limit deforestation, soil erosion, flooding risks, etc.).

(iv) Landscape beauty (e.g. a tourism operator paying a local community not to hunt in a forest being used for tourists' wildlife viewing). The above environmental services is not exhaustive as it is possible to design PES for poverty reduction/environmental resource conservation. Examples are wilderness/forest areas, provision of pollination services to agriculture

Finally, for PES packages to be successfully designed and implemented, there is a need to be supported by institutions, legal frameworks, and policies that define the ecosystem services, sellers or providers (who has the right to utilize and benefit), buyers or fee payers, and financial mechanisms (including the fees and taxes that generate funds for payments).

1.1. Necessary Condition for Environmental Services Payment

A widely accepted definition of payments for environmental services (PES) contains the following elements:

i. A voluntary transaction: this means that it should be at the instance of the individual, who is interested in conserving the environmental resource.

ii. A well-defined environmental service .The terms of the service involved should be explicit enough to be understood by the parties involved.

iii. At least a buyer. It takes at least one service buyer to set up PES.

iv. At least, a seller. It takes at least an environmental service seller to start up PES.

v. If and only if the environmental service provider secures service provision (conditionality).

Wunder (2008) noted that these five PES principles hold for several real-world schemes. However, some PES schemes are self-organized; hence most of these assumptions of PES are not satisfied. Example is the community and small holder carbon schemes worldwide or mushrooming watershed schemes in Latin America.

2.0. Review of relevant Literature

Agricultural land degradation caused by over exploitation, unhealthy farming practices such as deforestation, bush burning and the likes, are responsible for eroding natural environmental resources in arable lands. This is predominant in the developing countries, where farmers solely depend on land for their livelihood (Swinton & Quiroz, 2003; Suyanto, Khususiyah & Leimona 2007). The effect of this is the reduction in the soil carrying capacity, which will lead to poor/low agricultural productivity. PES could therefore be used as the market-based incentive buffer to subdue this problem.

Pagiola *et al.,*(2005) submitted that PES was originally designed and used as a mechanism to improve the efficiency of natural resource conservation and not as a mechanism for poverty reduction. The PES approach to land resource conservation is based on the theory of give and take. According to Pagiola and Platais (2005) as cited by Suyanto *et al.,* (2007) opined that PES approach is based on principle that environmental services providers should be adequately compensated and those who benefited from the services provided should pay for such services. For example, conversion of forest to agricultural land will cause imposition of costs on the

downstream population that will no longer enjoy the benefits of natural ecosystem such as water filtration (Suyanto *et al.,* 2007). To make the upstream population provide the services of conservation of the water shield, for the provision of clean water for the downstream users, payment for such service is needful. The opportunity cost of such service for the environmental service providers, must be higher than the gain from the alternative non-conserved land use. Also the opportunity cost should also be less than the value, of the gain the environmental service beneficiaries will realize from the service; these are the conditionality of PES, which must be met by the players in PES scheme.

Going by the cause and effect of poverty and land degradation in this study as The poor farmers in the quest for survival, are engaged in sort of environmentally unfriendly practices, such as burning of crop residue, deforestation, bush burning, etc. all these led to declining in the cultivable land and pasture land for crop growing and animal grazing, since the incentive to invest in the land as to conserve soil fertility is conspicuously absent. Hence farmers have no option than to make do with the available marginal lands. While the remaining few livestock are contending with the humans for crop residues, which could have served as a good source of fertilizer for the soil nutrients replenishment and rejuvenation. Since the whole scenario is a chain of reaction, less manure is expected, as the stock of animals that defecate as they are grazing are small. The resultant effect of all these, is that it gives way for erosion to set in and soil degradation eventually causes low productivity, hence low income and poverty as the end product. Payment for environmental resources (PES) that is intentionally designed to address the two major players (i.e. poverty and land degradation could be the antidote in this type of nexus.

Anderson *et al.,* (2002); Wild *et al.,* (2008), submitted that, the provision of credit through micro finance/agricultural banks, could be effectively used to finance preservation of the natural

environment resources such as agricultural land. In the Nigerian context, ecological funds could be borrowed to the potential farmers through the grass roots financial institutions such as Microfinance/Agricultural banks/Community banks. According to Cranford and Mourato (2012), there are three major ways by which the provision of credit could be linked to the conservation of ecosystem. PES mechanism could take any of the following:

i. Selective lending: Here, alternative livelihoods could be made for those that live on the products of ecosystem e.g. forest products. Also, micro credit could be provided to finance activities which will, have a positive impact on the provision of biodiversity or environmental services. This selective lending is better done at the household or even at the community level (Wild *et al.*, 2008).

ii. A Conditional environmental good behavior credit provision: Here the potential credit beneficiaries cannot be privileged to borrow, except a certain environmental behavior is first of all met (Anderson *et al.*, 2002), or such an individual must have previously met an environmental best practices agreement on the previous loans (Mandel *et al.*, 2009). Here the ecosystem resource conservation serves as the collateral for the borrowed microcredit value, this method is referred to as environmental mortgage.

iii. Environmental behavior conditional micro-credit provision: The proportion of the amount that an individual micro credit beneficial farmers payback is a function of the performance of the farmers with respect to a particular environmental conservation. This approach is important in the developing countries, where the poor have limited accessibility to credit facilities (Nickerson & Hand, 2009).

From the table below, 70-100 to 0 percent end of the conditionality: if an individual micro credit beneficiary farmer met all the contractual, environmental service conditions, all the loan will be forgiven, and is therefore converted to PES (Van Ejik & Kumar, 2009). If 70-89% of the contractual agreements are met, 75% of the credit will be waived. If less than 70% of the contractual agreements satisfied, it will attract 0% loan forgiveness. Hence the entire loan will be paid by the farmers, and this will be considered as non-PES.

Table *1*: Conceptualized Credit-Based PES (CB-PES)

Proportion of periodic repayment" waiver" if condition is met	70-100percent⟵	⟶	0 percent
Credit vs. PES	Convertible: Credit or PES	Credit/ PES combined	Credit without PES
Maximum size of the micro credit	Constrained to the amount of money that can be used for 1 ha agroforestry set up and amount ES supplies willing to pay.	Subject to: All environmental practices of 70-89% performance will have a certain amount of credit- waiving. Also will be determined by the amount the ES suppliers are willing to accept the offer of loan.	All environmental conservation Performance less than 70% success with attracts the penalty of the concerned micro credit beneficiary farmers to pay back all the amount.

3. Methodology

3.1. Description of study area

Oyo state is one of the states in the South-West geopolitical zone of Nigeria; this state was created from the old Western state in 1976, alongside with Ogun and Ondo states respectively, by the then military government. Going by the 2006 national population estimates, Oyo state is one of the densely populated states in sub-Saharan-Africa, with a population figure of 5,591,589 (NPC, 2006). The seat of government for the state is the ancient city of Ibadan. The state has thirty three local governments, its share boundary in the north with Kwara state, in the West, partially with Ogun state and the Republic of Benin respectively, and in the south with Ogun state, and bounded on the East by Osun state. Oyo state has about 28,000 square kilometer land mass cover, with a vast quantity of hard rocks and dome shaped hills.

The state is endowed with a well-drained rivers and gentle rolling low lands and plateau. Climatically, the state is blessed with the equatorial climate type, which is characterized by both wet and dry seasons, as well as a relatively high humidity. Usually the dry season is for the period of five months, and the rest of the year witnessed rainy season. The pattern of the vegetation in the state is that of rainforest in the southern hemisphere and derived guinea savannah in the north. Crops such as cassava, maize, yam, plantain, coffee, cashew, cocoa, and palm tree are majorly grown in Oyo state.

Quite a number of government owned farm settlements are in different locations in the state. The following is where they are located; Akufo, Eruwa, Ijaiye, Ipapo, Ilora, Iresaadu, Lalupon, Ogbomoso, and Sepeteri. Most of these farm settlements are located in the core rural while the rest is in the semi-rural areas. Out of these farm settlements, three of them are functioning well; Ijaye, Ilora and Akufo farm settlements.

The choice of Oyo state farm settlements for this study, was informed from the casual observation of the well pronounced agricultural land degradation   from water and wind erosion, bush burning, indiscriminate tree felling and all sorts of un-environmental friendly practices. The poor or near-poor farmers who are the users of the land, have no form of property rights (land ownership rights) and this situation became worse as the successive governments are not really sensitive to the pathetic situation of the farm settlements.

The dependent variable is preference for PES attributes. Explanatory variables used in this study for the determination of factors that predict the respondents' preference for PES attributes, are educational attainment, age of respondents, previous knowledge of PES, land tenure, provision of micro credit, number of dependents, marital status and main occupation. Kobbail (2011) used age of respondents, educational level and main occupation as explanatory variables in a similar study in Sudan, Mohamed *et al.,* (2012), used educational level in the willingness to pay for watershed conservation at Hulu Langat, Selangor. Bagerian *et al* (2009), in study of factor influencing local people's participation in watershed management programs in Iran, used knowledge of watershed management as one of the explanatory variables. Knowledge of the cloud forest reserves as explanatory variable was also used by. Ojeda (2012) in economic valuation of environmental services sustained by water flows in the Yaqui river Delta, also income, number of children in the household, educational level and occupation as the explanatory variables. Cranford and Mourato (2014), used credit facilities as the explanatory variable in Credit-based Payments for Ecosystem Services study.

3.2. Sampling Procedure

A multi-stage sampling technique was employed for this study; a multi-stage sample is one in which samplings are done sequentially across two or more hierarchical levels. This sampling technique was employed because of its advantage of cost and speed that normally associated with large/fairly large sample size collection. More importantly, a multi-stage sample is often more precise than a simple random sample of the same cost, and also more accurate than the cluster sampling for the same size sample.

Each of the farm settlement was classified as an Enumerated Area (EA) based on the National Population Commission (NPC); this is the first stage of the sampling. To ensure adequate representation of both rural and semi-rural localities, the farm settlements were stratified into rural and semi-rural. Prior to the second stage selection, complete listing of farming household units (and of household heads within household units) was carried out within each EA. In the determination of the sampling size, the study employed the use of Krejcie and Morgan (1970) sample size determination table. In Ijaye farm settlement, 220 households were randomly drawn from 300 (73%) farming households. In Ilora farm settlement, out of 150 farming households, 105 (70%) farming household heads were randomly selected and in Akufo out of 97 farming households, 70 (72%) farming household heads were randomly drawn. Total samples of 395 out of 547 (i.e.72%) were drawn cumulatively. Out of 410 Questionnaires distributed, 317 were useable. In Ijaye farm settlement, 181 questionnaires were usable, out of 220 (82%), in Ilora; 87 respondents were used out of 105 (83%) respondents and 49 responses were used out of 70 (70%) respondents in Akufo. The cumulative response rate of the respondents in the three farm settlements is 77.31%. Data on, socioeconomic characteristics of the farmers, education, housing/standard of living, land ownership, asset and consumption were collected.

3.3. Data Collection and Instrument of Data Collection

This study used exclusively Primary data. Primary data were collected through the use of a well-structured questionnaires and interview schedule for the literate and non-literate farmers

respectively. An adapted version of the Questionnaire used by Ataguba *et al.,* (2013) which was originally developed by a team of experts at the OPHI, was used to obtain the necessary data for the study. This questionnaire had been extensively used in 104 developing countries, for related study. Interview schedule was mostly used as most of the respondents were non-literates.

A total of 410 questionnaires were distributed in all the three farm settlements with the assistance of well-trained enumerators. The nature of this study demands for collection of two main data; data for multidimensional rural poverty and data for the respondents' preferences/perspectives of the set of PES attributes presented to them. Information was elicited from the respondents concerning multidimensional poverty on (i) education, (ii) consumption, (iii) housing/living conditions.

Prior to interview season, information on the market, village and political meeting days and venues were known by the researcher and enumerators through inquiry. This assisted in reaching a good number of farmers for the interview on these days. Before administration of questionnaires and interview schedule exercise, a series of meetings were held with the respondents. This was centered on explanations on the purpose of the study and familiarization with the people.

The data collection exercise was not without obstacles, such as non-cooperative attitude, unwilling to give information, lack of interest, fear of being taxed by the government, tradition and cultural believe problems. However, these problems were resolved in a diplomatic manner between the researcher and respondents. This was achieved, by organizing meetings with any 'perceived' influential leaders and distributed some token gifts when the need arose.

3.4. Determinants of Respondents' Preference for PES Attribute

From the tables 2, below five variables (i.e. Education attainment, previous knowledge of PES, landownership rights, number of the dependents and provision of micro credit were used to determine the preference of the respondents for PES attributes. Out of these variables, previous knowledge of PES and provision of microcredit are significant at 5% each, while land ownership rights is significant at 10% in the educational poverty group. In the consumption poverty group, previous knowledge of PES is significant at 5%, while land ownership rights is significant at 1%, respectively. Housing/living standard poverty group; previous knowledge of PES and land ownership rights are significant at 5% each. All the significant variables were positively related to the respondents' choices (preference), except land ownership right that is negatively related to the respondents' choices (preferences).

The results could be explained thus: previous knowledge of PES influences the choice of PES attributes by the respondents. Respondents claimed to have heard about PES through information media, such as radio and television and even through friends. Also, most of them have an understanding of PES from the preliminary video/projector show, in the cause of the researcher/enumerators explanations of the concept of PES as it related to poverty and environmental resource conservation, prior to questionnaires distribution .This result is similar to findings of Bagerian *et a.l.,* (2009), where knowledge of water management programs (wmp) influences local people's participation in watershed management programs in Iran. Also, land ownership right has a negative influence on the respondent choices, this is expected. Mainly, in many African countries and Nigeria in particular, communal land ownership is practiced, for this reason, access to land is a scary task for individuals who may be interested in engaging in agricultural activities. According to Bassey (2003), land tenure is a crucial factor in resource

conservation and management in the rural areas. He noted that the difficulty attached to land tenure system in rural areas in Nigeria, contributes greatly to agricultural land degradation, deforestation, reducing of soil carrying capacities as well as poaching and extinction of wild biotic natural resources. Provision of microcredit for farmers to involve in PES, shows a positive relationship with the choice of PES attributes, only among the educational poverty respondents. Provision of microcredit (especially reduction of the constraints attached to the credit facility presented to the respondents) could be the reason for the preference of the poor for the PES attributes. This finding is similar to empirical results of Cranford and Mourato (2014) in Credit-Based Payments for Ecosystem Services: Evidence from a Choice Experiment in Ecuador, where credit-based PES was found to be preferable by the people.

Table 2 :Factors that Determine Respondents' Preferences for PES attributes

Educational Poverty Respondents' Preference

Variable	Coefficient	Std Err.	P-value
Education Attainment	0.135	0.175	0.439
Previous knowledge of PES	0.159	0.168	0.034**
Land Ownership rights	-0.071	0.048	0.101*
Provision of Micro Credits	0.079	0.102	0.044**
No of Dependant	-0.017	0.023	0.469
Constant	0.657	0.315	0.388

Pseudo R^2=0.0219,Logliklihood=-147.22497,LR chi^2(5) = 5.99 Prob>chi^2=0.03073

No.ofobservation=142

* ** signficant at 1%, 5% levels respectively.

Consumption   Poverty Respondents' Preference

Variable	Coefficient	Std Err.	P-value

Variable	Coefficient	Std Err.	P-value
Education attainment	-0.008	0.163	0.962
Previous knowledge of PES	0.195	0.173	0.026**
Land Ownership rights	-0.743	0.053	0.014***
Provision of Micro Credits	0.003	0.008	0.694
No of Dependant	-0.018	0.024	0.445
Constant	0.968	0.513	0.060*

Pseudo R^2=0.0238 ,Loglikelihood= -144.00559, LRchi^2(5)=5.53, Prob>chi^2(5)=0.0354,

No. of observation.=237 * ** *** significant at 1%, 5%, 10% levels respectively.

Housing/Standard of Living Respondents' Poverty Preference

Variable	Coefficient	Std Err.	P-value
Education Attainment	0.041	0.157	0.794
Previous knowledge of PES	0.184	0.164	0.024**
Land Ownership rights	-0.056	0.055	0.030**
Provision of Micro Credits	0.062	0.092	0.500
Constant	0.514	0.251	0.041**

Pseudo R^2 =0.0147, Loglikelihood= -178.01828   Prob>chi^2=0.06492, LRchi^2(4)= 2.47

No.of observation=283, ** significant at 5%, level respectively.

4.0. Summary and Conclusion

Farming households in the Oyo state Farm settlement were subjected to different attributes of PES with regards to conservation of Agricultural lands. This study shows that a good number of the farmers were interested in conservation of the farm land, despite little or no land property rights. Hence, these findings reveal the willingness to conserve the productive asset of the rural farmers provided credit facilities were provided as was in the PES scheme. Institution arrangement that will be designed and well related to PES scheme will further enhance conservation of natural resources as well reducing poverty among rural farming households

This study examined empirically the relationship that exists between one-dimensional (monetary) poverty and multidimensional poverty of the farming household in rural are of Oyo state, Nigeria. Multistage sampling procedure was employed for the selection of 317 respondents in Ijaye, Ilora and Ido farm settlement respectively. Three dimensions were considered:

education, consumption and housing/standard of living dimensions for the multidimensional poverty, consumption   equivalent of S1.25 per capita per day was used as poverty line for the monetary poverty. Concerning the relationship between income poverty and multidimensional poverty, income still play a major role in poverty determination, though multidimensional examination of poverty revealed better the deprivation of human basic capability, covering both one-dimensional and multidimensional   poverty. The statistical revelation indicated that monetary headcount is about 87%, while multidimensional headcount is 82%. The probit estimates results indicated that an increase in income alone in isolation of other deprivation variables cannot significantly reduce individual poverty

References

Anderson, C. L., Locker, L., & Nugent, R. (2002).Microcredit, Social Capital, and Common Pool Resources. *World Development*, 30(1): 95-105. doi:10.1016/S0305-750X(01)00096-1.

Adesiyan (2016). Payment for Environmental Services, Rural Poverty Reduction and Rgricultural lanConservation in Oyo State Farm Settlements, Nigeria,Unpublished Ph.D Thesis, Universiti Utara Malaysia.

Ataguba,J., Ichoku, E. H., & Fonta, W. M. (2013). Multidimensional poverty assessment: applying the capability approach. *International Journal of Social Economics,* Vol. 40v (4), 331 – 354.

Bagherian, A.S. Bahaman, A.S. Asnarulkhadi & Shamsuddin A. (2009). Factors Influencing Local People's Participation in Watershed Management Programs in Iran. *American-Eurasian J. Agric. & Environ. Sci*., 6 (5), 532-538.

Bassey(2003).The effects of land tenure on natural resource conservation in the Nigerian rainforest ecosystem, unpublished PhD thesis

Cranford, Matthew and Mourato, Susana (2014) *Credit-based payments for ecosystem services:*
Mandel, J. T., Donlan, C. J., Wilcox, C., Cudney-Bueno, R., Pascoe, S., &Tulchin, D. (2009).
Debt investment as a tool for value transfer in biodiversity conservation.

 evidence from a choice experiment in Ecuador. World Development 0305-750X

Derisen,S.,Latacz-Lohmann,U.(2011).What are Pes?. A review of definitions and an extension. In proceeding for ecosystem services (PES) and their institutional dimensions. *Development Economics*, 15 (02), 219–240.

Niesten,E., & Rice, R. (2004). Sustainable forest management and conservation incentive agreements.*International Forestry Review*,(6),56-60.

Pagiola, S., Arecenas, A., Platis G. (2005).Can Payment for Enivironmental Services Help Reduce Poverty? An exploration of the issues and the evidence to date from Latin America.*World Development*, (33),237-253.

Nickerson, C., & Hand, M. (2009). Participation in Conservation Programs by Targeted Farmers: Beginning, Limited-Resource, and Socially Disadvantaged Operators' Enrollment Trends. U.S. Department of Agriculture. Economic Research Service. Economic Information Bulletin No. 62. Washington: USDA. www.ers.usda.gov/media/150252/eib62.pdf.

Mohamed, N., Shamsudin, M.N., Ghani, A.N.A., Radam, A. Kaffashi, S., Rahim N.N., & Bin Hassin, N.H. (2012). Willingness to Pay for Watershed Conservation at Hulu Langat, Selangor. *Journal of Applied Sciences,* (12),1859-1864.

Krejcie,R.V.,Morgan,D.W.(1970).Determining Sample Size for Research Activities.Educational and Psychological Measurement,30:607-610.

Ojeda, M.I., Mayer, A.S., & Solomon, B.D. (2007).Economic valuation of environmental services sustained by water flows in the Yaqui River Delta. *Ecological Economics* doi:10.1016/j.ecolecon.2007.06.006.

Scherr,S.,White,A.& Khare,A.(2004). The current status and future potential of markets for the ecosystem services provided by tropical forest. International Timber Organisation Technical Services,21.

Swinton,S.M., & Quiroz, R. (2003). Is poverty to blame for soil, pasture and forest degradation in Peru's Altiplano? *World Development*,31(11), 1903-1919.

Suyanto, S. Permana, R.P., khususiyah, N., &Joshi,L.(2005). Role of land tenure in adopting agroforestry and reducing wildfire in a forest zone in Lampung-Sumatra. *Agroforestry Systems,* (65), 1-11.

Van Eijk, P. & Kumar, R. (2009). Bio-rights in theory and practice: A financing mechanism for linking poverty alleviation and environmental conservation. Wageningen,TheNetherlands:WetlandsInternational.Retrievedfromhttp://www.wetlands. org/LinkClick.aspx?fileticket=ZB0KC4oOYew%3D&tabid=56.

Wunder,S.(2008).Payments for environmental services and poor:concepts and preliminary evidence.*Environmental and development Economics,*13(3).

Wunder, S.(2009). Can payments for environmental services reduce deforestation and forest degradation? In: *Realising REDD+: National strategy and policy options* (ed.Angelsen, A.). Pp.: 213–223. Bogor: Centre for International Forestry Research preliminary evidence". *Environment and Development Economics*13(3), 279-297.

Wild, M., J. Grieser, and C. Scha¨r (2008).Combined surface solar brightening and increasing greenhouse effect support recent intensification of the global land-based hydrological cycle, *Geophys. Res. Lett., 35*, L17706, doi:10.1029/2008GL034842.

Warner,K.(2008). The Concept of Application of Payment for Ecosystem Services,IUCN,2008.