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Ecological restoration in the Convention on Biological Diversity targets

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Abstract: Ecological restoration has been incorporated into several Multilateral Environmental Agreements (MEAs), including the United Nations Convention on Biological Diversity (CBD). Target 15 of the Aichi Targets for 2020 sets a numerical goal of restoration of 15 percent of degraded ecosystems; however, the CBD has not established a clear statement defining restoration within this context. Without such a definition, the CBD will be unable to measure progress against the goal. The adopted definition of ecological restoration would have to allow for measurement against the numerical target, or the target should be modified to match the chosen definition.

Key words: biodiversity; ecological restoration; goal-setting; policy

Introduction

Ecological restoration, defined by the Society for Ecological Restoration (SER) as the practice of "assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed" (SER 2004), is fast becoming a major 21st century conservation paradigm

(Hobbs and Harris 2001; Roberts et al. 2009). Although no global survey exists for restoration efforts, stream and river restoration efforts in the US alone were estimated to be over $1 billion per year in 2005 (Bernhardt *et al.* 2005), giving a sense of the scale of restoration. Restoration has been integrated into the program of several key Multilateral Environmental Agreements (MEAs), including the United Nations (UN) Convention on Biological Diversity (CBD 2010a), UN Convention to Combat Desertification (UNCCD 2009), and Ramsar Convention on Wetlands (2008), among others. In addition, one of the priority outcomes of the 2012 UN Rio +20 Conference on Sustainable Development was a target to restore 150 million ha of degraded forest by 2020 (IUCN 2012).

The focus on ecological restoration in international conservation policymaking has reached an almost feverish pitch. In conjunction with the October 2012 CBD Conference of Parties (COP) meeting in India, a "Call for a Concerted Effort on Ecosystem Restoration" was issued jointly by CBD, UNCCD, Ramsar, and a host of other organizations, which urged governments, agencies, and others to "make concerted and coordinated long-term efforts" in ecological restoration (Ramsar Convention on Wetlands 2012). Aronson and Alexander, who were both presenters at the Hyderabad Ecosystem Restoration Day, label these developments as a time for restoration ecologists "to roll up our sleeves" and participate fully in the restoration efforts made possible through CBD policymaking (Aronson and Alexander 2013).

The potential financial investment in ecological restoration because of these biodiversity policy decisions is huge—the Rio +20 forestry initiative alone is estimated to cost $18 billion per year until 2020 (IUCN 2012). The scale of these initiatives has the potential to lead to significant landscape-scale restoration efforts (Menz et al. 2013), but

may not necessarily do so. Although restoration is incorporated as a key conservation measure in the MEAs, none of the texts actually define what the term means in the context of the MEA. This may lead to confusion about what counts as ecological restoration when evaluating progress against targets.

Here, I examine the incorporation of ecological restoration as part of the global biodiversity targets within CBD, the most broad and encompassing of these MEAs. I argue that the failure to define ecological restoration before writing it into its targets will pose future problems when evaluating progress toward the 2020 biodiversity goals.

Incorporating restoration in the Aichi Targets

CBD has recently been through a process to create measurable targets for biodiversity conservation. Progress toward the biodiversity conservation goal of 2010 was poor (CBD 2010d) and the COP decided to make outcome-oriented targets for 2020 (CBD 2010c). New "SMART" (specific, measurable, ambitious, realistic and time-bound) targets were established in 2010, known as the Aichi Targets (CBD 2010a). Target 15 set a numerical goal for restoration: "By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification." While Target 15 set a SMART goal, it did not include any definitions of terms or practical guidance about restoration.

To provide that guidance, the COP 2010 adopted a decision to identify the "ways and means to support ecosystem restoration, including the possible development of

practical guidance on ecosystem restoration and related issues" (CBD 2010b). The CBD Executive Secretary commissioned the Society for Ecological Restoration (SER) to compile three reports on restoration covering available guidelines, tools, and definitions (CBD 2012a, 2012b, 2013c) to meet this mandate.

In the commissioned report, SER did not prioritize the definitions (CBD 2012c) they provided. Four different definitions for "ecological restoration" were listed, in alphabetical order by author name, with no ranking (Table 1). The definitions have important divergences, as three of them reference the prior state of the specific ecosystem, whereas one does not; two name structure and function, while the other two do not. Likewise, five definitions of what constitutes "degradation" and six definitions for "rehabilitation" were given in the document.

The COP 2012 reviewed the three SER documents and requested that the Executive Secretary "develop clear terms and definitions of ecosystem rehabilitation and restoration and clarify the desired outcomes of restoration activities" (CBD 2012d). In this statement, made two years after a target was set to restore 15 percent of degraded ecosystems, the COP acknowledged that they still did not know the definition of restoration or what the outcomes of such activities would be. While listing all commonly used definitions may be a valid scientific approach, this may not suffice in the policymaking arena where targets must be measurable and actionable.

Matching definitions and targets

CBD decided on a target of "restoration of at least 15 per cent of degraded ecosystems" (2010a) before they had a clear definition of restoration or degraded ecosystem. Now

CBD faces several problems with adopting definition that can actually be measured against the target.

First, there is no global survey of "degraded" ecosystems available to know how much would need to be restored to reach the 15 percent level. It was only in October 2012 that the CBD requested that governments begin identifying degraded ecosystems (CBD 2012d). Because progress toward the 15 percent goal will necessarily be based on the reported amount of degraded ecosystems, national governments may have a motivation to under-report their degraded ecosystem totals. Unlike the Rio +20 goal, which established a quantity of forest hectares to be restored, the percentage goal does not. It is not even clear if the quantity of degraded ecosystems should be measured as land area, and in that case, how water systems should be tallied.

Second, it is unclear what constitutes an "ecosystem" and whether or not single species efforts such as the reintroduction of a locally extinct animal or the removal of one invasive species should count as ecological restoration, even though these may benefit biodiversity. The 2012 IUCN guideline *Ecological Restoration for Protected Areas* outright adopts the SER definition of ecological restoration and offers examples of what constitutes "degraded, damaged or destroyed," leaving the scope of ecological restoration large, from single species recovery to invasive species removal to whole ecosystem reconstruction (IUCN WCPA Ecological Restoration Task Force 2012). Others (e.g. Clewell and Aronson 2007) have rejected all efforts that focus on single ecosystem components, such as the reintroduction of one species, from their definition of ecological restoration. Menz et al. (2013) likewise advocates only landscape-scale restoration as appropriate for MEA targets. If a single species action is counted toward the target,

would the entire areal extent of the species range be counted as restored or some portion thereof?

Third, a decision will have to be made about *when* the restoration action is considered countable. In the SER (2004) guidelines, restoration is "the process of assisting the recovery of an ecosystem," thus once a restoration project has begun, it might be legitimate to count it toward the goal. Clewell and Aronson (2007:8), however, state that an ecosystem has been restored when it is "self-organizing, self-sustaining, and capable of maintaining itself." A definition of restoration following these lines would be much more restrictive because it assumes some completeness of the action taken. Success of restoration is of course notoriously difficult to measure (e.g. Ruiz-Jaen and Aide 2005; Zedler 2007; Jähnig et al. 2011), so defining an ecosystem as "restored" is not a straightforward affair.

Finally, restoration is not an end in itself in CBD. The stated goal of Target 15 is to enhance ecosystem resilience and carbon stocks, contribute to climate change mitigation and adaptation, and to combat desertification through biodiversity conservation (CBD 2010a). Thus, ecological restoration that is included toward CBD goal progress might be bounded by these aims, so that only actions that directly contribute to one of those areas count.

Conclusions

Ecological restoration is clearly on the political agenda. Yet this analysis has shown that restoration has been incorporated in the Aichi Targets without the political actors knowing what word implies. It seems that the approach to ecological restoration in these

MEAs has been, as famously stated by US Supreme Court justice Potter Stewart in his decision on pornography in *Jacobellis v. Ohio*, 1964, "I know it when I see it."

Defining what ecological restoration means in the context of CBD will become vital to measuring progress toward the 2020 goals. Based on CBD, inter-governmental entities like the EU and individual COPs have incorporated ecological restoration in their goals—the EU 2020 Biodiversity Strategy, for example, includes restoring 15 percent of degraded ecosystems as a target (European Commission 2011)—yet they too have left restoration undefined. These commitments will route money and resources toward restoration, likely in the tens or hundreds of billions of dollars, yet funds might end up used in arbitrary, useless, or even harmful ways if what counts as ecological restoration is left unclear.

Logically, CBD has two potential paths: either adopt a definition of restoration that can be measured against the already-established Aichi Target 15, or modify the target to match a realistic definition of restoration. If the former option is chosen, restoration tied to the target must be limited to projects that can be measured in land area and involve whole ecosystem interventions rather than select species. This will create a narrow definition of ecological restoration, but activity could be calculated as a percentage of the total area of "degraded ecosystems" when (and if) those numbers become available for all member states. I believe, however, that this option runs counter to the spirit of CBD because ecological restoration is a broad constellation of practices that can benefit biodiversity yet cannot be measured as a "per cent of degraded ecosystems".

Instead of limiting restoration to activities so narrowly, CBD could instead redefine Target 15. I acknowledge that revising targets is not an easy process for CBD,

but it may be the only way to strategically deploy restoration as an effective biodiversity conservation tool. Rather than setting the goal before the definitions, CBD could first define restoration and its outcomes based on the *Ecological Restoration for Protected Areas* guideline, which was developed through a comprehensive two-year consultation with scientists, practitioners, and other stakeholders (IUCN WCPA Ecological Restoration Task Force 2012). Then a similar consultation, although perhaps over a shorter timeframe, could develop a more appropriate way of quantifying restoration activity as a biodiversity conservation measure.

The adoption of SMART goals is only smart if the goals are possible to achieve. CBD's Target 15 was adopted without considering the definition restoration, and was thus written in such a way that the goal cannot be reached because it cannot be measured. Restoration science, practice, and policy need to collaborate at the early stages of the policymaking process in the future to ensure that definitions match targets.

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Table 1. Restoration and rehabilitation definitions as written in "Most used definitions/descriptions of key terms related to ecosystem restoration" (UNEP/CBD/COP/11/INF/19) prepared by the Society for Ecological Restoration for Convention on Biological Diversity, 2012.

Ecological Restoration (T14 & 15, GSPC 4 & 8) ***(Also Ecosystem Restoration)*** The process of returning an ecosystem to a natural pre-disturbance structure and function. (Briggs 1996). The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. (SER 2004). The process of intentionally altering a site to establish a defined, indigenous ecosystem. The goal of this process is to emulate the structure, function, diversity and dynamics of the specified ecosystem. (UNEP 2003). Human intervention … designed to accelerate the recovery of damaged habitats, or to bring ecosystems back to as close an approximation as possible of their pre-disturbance states. (Cairns 1993; Yap 2000).
Rehabilitation ***(See also Forest Rehabilitation; Ecosystem Enhancement)*** Seeks to repair damaged or blocked ecosystem *functions*, with the primary goal of raising ecosystem productivity for the benefit of local people. (Aronson et al. 1993). The action of restoring a thing to a previous condition or status. This appears rather similar to restoration, but there is little or no implication of perfection. Indeed in common usage, something that is rehabilitated is not expected to be in as original or healthy a state as if it had been restored. (Bradshaw 1996). The improvement of ecosystem functions without necessarily achieving a return to 'pre-disturbance' conditions. Emphasis is generally on restoring ecosystem processes and functions so as to increase the flow of services and benefits to people. (Clewell and Aronson 2007). The act of partially or, more rarely, fully replacing structural or functional characteristics of an ecosystem that have been diminished or lost, or the substitution of alternative qualities or characteristics than those originally present with the provision that they have more social, economic or ecological value than existed in the disturbed or degraded state. (Edwards 1998). The reversal of site degradation, usually for the purpose of increasing its capacity to provide ecosystem services. (Galatowitch 2012). Rehabilitation shares with restoration a fundamental focus on historical or pre-existing ecosystems as models or references, but the two activities differ in their goals and strategies. Rehabilitation emphasizes the reparation of ecosystem processes, productivity and services, whereas the goals of restoration also include the re-establishment of the pre-existing biotic integrity in terms of species composition and community structure. (SER 2004).

Full references for the citations in these definitions are available in the "References Cited" section of the source document "Most used definitions/descriptions of key terms related to ecosystem resotration", UNEP/CBD/COP/11/INF/19