Are Payments for Ecosystem Services (PES) schemes a safeguard for biodiversity?

Daniels Silvie[1], **Witters Nele**[1], **Van Passel Steven**[1]

[1]*Hasselt University, Centre for Environmental Sciences, Belgium, Silvie.daniels@uhasselt.be*

Payments for Ecosystem Services (PES) receive increasing interest as an incentive-based policy to overcome the difference between private and social benefits of ecosystem services flows. The provisioning of flows is generated by the interaction between biotic and abiotic factors, while at the same time the relationship between biodiversity and ecosystem services provisioning remains poorly understood. This paper attempts to answer the question on whether the design of Payments for Ecosystem Services can safeguard a minimum level of biodiversity.

First, an integrated ecological model is built in order to represent the ecosystem. Several species that represent the population dynamics are taken up. Population dynamics can be represented in terms energy flows. The model maximizes the net energy intake while minimizing the net energy expenditure to obtain the biomass needed for energy intake.

Next, the delivery of ecosystem services (ES) that follow from the ecosystem functioning are assessed with regards to the design of a PES scheme. A distinction is made between PES schemes designed for a single ES or bundles of ES. The consequences of designing PES in order to obtain (i) a cost-effective and (ii) an efficient scheme, are examined with regards to species dynamics. the consequences of PES schemes for the ability to strengthen biodiversity conservation objectives are assessed with regards to (i) the tradeoffs between the ecosystem services and (ii) the impact on the ecosystem with regards to different measures of biodiversity (e.g. species richness, Shannon Index, the divergence from natural biodiversity).

While some species will benefit from the enhancement of one service, other species may be put at risk. Therefore, PES schemes are not necessarily beneficial from a biodiversity conservation perspective. More specifically, it can be expected that substantial tradeoffs exist, implying that choices need to be made when designing PES schemes. As a result this analysis could strongly support the adoption of decision tools that take into account biodiversity conservation objectives to allow for context-specific PES design and furthermore would allow for desired PES outcomes to be achieved.