

## POLICY PERSPECTIVE

# Formulating Smart Commitments on Biodiversity: Lessons from the Aichi Targets

Stuart H. M. Butchart<sup>1,2</sup>, Moreno Di Marco<sup>3,4</sup>, & James E. M. Watson<sup>4,5</sup><sup>1</sup> BirdLife International, David Attenborough Building, Pembroke Street, Cambridge CB23QZ, UK<sup>2</sup> Department of Zoology, University of Cambridge, Downing Street, Cambridge CB23EJ, UK<sup>3</sup> ARC Centre of Excellence for Environmental Decisions, Centre for Biodiversity and Conservation Science, University of Queensland, St. Lucia, QLD 4072, Australia<sup>4</sup> School of Geography, Planning and Environmental Management, University of Queensland, St. Lucia, QLD 4072, Australia<sup>5</sup> Global Conservation Program, Wildlife Conservation Society, Bronx, NY 10460, USA**Keywords**

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**Correspondence**

Stuart Butchart, BirdLife International, David Attenborough Building, Pembroke Street, Cambridge CB23QZ, UK.

Tel: +44 1223 747530; fax: +44 1223 281441.

E-mail: stuart.butchart@birdlife.org

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**Abstract**

The world is currently not on course to achieve most of the Convention on Biological Diversity's Aichi Targets to address biodiversity loss. One challenge for those implementing actions to achieve them may be the complexity and lack of clarity in the wording of the targets, which also make it difficult to stimulate and quantify progress. Drawing on experience in developing and measuring indicators to assess progress toward targets, we identify four key issues: ambiguity, quantifiability, complexity, and redundancy. The magnitude of required commitments under some targets is rendered ambiguous by the use of imprecise terms (e.g., "substantially"), while many targets contain poorly defined operational terms (e.g., "essential services"). Seventy percent of targets lack quantifiable elements, meaning that there is no clear binary or numeric threshold to be met in order for the target to be achieved. Most targets are excessively complex, containing up to seven different elements, while one-third of them contain redundancies. In combination, these four issues make it difficult to operationalize the targets and to ensure consistent interpretation by signatories. For future policy commitments, we recommend the adoption of a smaller number of more focused headline targets (alongside subsidiary targets) that are specific, quantified, simple, succinct, and unambiguous.

**Introduction**

In 2002, world governments adopted a global commitment to address biodiversity loss through the Convention on Biological Diversity (CBD), setting themselves a target "to achieve by 2010 a significant reduction of the current rate of biodiversity loss" (CBD 2003). This "2010 target" was also incorporated into the United Nations Millennium Development Goals (United Nations 2008). By 2010, it was widely accepted that the world had failed to achieve the target (Butchart *et al.* 2010; CBD 2010a).

Recognizing that the condition of biodiversity is influenced by multiple pressures and underlying drivers that must be counteracted by diverse policy responses,

the CBD adopted a more sophisticated approach for the decade following 2010, developing a Strategic Plan on Biodiversity that included 20 Aichi Targets (CBD 2010b). Halfway toward the end-date for achieving these targets, it is clear that despite accelerating policy and management responses, trends in the state of biodiversity are unlikely to improve by 2020 without both a substantial scaling up and refocussing of efforts (Tittensor *et al.* 2014; CBD 2014) and a better consideration of the synergies and trade-offs in achieving multiple targets (Perrings *et al.* 2010; Di Marco *et al.* 2016a). Moreover, the articulation and specification of the Aichi Targets themselves may also constitute an additional challenge for those implementing actions to achieve them. It is likely that further targets will be set after 2020 and after the United

Nation's Sustainable Development Goals (SDGs) expire in 2030; (United Nations General Assembly 2015). What, therefore, can we learn from the wording of the Aichi Targets to ensure that future targets are formulated more effectively?

## The shortcomings of the Aichi Targets

The Aichi Targets are, in some respects, a vast improvement over the 2010 Biodiversity Target. For example, as well addressing the state of biodiversity, they also focus on pressures on biodiversity, underlying drivers, policy responses, and integration of biodiversity issues across sectors. However, we argue that they have a number of shortcomings. We draw on our experience in attempting to identify indicators with which to measure progress against biodiversity targets, including in relation to the Streamlining European Biodiversity Indicators initiative (European Environment Agency 2012), the Aichi Targets through two CBD Ad Hoc Technical Expert Groups on indicators (CBD 2004, 2015), the SDGs (Sustainable Development Solutions Network 2015), and the Ramsar Strategic Plan (Convention on Wetlands 2015). Identifying meaningful and effective indicators requires forensic analysis of the wording of targets and their meaning, from which we have drawn some of the insights covered below.

Similarly, we also draw on efforts to synthesize evidence across multiple indicators to quantify progress in achieving such targets (Butchart *et al.* 2010; Juffe-Bignoli *et al.* 2014; Tittensor *et al.* 2014), which poses similar challenges. We, therefore, attempt to identify problems with the Aichi Targets that may hinder their ease of understanding and interpretation, as well as their measurability and intercomparability (between countries and targets), leading to ineffective efforts to identify and implement the actions they are intended to stimulate.

While there have been previous general calls for smarter, less vague environmental targets with greater quantification (Perrings *et al.* 2010; Stafford-Smith 2014; Maxwell *et al.* 2015), we provide the first detailed analysis of each element in each of the 20 Aichi Targets (Table 1). We define "elements" as clauses or components of the targets that address different aspects of the status of biodiversity, threats to it, or actions needed for it, or that require very different indicators or datasets to monitor progress toward their achievement. We argue that the Aichi Targets would be more effective if they contained fewer elements, ambiguities, redundancies and unnecessary complications, were less complex, and contained more quantification. We then propose some general recommendations for future target setting.

## Ambiguously worded

Some of the targets contain wording that is difficult to interpret because of its ambiguity. For example, caveats like "as appropriate" (target 2) and "where feasible" (target 5) render the target so subjective that individual Parties could defend almost any action and outcome as being sufficient, greatly weakening the value of their commitment. Similarly, the magnitude of required commitments under some targets is rendered ambiguous by the use of imprecise terms such as "significantly" (target 5), "substantially" (target 20), "minimized" (target 10), or by language such as "taken steps to achieve" (sustainable production and consumption, in target 4). Such ambiguities make it impossible to define and quantify what achievement of these targets would comprise, and they make it difficult for Parties to ensure consistency of response.

Some terms used in the targets remain undefined and can be interpreted in different ways within different scientific contexts or by different Parties, making it difficult to measure global target achievement. For example, in relation to target 11, there are multiple approaches to defining what comprises an "ecologically representative" protected area system (Watson *et al.* 2016) and a "well-connected" system (Fischer and Lindenmayer 2007). Similarly, "safe ecological limits" (in relation to production and consumption systems other than fisheries; target 4), "areas of importance for biodiversity and ecosystem services" and "other effective area-based conservation measures" (target 11), and "degraded ecosystems" and "restoration" (target 15) are not easily defined. For some of these, work is underway to reach consensus (Watson *et al.* 2016). For example, IUCN has recently established a Task Force to develop guidance on the definition of "other effective area-based conservation measures." Similarly, many of the approaches to identify "areas of importance for biodiversity," such as Important Bird and Biodiversity Areas (BirdLife International 2014) and Alliance for Zero Extinction sites (Ricketts *et al.* 2005) have now been brought together under a single umbrella with the development of unified standard for the identification of Key Biodiversity Areas (IUCN 2016), while potential protected areas to conserve biodiversity in the marine realm have been identified worldwide through delineation of "Ecologically or Biologically Significant Areas" (CBD 2009). However, while the inclusion of such terms in the Aichi Targets has stimulated new work to advance biodiversity conservation, when target wording is not carefully defined, it is likely that different Parties will use different definitions and interpretations, with the probable outcome of less coherent global conservation responses than would be achieved otherwise (Di Marco *et al.* 2016b).

**Table 1** The multiple elements and shortcomings of the Aichi Biodiversity Targets

Target	Elements	Quantifiable	Ambiguities	Unnecessary complexities	Redundancies
1. By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	People are aware of the values of biodiversity to conserve and use it sustainably	No			
2. By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.	Biodiversity values have been integrated into national and local development and poverty reduction strategies Biodiversity values have been [...] integrated into national and local planning processes Biodiversity values have been [...] integrated into national [...] reporting systems Biodiversity values have been [...] integrated into reporting systems	No	"As appropriate"		
3. By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out, or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the convention and other relevant international obligations, taking into account national socioeconomic conditions.	Incentives, including subsidies, harmful to biodiversity are eliminated, phased out, or reformed in order to minimize or avoid negative impacts Positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the convention and other relevant international obligations, taking into account national socioeconomic conditions.	No		"consistent and in harmony with the convention and other relevant international obligations, taking into account national socioeconomic conditions"	
4. By 2020, at the latest, Governments, business, and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	Governments, business, and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption Governments, business, and stakeholders at all levels [...] have kept the impacts of use of natural resources well within safe ecological limits.	No	"Taken steps to achieve or have implemented plans for"; "safe ecological limits."	"Taken steps to account national socioeconomic conditions"	"Taken steps to achieve" = "have implemented plans for"
5. By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	The rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero Degradation and fragmentation [of natural habitats] is significantly reduced	Yes (numeric)	"Where feasible"; "significantly reduced"		"including forests" is encompassed by "all natural habitats"

Continued

**Table 1** Continued

Target	Elements	Quantifiable	Ambiguities	Unnecessary complexities	Redundancies
6. By 2020, all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally, and applying ecosystem-based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems, and the impacts of fisheries on stocks, species, and ecosystems are within safe ecological limits.	All fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally, and applying ecosystem-based approaches Overfishing is avoided Recovery plans and measures are in place for all depleted species Fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems The impacts of fisheries on stocks, species, and ecosystems are within safe ecological limits Areas under aquaculture [...] are managed sustainably Areas under agriculture [...] are managed sustainably Areas under forestry [...] are managed sustainably	No	"Safe ecological limits"		"Fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems" is encompassed by "the impacts of fisheries on stocks, species, and ecosystems are within safe ecological limits"
7. By 2020, areas under agriculture, aquaculture, and forestry are managed sustainably, ensuring conservation of biodiversity.		No			
8. By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	Pollution [...] has been brought to levels that are not detrimental to ecosystem function and biodiversity. Pollution [...] from excess nutrients should be brought to levels that are not detrimental to ecosystem function and biodiversity	No			"Including from excess nutrients" is encompassed by "pollution"
9. By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	Invasive alien species are identified and prioritized Invasive alien [...] pathways are identified and prioritized Priority [invasive] species are controlled or eradicated Measures are in place to manage pathways to prevent their introduction and establishment	No			
10. By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	The multiple anthropogenic pressures on coral reefs [...] are minimized, so as to maintain their integrity and functioning	No	"Vulnerable ecosystems impacted by climate change or ocean acidification", "minimized"		"Or ocean acidification"

Continued

**Table 1** Continued

Target	Elements	Quantifiable	Ambiguities	Unnecessary complexities	Redundancies
	The multiple anthropogenic pressures on [...] other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning	No			
11. By 2020, at least 17% of terrestrial and inland water, and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	At least 10% of coastal and marine areas [...] are conserved At least 17% of terrestrial and inland water areas [...] are conserved [...] Areas of particular importance for biodiversity and ecosystem services, are conserved [Areas are conserved through] ecologically representative ... protected areas and other effective area-based conservation measures [Areas are conserved through] effectively and equitably managed ... protected areas and other effective area-based conservation measures [Areas are conserved through] well-connected systems of protected areas and other effective area-based conservation measures Areas are conserved [...] and integrated into the wider landscapes and seascapes The extinction of known threatened species has been prevented The conservation status [of known threatened species, particularly of those most in decline] has been improved and sustained The genetic diversity of cultivated plants [...] is maintained The genetic diversity of [...] farmed and domesticated animals [...] is maintained The genetic diversity of [...] wild relatives [...] is maintained The genetic diversity of [...] socioeconomically as well as culturally valuable species, is maintained [...] Strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity	Yes (numeric) Yes (numeric) No No No No No Yes (binary) Yes (binary) No No No No No	"Areas of particular importance for biodiversity and ecosystem services"; "other effective area-based conservation measures"; "integrated into the wider landscapes and seascapes"		
12. By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.					
13. By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socioeconomically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.					

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**Table 1** Continued

Target	Elements	Quantifiable	Ambiguities	Unnecessary complexities	Redundancies
14. By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods, and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	Ecosystems that provide essential services, including services related to water, and contributing to health, livelihoods, and well-being, are restored  Ecosystems that provide essential services, including services related to water, and contributing to health, livelihoods, and well-being, are safeguarded	No  No	"Essential" services	"Taking into account the needs of women, indigenous and local communities, and the poor and vulnerable"	"Including services related to water, and health, contribute to livelihoods, and well-being"
15. 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% of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	Ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration [...] thereby contributing to climate change mitigation and adaptation and to combating desertification  [...] Including restoration of at least 15% of degraded ecosystems [...]	No  Yes (numeric)	"Enhanced"; "degraded ecosystems"; "restoration"		
16. By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force [by 2015]	Yes (binary)		"Consistent with national legislation"	
17. By 2015, each party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.	The Nagoya Protocol [...] is operational [and] consistent with national legislation [by 2015] Each Party has developed [...] an effective, participatory, and updated national biodiversity strategy and action plan (NBSAP) Each party has [...] adopted as a policy instrument [...] an effective, participatory, and updated national biodiversity strategy and action plan (NBSAP)  Each party has commenced implementing [...] an effective, participatory, and updated national biodiversity strategy and action plan (NBSAP)	Yes (binary) Yes (binary) Yes (binary) Yes (binary)	"Effective"		

Continued

**Table 1** Continued

Target	Elements	Quantifiable	Ambiguities	Unnecessary complexities	Redundancies
18. By 2020, the traditional knowledge, innovation, and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations [...] at all relevant levels. In the implementation of the convention with the full and effective participation of indigenous and local communities, at all relevant levels.	<p>The traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations [...] at all relevant levels.</p> <p>The traditional knowledge, innovations, and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are [...] fully integrated and reflected in the implementation of the convention [...] at all relevant levels.</p> <p>The traditional knowledge, innovations, and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, [are respected, integrated, and reflected] with the full and effective participation of indigenous and local communities, at all relevant levels.</p>	No		“At all relevant levels”	<p>“Innovations and practices” is encompassed by</p> <p>“knowledge” and</p> <p>“reflected” is encompassed by</p> <p>“integrated”</p>
19. By 2020, knowledge, the science base, and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared, and transferred [...] applied.	<p>The science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared, and transferred [...] applied.</p> <p>The science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are [...] applied.</p> <p>Information and tools at the disposal of policy is applied</p>	No			

Continued

**Table 1** Continued

Target	Elements	Quantifiable	Ambiguities	Unnecessary complexities	Redundancies
20. By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011–2020 from all sources, and in accordance with the consolidated and agreed process in the strategy for resource mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs, assessments to be developed and reported by Parties.	The mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011–2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for resource mobilization, should increase substantially from the current levels [...]	No	“Substantially”; “current levels”	“Consolidated and.” “This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.”	



In other cases, the intended meaning can be presumed, but clearer wording would be helpful to avoid potential ambiguity. For example, “safe ecological limits” (under target 4) in relation to fisheries may refer to “limit reference points” (maximum values of fishing mortality or minimum values of the biomass which must not be exceeded in order to ensure harvests are sustainable; Cadima 2003). Similarly, under target 11, “areas of particular importance for biodiversity and ecosystem services” presumably refers to areas that are important for at least one of these features, rather than being restricted to areas that are important for both. The latter interpretation would be highly problematic and potentially inherently contradictory given that some essential ecosystem services (e.g., timber extraction or fishing) can have a negative influence on biodiversity if the levels of extraction are unsustainable (Mace *et al.* 2012). Indeed for some services associated with particular biodiversity features (e.g., coastal defense by coral reefs), areas of high importance for biodiversity (e.g., where the habitats are most intact and richest in diversity) do not generally coincide with the areas of high ecosystem service value (i.e., adjacent to the largest coastal populations and associated infrastructure) (Mora *et al.* 2011).

Target 10 is perhaps the most problematic to interpret: “the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized.” The vast majority of ecosystems (and conceivably all of them) will be impacted by climate change, so most could be argued to be vulnerable, which, in combination with the all-encompassing “multiple anthropogenic pressures” to be minimized, arguably means that achievement of target 10 requires addressing the entire biodiversity crisis, and almost all elements of the other 19 targets. Furthermore, ocean acidification is a consequence of greenhouse gas emissions and climate change, so singling it out for extra emphasis is somewhat confusing.

### Unquantifiable

A major difficulty with the wording of the Aichi Targets is that most (14 of 20) lack quantified elements (Table 1), meaning that there is not a clear, binary or numeric, threshold to be met in order for the target to be achieved. Without such clarity and quantification, it is difficult to determine progress toward targets (Stafford-Smith 2014). Three targets contain explicit numeric thresholds for at least some of their elements: habitat loss is “at least halved” (target 5), conservation of “at least 17% of terrestrial and inland water, and 10% of

coastal and marine areas” (target 11), and “restoration of at least 15% of degraded ecosystems” (target 15). A further three targets contain clear binary thresholds that can objectively be met or not, for example, “the extinction of known threatened species has been prevented” (target 12), “the Nagoya Protocol... is in force” (target 16), and each Party has “commenced implementing... a national biodiversity strategy and action plan” (target 17). However, only two targets (16 and 17) have all their elements quantifiable, and these are both measurement of human responses rather than underlying biodiversity status or pressures. This lack of quantifiability for most targets proved a major difficulty when reviewing progress at the midpoint of the Aichi target’s lifespan (Tittensor *et al.* 2014; Secretariat of the Convention on Biological Diversity 2014). It should be noted that for some elements of some targets, quantification may not require a particular number to be specified in the target text itself. For example, “safe ecological limits” for fisheries (under target 4) should be quantified for each fishery individually, as a universal value across all fisheries would be meaningless.

A related issue is the availability of indicators. While adoption of targets can stimulate development of indicators to meet measurement needs, it would seem ineffective to create a target for which indicators are presently unavailable and unlikely to be developed. Tittensor *et al.* (2014) found that indicators suitable for assessing progress were unavailable for 23 elements across 12 of the Aichi targets. The availability of relevant existing indicators and the feasibility of developing new ones must be borne in mind when formulating future biodiversity targets.

We acknowledge the fact that it is difficult at present to determine objectively a meaningful number for some aspects of some targets, for example, the level of habitat connectivity required for a protected area network, or the degree of ecological integrity needed to maintain essential ecosystem services. This is closely connected to the difficulty in finding universal measures of these elements. Nevertheless, it would be more coherent and efficient to adopt a standard approach with a common aim rather than leaving this to the interpretation of individual Parties or to those scientists attempting to quantify progress in achieving the relevant targets. At the same time, it is important to be explicit about the basis of the quantification: for the Aichi targets, these are largely politically rather than scientifically derived, and in some cases may only partly achieve the overall aspiration to achieve sustainable development and to halt or significantly reduce biodiversity declines. A stronger scientific basis for the values adopted in future quantified targets is desirable.

### Excessively complex

Although there are 20 targets, most have multiple elements, each of which requires different actions to address and indicators with which to measure progress. Only one target has a single element: target 20 on increasing the mobilization of financial resources for effectively implementing the CBD strategic plan. Other targets typically contain two or three elements, with an overall mean of 2.8 elements per target (Table 1). Target 11 is particularly complex, having at least seven distinct elements (some of which arguably could be subdivided further; Table 1). With so many elements, it is not straightforward to identify the actions and solutions required to achieve the target as a whole, nor to develop indicators for measuring progress toward its achievement (Juffe-Bignoli *et al.* 2014; Watson *et al.* 2016). Indeed, no single indicator is able to incorporate all the seven elements of target 11, with some of the elements (e.g., the percentage area targets) being arguably easier to measure than others, and some elements being objectively difficult to quantify (e.g., “integration with the wider landscape and seascape”). Furthermore, it is unclear how many elements need to be met before the target is considered to have been achieved: arguably, all of them. We suggest that it would be more effective to have headline targets that are less complicated, with different elements separated out into specific subsidiary targets.

### Containing redundancies and unnecessary complications

The wording of one-third of the targets could be shortened and simplified without changing their meaning because of redundancies within the text. For example, “all natural habitats, including forests” (target 5), and “pollution, including from excess nutrients” (target 8). If particular emphasis is to be placed on a particular aspect, then these may be better addressed in a separate target. Similarly, “implemented plans for” is arguably encompassed by, or at least confounded with, “taken steps to achieve” (target 4) while ecosystems that “contribute to health, livelihoods, and well-being” are arguably a subset of those that “provide essential services” (target 14).

Several of the targets contain text that would arguably be better placed in background documentation and guidance. For example, under target 3, positive incentives are to be developed and applied “consistent and in harmony with the convention and other relevant international obligations, taking into account national socioeconomic [sic] conditions.” However, these riders arguably apply to all targets, not just this one. This is also true for

the text “taking into account the needs of women, indigenous and local communities, and the poor and vulnerable” (in relation to safeguarding ecosystems that provide essential services under target 14), and “consistent with national legislation” (in relation to the Nagoya Protocol being operational under target 16). The final clause of target 20 (“this target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties”) is an explanatory caveat that arguably belongs in the preamble, not the target. We are not the first to call for less ambiguous and more quantified environmental targets (Stafford-Smith 2014; Maxwell *et al.* 2015), but our more detailed target-by-target analysis also highlights the unnecessary complexities, redundancies, and complications in the structure and wording of the Aichi Targets. While these are potentially not as problematic as the other issues, they nonetheless reduce the ease with which the targets are interpreted and communicated, and hence may impact the degree to which they are adopted and applied.

### Lessons for future target setting

The wording of biodiversity targets are typically negotiated in intergovernmental policy fora through protracted and tortuous discussions (Maxwell *et al.* 2015). This renders them susceptible to the introduction of redundancies, complications, ambiguities, and contradictions, and to the inclusion of references reflecting the agendas of particular groups, whether their focus is forests, fisheries, water, indigenous peoples, or other aspects.

In constructing targets to address biodiversity loss in future, efforts should be made to keep target language as simple and succinct as possible, using background documents, guidance, and preamble text to cover explanations, definitions, and caveats rather than incorporating these into the wording. In addition, targets should be worded as specifically as possible (the “S” in the mnemonic acronym “SMART,” which is often used in relation to targets; Doran 1981), and with quantified components as far as possible (Stafford-Smith 2014). This makes the magnitude of required actions unambiguous and transparent. These considerations should be revisited throughout the process of constructing future targets to ensure that they are reflected in the final wording adopted.

It is critical that national biodiversity strategies and action plans (which set out CBD Parties’ plans for implementing the actions needed to achieve the 20 Aichi Targets) take into account the potential synergies and trade-offs between targets (Stafford-Smith 2014; Di Marco *et al.* 2016a). For example, actions to expand terrestrial protected area coverage (target 11) could also

contribute to reducing habitat loss (target 5) avoiding extinctions (target 12), and maintaining carbon stocks (target 15; Di Marco *et al.* 2016a).

We suggest that there may be merit in selecting a smaller number of more focused headline targets, alongside specific subsidiary targets capturing other elements. The former might highlight a set of specific actions, which if implemented in full, could together produce a major reduction in the rate of biodiversity loss. For example, ambitious, specific, quantified targets to reduce deforestation and wetland degradation, increase the sustainability of fisheries, minimize agricultural expansion, tackle invasive alien species, increase the scale and effectiveness of protected areas (and their coverage of important sites for biodiversity and large areas of intact habitat such as primary forest), address ocean acidification, recover threatened species, and augment financing. This set of headline targets could be sufficiently focused as to concentrate efforts while being adequately broad in impact as to advance biodiversity conservation substantially. They could be underpinned by more specific subsidiary targets covering the other aspects and elements of the Aichi Targets.

In conclusion, we suggest that future biodiversity targets should be specific, simple, succinct, quantified, unambiguous, relatively few in number, and set through a process involving greater collaboration between scientists and policy makers. Ultimately, however, the success of such targets in stimulating effective action to tackle the biodiversity crisis, as with the Aichi Targets and relevant SDGs, will be largely determined by the degree to which progress or lack thereof is transparent, and the degree to which national governments prioritize the needs of nature and of future generations of people over short-term aspirations.

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