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# Environmental Agreements for biodiversity conservation

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## ABOUT THE STUDY

Management of global environmental resources is a difficult challenge because binding guidelines have to be agreed upon internationally but need to be implemented at a national level. A wide range of International Environmental Agreements (IEAs) has been negotiated to address specific environmental concerns. In specific, some of the main international agreements created to address biodiversity conservation are the Convention of Biological Diversity (CBD), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on the Conservation of Migratory Species of Wild Animals (CMS), the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), the Convention on Wetlands (additionally referred to as the Ramsar Convention), the World Heritage Convention (WHC) and the International Plant Protection Convention (IPPC). These treaties range in scope and participation, however, they all have more than one hundred twenty signatories. Still, the effectiveness of such global treaties is a subject of concern, and biodiversity decline stays a key problem on the global environmental policy agenda.

Different characteristics distinguish the case of biodiversity conservation from the conventional emission abatement model. First, biodiversity is inconsistently distributed among countries. Every country has a unique biodiversity endowment this is finite, and consequently, the outcomes of conservation efforts within a country are constrained. Second, benefits from conservation are perceived differently at distinctive scales (from nearby to worldwide). Third, efforts of conservation must not be aggregated in an additive manner as it is usually completed for emission abatement efforts in coalition formation models of weather change. Two regions of the equal size may be very unique in terms of biodiversity richness (as measured through a species count, for example).

Given the particular functions of biodiversity, global agreements for biodiversity conservation deserve special attention. In terms of modeling, there are a minimum of 3 features that differentiate an IEA for biodiversity conservation from the emission abatement case.

The first feature is the existence of a natural upper bound of conservation in every country. In the case of GHGs, the amount that a country can emit isn't always constrained by nature however intently connected to its financial activities; particularly land use, transportation, and industry. However, in the case of biodiversity conservation, the amount of biodiversity that a country can keep in its territory is restricted. We assume that as any country approaches its maximum level of conservation of biodiversity, every additional unit preserved is more costly. To represent a vast increase in marginal costs of conservation, we make use of hyperbolic cost functions in our model, rather than the often-used polynomial cost functions (e.g., quadratic functions) in models of climate agreements.

The second feature addresses the mismatch between the scales at which costs and advantages of biodiversity conservation take place. Costs of biodiversity conservation are local, however, the advantages of conservation are perceived at distinctive scales: local, regional, and worldwide. GHG reductions have an effect on the worldwide attention of GHGs no matter where the reductions take place, even though the local effects of those reductions can vary across countries. By contrast, biodiversity conservation isn't always a pure public good because local conservation measures can provide greater immediate benefits on a local scale. Global benefits of biodiversity are the ones associated with the general public good dimension of biodiversity: one cannot prevent people from taking part in biodiversity (non-excludability) and a person's entertainment of biodiversity does not deplete its availability to others.

Local benefits of biodiversity correspond to the benefits which can be directly perceived from local biodiversity. For example, worldwide forest conservation includes biodiversity benefits that can be perceived on an international scale, irrespective of the region where conservation efforts take place. However, in addition to those international benefits, forest conservation includes local benefits directly perceived by the inhabitants of the region where conservation occurs, including wood and non-wood forest products, enhancements in air quality, and recreation benefits. We additionally consider the local benefits of conservation in our model because of their vital role in incentivizing participation in an international conservation agreement.

The third feature is the subadditivity of the global conservation function. Models of IEAs focus predominantly on emission abatement and generally define international abatement levels because of the sum of the individual abatement levels of all countries. For the case of biodiversity, there's no standardized, normally accepted measurement of aggregate conservation levels. Therefore, we adopt a conceptual framework. In this framework, conservation measurements are associated with sets of species or ecosystems. A diversity measure can, in principle, be built on the dissimilarity between species in a set.