**An Empirical Differential Game for Sustainable Forest Management**

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We model the role of the world's forests as a major carbon sink and consider the impact that forest depletion has on the accumulation of $CO_2$ in the atmosphere. Two types of agents are considered: Forest owners who exploit the forest and draw economic revenues in the form of timber and agricultural use of deforested land; and non-forest owners who pollute and suffer the negative externality of having a decreasing forest stock. We retrieve the cooperative solution for this game and show in which cases cooperation allows to partly reduce the negative externality. We analyze when it is jointly profitable to abate emissions, when it is profitable to reduce net deforestation, and when it is optimal to do both things (abate and reduce net deforestation). Finally, we consider the issue of sustainability of the cooperative agreement overtime.

Key Words: Dynamic games, deforestation, forest management, emissions, renewable resources, sustainability.