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THE IDENTIFICATION OF SCIENTIFIC AND TECHNICAL NEEDS FOR THE ATTAINMENT OF THE TARGETS UNDER STRATEGIC GOAL B OF THE STRATEGIC PLAN FOR BIODIVERSITY 2011-2020

Note by the Executive Secretary

I. INTRODUCTION

1. In paragraph 1 of decision XI/13 B, the Conference of the Parties requested the Executive Secretary to prepare information on:

(a) Scientific and technical needs related to the implementation of the Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets;

(b) Existing policy support tools and methodologies developed or used under the Convention and their adequacy, impact and obstacles to their uptake, and gaps and needs for further development of such tools and methodologies;

(c) The adequacy of observations, and of data systems, for monitoring the biodiversity attributes addressed in the Aichi Biodiversity Targets; and

(d) Options for assessing the effects of the types of measures taken in accordance with the provisions of the Convention;

and to report on progress on these matters to a meeting of the Subsidiary Body on Scientific, Technical and Technological Advice prior to the twelfth meeting of the Conference of the Parties.

2. Accordingly, the Executive Secretary, through notification SCBD/STTM/DC/ac/81207 (2013-005) of 21 January 2013, invited the views of Parties and relevant organizations on these issues.

3. Eleven Parties (Argentina, Australia, Bolivia, Bulgaria, Canada, China, Colombia, Mexico, the European Union, France and the United Kingdom) and eight organizations (BirdLife, Conservation International, the Global Biodiversity Information Facility (GBIF), the Group on Earth Observations Biodiversity Observation Network (GEO-BON), the International Union for Conservation of Nature

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(IUCN), the Japan Civil Network for the United Nations Decade on Biodiversity, the Secretariat of the Convention on the Conservation of Migratory Species of Wild Animals (CMS), and the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC)) responded to this notification.

4. The present note, prepared on the basis of these and other inputs, contains for each target under Strategic Goal B of the Strategic Plan for Biodiversity 2011-2020: general observations and considerations regarding the adequacy of policy support tools; the adequacy of data, observations and indicators; and the effects of the types of measures taken in accordance with the provisions of the Convention on Biological Diversity; and on that basis draws conclusions on scientific and technical needs related to the implementation of the Strategic Plan and to each of these targets.

5. A draft of this note was subjected to peer-review from 27 June to 15 July 2013. Comments from 20 Parties (Canada, Cook Islands, European Union, Fiji, Guatemala, Japan, Kiribati, Marshall Islands, Mexico, Micronesia (Federated States of), Nauru, Niue, Nepal, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu) and four organizations (the Food and Agriculture Organization of the United Nations, the Global Invasive Alien Species Information Partnership, the International Union for Conservation of Nature and the Secretariat of the International Plant Protection Convention) were received.[1]

II. SCIENTIFIC AND TECHNICAL NEEDS FOR THE ATTAINMENT OF THE TARGETS UNDER STRATEGIC GOAL B

Target 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.

5.1 Elements of Target 5

6. Globally most natural habitats are in state of decline. Economic, demographic and social pressures are likely to mean some continued habitat loss due to land-use change, as well as degradation and fragmentation, up to and beyond 2020. The reality is that in some local circumstances incentives remain to convert habitats, including forests, to other uses particularly those perceived to be more productive by local stakeholders. The rate and amount of change needs to be substantially reduced if biodiversity loss is to be halted. Ultimately, there must be limits to the loss and degradation of natural habitats if this target is to be achieved.

7. This target refers to all natural habitats, including forests. Achieving this target requires that the rate of loss of all natural habitats is at least halved and where feasible brought close to zero. Depending on the habitat being considered and national circumstances it may be possible to halt the loss of a given habitat, or even reverse it through restoration (Targets 14 and 15). This would be particularly important in those cases where very little of a habitat remains and further loss would mean it would be completely lost, or cases where further loss would lead to a risk of crossing "tipping points". However, for some habitats, in some countries, it will not be feasible to halt all loss by 2020 given other socioeconomic needs. In these cases the aim should be to at least halve the rate of loss.

8. This target also requires that degradation and fragmentation of natural habitats is significantly reduced. The condition of natural habitats is important for biodiversity. Habitats which are highly

[1] Comments were provided by experts in their individual capacity. 14 Pacific Island States made a joint submission prepared at the margins of the Regional Workshop for the Pacific Countries on the Preparation of the Fifth National Report (Nadi, Fiji, 22-26 July 2013).

degraded or fragmented are less likely to be able to support their full complement of species or provide the same level of ecosystem services provided by intact habitats.

5.2 Existing policy support tools and methodologies, their adequacy, impact, obstacles to their uptake, and gaps

Policy support tools and methodologies to help achieve Aichi Biodiversity Target 5

9. Habitat loss is occurring in virtually all habitat types. Reduction in the loss and degradation of natural habitats could be achieved in a number of ways, including through improvements in production efficiency and land-use planning, enhanced mechanisms for natural resource governance, and the greater recognition and valuation of the economic and social values of the ecosystem services provided by natural habitats. (Thus, measures to address other Aichi Biodiversity Targets, such as Targets 3, 4 and 7, will also contribute to Target 5). A range of policy support tools and methodologies are relevant to this target. Generally tools relevant to Target 5 can be divided into two types: tools and methodologies for assisting with the monitoring of ecosystems and tools for developing plans or approaches for reducing habitat loss and habitat degradation and fragmentation. Further, some of the tools that exist are applicable in multiple ecosystem types while others have been developed with specific ecosystem types in mind.

10. Numerous organizations have developed tools or methods to support the assessment of habitats and ecosystems. For example IUCN has developed Criteria and Categories for the IUCN Red List of Ecosystems. The IUCN Red List of Ecosystems methodology has been published in peer-reviewed journals and is now being applied in selected regions. Guidelines for Biodiversity in Tropical Production Forests have also been developed by IUCN and the International Tropical Timber Organization (ITTO). In addition the Collaborative Partnership on Forests, of which the Secretariat of the Convention on Biological Diversity is one of 14 members, has produced fact sheets on sustainable forest management. A second edition of the Global Ecological Forest Classification and Forest Protected Area Gap Analysis is another tool, prepared jointly by UNEP-WCMC and non-governmental organizations. Further, many Parties to the Convention, and the United Nations system in general, have tended to use ecological regions as classified by FAO.

11. Many countries have developed their own policy support tools or methodologies for combating habitat loss. Examples of these include observation and information systems based on remote sensing activities, habitat mapping, and ecosystem inventories.

12. Under the Convention, several policy support tools or methodologies have been elaborated which can be used to develop strategies to reduce the rate of habitat loss. One of these is the ecosystem approach, which has been recognized by the Conference of the Parties as being the primary framework of action to be taken under the Convention. The ecosystem approach is applicable to all habitats and a wide range of guidance for its use has been developed by the Convention and other organizations. In addition the seven thematic programmes of work of the Convention as well as several of its cross-cutting programmes provide frameworks for actions which are relevant to this target. National biodiversity strategies and action plans (NBSAPs) provide policy direction. Further, a number of CBD technical series and other guidance materials which provide tools and methodologies to support the development of policies have been developed under the Convention. These include, but are not limited to:

(a) Indicative list of technologies relevant to the conservation and sustainable use of mountain biological diversity and other related thematic areas and cross-cutting themes;

(b) Options for preventing and mitigating the impact of some activities on selected seabed habitats;

(c) Ecological criteria and biogeographic classification system for marine areas in need of protection;

(d) Marine spatial planning and voluntary guidelines for the consideration of biodiversity in environmental impact assessments and strategic environmental assessments in marine and coastal areas;

(e) Voluntary guidelines for the consideration of biodiversity in environmental impact assessments and strategic environmental assessments in marine and coastal areas;

(f) Guidance on how to improve the sustainable use of biodiversity in a landscape perspective, including the principles for integrating biodiversity into production landscapes (UNEP/CBD/SBSTTA/15/13);

(g) CBD Technical Series 47 - Water, wetlands and forests: a review of ecological, economic and policy linkages;

(h) CBD Technical Series 43 - Forest resilience, biodiversity, and climate change;

(i) CBD Technical Series 39 - Cross-sectoral toolkit for the conservation and sustainable management of forest biodiversity;

(j) CBD Technical Series 33 - Conservation and use of wildlife-based resources: the bushmeat crisis;

(k) CBD Technical Series 14 - Integrated marine and coastal area management (IMCAM);

(l) CBD Technical Series 9 - Facilitating conservation and sustainable use of biological diversity.

13. A number of policy support tools and guidelines have also been developed by other organizations.

The application of existing policy support tools and methodologies

14. A number of the policy tools noted above have been used in the development or formulation of national policies. Information from the national reports to the Convention on Biological Diversity as well as reviews of implementation of the various programmes of work suggests that the programmes of work have been useful in providing an overall direction for national policy development. However, while the programmes of work have served as useful frameworks for action by Parties and other stakeholders, it has often been observed that these are rarely fully implemented, thus limiting their effectiveness.

Obstacles to the use of existing policy support tools and methodologies

15. Developing ways of applying generic policy support tools and methodologies is challenging, especially given the diverse range of habitats. Developing approaches to balance competing demands on habitats involves trade-offs. The focus of existing tools is generally geared towards conservation rather than sustainable use. Also in many countries there are limited resources and capacity with which to apply these tools and/or to adapt them to national circumstances.

Gaps in policy support tools and methodologies

16. Tools need strengthening to enable imperfect or insufficient data to be used to assess the state of habitats, and tools are needed to facilitate the measurement of short-term and long-term changes in habitats. Existing tools and methodologies often focus primarily on conservation benefits only. In many

regions, it is necessary to balance conservation outcomes against sustainable resource use and management. Tools that address this dual purpose are needed. This requires better tools to understand what the trade-offs are and improved tools to help incorporate the cost of loss of ecosystem services, including the long-term loss of habitat, into decision-making. There is also a need for general agreement on definitions for key terms such as degradation, natural habitats, fragmentation, etc.

17. Better understanding of the scientific and technical needs necessary to remove the pressures on habitat loss is required and whether these needs are different for different habitats. Some of these needs relate to social science, such as the need to explore different urban settlement models that do not result in encroachment but still allow people to have a positive, community-based living experience, or the need for approaches that prevent development of floodplains, which would prevent encroachment on wetland habitat and also increase safety for people in changing climate regimes. For forests, for example, developments in logging equipment and techniques allow for less linear disturbance or the reclamation of linear disturbance after industrial activity. The further exploration and use of the social sciences in reducing the pressures on habitats could be considered

18. There are a large number of tools and approaches for spatial planning (and related concepts such as land-use planning, and ecological and economic zoning) used by Parties (especially at the subnational level) and by organizations, including tools and approaches for recognizing trade-offs and to facilitate discussions among stakeholders to resolve potential conflicts. However, these are not readily accessible to all Parties and stakeholders. Work to compile, and to facilitate exchange of, these tools and approaches could fill this gap.

5.3 The adequacy of observations, and of data systems, for monitoring the biodiversity attributes addressed in Aichi Biodiversity Target 5 and the use and development of indicators for the target

Ability to assess/measure the status of progress towards the target at global, regional, national and subnational levels

19. The following operational indicators have been identified in the annex to decision XI/3 A:

(a) Trends in extent of selected biomes, ecosystems and habitats;

(b) Trends in proportion of degraded/threatened habitats;

(c) Trends in condition and vulnerability of ecosystems;

(d) Trends in fragmentation of natural habitats;

(e) Trends in the proportion of natural habitats converted;

(f) Trends in proportion of land affected by desertification;

(g) Extinction risk trends of habitat dependent species in each major habitat type;

(h) Population trends of habitat dependent species in each major habitat type;

(i) Trends in primary productivity.

20. The first six of these indicators relate directly to the target, while the remaining three are proxy indicators. Overall trend data are currently available globally for many components of this target. In addition improvements in habitat extent estimates are expected in the coming decade with advancements in remote sensing such as finer spatial and spectral resolution, and data which are collected more frequently and better resolved into habitat types. Indicators relevant to this target also exist in many countries and in some regions. There are some differences in available technologies, indicators and data between different habitat types, particularly between terrestrial habitats (where land cover status is more easily measured) and marine areas, particularly offshore, where relevant area and condition are more

difficult to measure. Difficulties also remain in monitoring certain kinds of wetlands, particularly temporary (seasonal) or transient areas. Soil habitats, and soil biodiversity, possibly require more attention although relevant information can be derived from the status of land cover (land degradation) and very useful remote sensing approaches are emerging to monitor soil carbon and soil moisture.

21. Some of the best biological data currently available are for terrestrial habitats but they do not exist for all areas, nor is it always possible to estimate trends. Increasingly these data are being improved using various remote sensing techniques and are showing promise also for coastal ecosystems and shallow marine areas. Technological advancements in this field will enhance our ability to monitor habitats in the future. Such techniques are already delivering indicators of habitat extent, state, change and fragmentation with very high spatial and temporal resolution. However, on-the-ground country validation of the information collected through these techniques will still be needed.

22. While there are issues related to data consistency and comparability, trends in terrestrial habitats can generally be discerned and are sufficient to guide the development of national policies. For example information exists on a variety of habitats, including forest, grassland, shrubland, deserts, some wetlands including rivers, lakes, coastal habitats (mangrove and seagrasses) and coral reefs, and polar habitats, though the quality of information varies. Measuring habitat degradation remains challenging for some habitats as it can often go unnoticed. While hyperspatial and hyperspectral remote sensing data and LIDAR (Light Detection and Ranging) can provide relevant data for assessing habitat degradation, these are available only at local or in some cases national levels. With regards to the marine environment, habitat loss, except for the shallowest marine habitat types, including estuaries, cannot be measured using satellite-based remote sensing.

Areas where enhanced monitoring/better data/additional observations/additional indicators would make a significant difference in our ability to monitor progress in order to guide appropriate/targeted action

23. While trend information is available for some habitats, important gaps remain. This is particularly true for the marine environment, where better information would enable a more comprehensive assessment of progress towards this target. Marine habitats for which additional information would be particularly helpful include temperate coastal habitats, offshore feeding, breeding and spawning grounds, kelp forests, intertidal and sub-tidal wetlands, vulnerable shelf habitats, seamounts, hot and cold seeps, and benthic and deep sea habitats. For terrestrial habitats, better information on non-forest ecosystems and inland wetlands would be beneficial. For both marine and terrestrial environments, better information on small-scale habitat loss, degradation and fragmentation would allow for a more comprehensive assessment of progress.

24. Differences in understanding of what constitutes “degradation and fragmentation of natural habitats” and other characteristics of habitat quality is an obstacle for globally coherent monitoring. There are also fundamental science gaps on the value of existing indicators, the development of remote indicators and the application of new technology to resource management.

25. Most of the current indicators are designed to monitor trends in extent and condition of habitats. However, it is equally important to monitor the drivers of trends, including where things are improving. Progress towards the target will be limited unless pressures for land conversion are addressed, leading to difficult issues surrounding increasing population and increasing *per capita* consumption which are addressed through Target 4. Habitat loss is often due to conversion of land to other uses, and as such it may be practical to complement direct monitoring of habitat loss with monitoring of direct drivers such as the expansion of urban, industrial, low- and high-intensity agriculture, plantation forestry, etc. Similarly, more information may be available on fragmenting infrastructure (e.g. expansion of road and rail) than on fragmentation of habitats, providing a strong proxy until better data are available.

Limitations in making these enhancements

26. In some cases the limits relate to the absence of technological tools to assess the trends of certain types of habitats in a relatively quick and cost-effective manner. Similarly, with regards to the assessment of habitat fragmentation and degradation there are many technical challenges to undertaking this work. However, with increasing advancements in the field of remote sensing these limitations will likely be addressed in the future. The main limitations include the lack of capacities to fully analyse the relevant data, challenges in conducting the required work at different scales and ensuring that efforts are sustained over time.

5.4 Assessing the effects of the types of measures taken in accordance with the provisions of the Convention

27. Natural habitats in most parts of the world continue to decline in extent and integrity, although there has been significant progress to reduce this trend in some regions and habitats. For example the net loss of forests has slowed substantially in the past decade, though the loss of natural habitats is still alarming, and political commitment towards forest conservation and protection has increased. The examples of where habitat loss has been reduced or halted illustrate that where concerted efforts are taken it is possible to avoid this direct driver of biodiversity loss. Successes often involve several different types of action, ranging from strict enforcement of laws and policies to monitoring programmes, awareness raising activities and incentives. However, the fact that habitat loss continues in most ecosystems at current or escalating rates suggests that the actions which have been taken to date have had a limited effect on the underlying causes of biodiversity loss. Critical to achieving Target 5 will be progress in addressing the pressures on habitat loss as addressed in other strategic goals and targets of the Strategic Plan for Biodiversity 2011-2020, for example Targets 4 and 7.

5.5 Conclusions from previous sections to enable identification and prioritization of scientific and technical needs related to the implementation of Target 5

Adequacy of guidance and tools in support of implementation at national level

28. Guidance related to reducing or preventing habitat loss as well as degradation and fragmentation, from the conservation perspective, is well developed. A range of guidance has been developed under the Convention and by other United Nations agencies and inter- and non-governmental organizations. One of the challenges in applying this guidance relates to their translation into guidance and tools that can be applied at the national level. Further, securing the resources to effectively make use of existing guidance can be challenging. Other challenges to the use of existing guidance and tools include: (i) a lack of examples that show how policy changes have been effective in addressing habitat loss at the national or subnational levels; (ii) limited consideration of the trade-offs associated with the conversion of habitats, and the ecosystem services they provide, to other uses and (iii) a need for better accounting for the social causes and issues associated with biodiversity loss.

Adequacy of data and information for monitoring progress at different scales

29. While there are significant data gaps for some ecosystems and more consistent monitoring is required, the existing datasets and monitoring resources do allow for assessments of progress towards this target at certain larger spatial scales. However, at finer scales this remains challenging. The further development of remote sensing tools would greatly enhance our ability to monitor progress towards this target.

Effectiveness of actions taken

30. The general types of actions that need to be taken to achieve this target, by addressing proximate causes of habitat loss, are generally known. Where concerted actions among different stakeholders have been taken, such as in many forest ecosystems, they have had a significant positive effect on habitat loss. However, actions to address underlying drivers of habitat loss are not well understood, and overall to date the actions taken may have not been effective in reducing habitat loss at the global level.

Summary conclusion

31. Reconciling different national objectives, especially development and conservation goals, will be important to make progress on this target. There do not appear to be any major gaps in terms of guidance, tools, data or observations which are preventing progress towards this target from being made at the global level, though a better estimate of the economic and social benefits provided by ecosystem services would be useful. More attention needs to be given to identifying successful approaches and sharing these among Parties, such as, for example, an analysis of the impacts of GEF projects and other sources of relevant information. The primary issues limiting progress towards this target relate to balancing the multiple demands being placed on habitats resulting in limited implementation of coherent, consistent and sustained actions to reduce habitat loss and prevent degradation and fragmentation.

Target 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.

6.1 Elements of Target 6

32. Overexploitation and unsustainable fishing practices are severe pressures on fisheries, and on the ecosystems that support them, and have led to the loss of biodiversity and ecosystem structure. Despite progress in sustainability for some fisheries, overfishing still occurs in many areas, and fisheries could contribute more to the global economy and food security with more universal commitment to sustainable management policies. This target should reflect the ecosystem approach with the goal of planning, developing and managing fisheries, while addressing the multiple needs of a society, and should be regarded as a step towards ensuring that resources are harvested sustainably. This target refers to all harvested fish and invertebrate stocks and aquatic plants. Technically the target applies to all fisheries whether marine, coastal or inland, although most of the attention to it has been with regards to marine and coastal fisheries. It has number of components which need to be considered:

(a) Stocks need to be managed and harvested sustainably, legally and applying ecosystem-based approaches: There are a variety of management and harvesting methods used worldwide. These need to be applied in ways which do not jeopardize the long-term sustainability of resources, do not constitute illegal, unreported or unregulated fishing, and which take account of the impact of the fishery on the ecosystem;

(b) Overfishing is avoided: Overfishing refers to exploitation of stocks that reduces them to levels that affect their ability to replenish themselves. The ability of a fish stock to cope with harvesting pressure is dependent on, among other things, ecosystem conditions, the life cycle of the species being harvested and the magnitude and type of harvesting pressure applied;

(c) Recovery plans and measures are in place for all depleted species and stocks: For those species which have already been depleted, the development and implementation of a recovery plan is a

first step towards their possible recovery. Depending on the state of the stock and the capacities of management there is a spectrum of management options available;

(d) Fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems: In addition to the direct pressure of exploitation on target stocks, some harvesting and fishing methods can have unintentional impacts on other species such as through by-catch and/or damage to habitat. These impacts, though usually unintentional, can nonetheless have major ramifications on species and ecosystem health and should be minimized;

(e) The impacts of fisheries on stocks, species and ecosystems are within safe ecological limits: Ultimately the impacts on species and ecosystems must be kept at levels which do not undermine the long-term sustainability of the ecosystem. In this respect pressures need to be within the limits of what ecosystems can sustain, including their ability to sustain other ecosystem services.

6.2 Existing policy support tools and methodologies, their adequacy, impact, obstacles to their uptake, and gaps

Policy support tools and methodologies to help achieve Aichi Biodiversity Target 6

33. The overarching principles for sustainable fisheries have been agreed and are enshrined in a number of international instruments adopted for governance, including the 1982 United Nations Law of the Sea Convention ("Law of the Sea"); the 1993 FAO Compliance Agreement, the 1995 United Nations Fish Stock Agreement and the 1995 FAO Code of Conduct for Responsible Fishing. With their accompanying guidelines and action plans, they represent a framework for fisheries policy and management and have been translated into fisheries legislation in most nations, certainly for larger-scale, commercial, fisheries; small-scale fisheries often need further attention. If these instruments were fully and effectively implemented then sustainability and conservation of biodiversity would largely be achieved.

34. In 1995, FAO adopted the Code of Conduct for Responsible Fishing (the Code of Conduct). The Code provides the obligation to ensure effective conservation of living aquatic resources. It calls for due respect for ecosystems and biodiversity; maintenance of diversity and the conservation of target species, associated and dependent species and assessment of relations between populations; protection and rehabilitation of critical habitats; minimization of impacts (e.g. lost gear, by-catch, ghost fishing) and use of environmentally-safe fishing gear; recognition of the transboundary nature of ecosystems; a precautionary approach; and compatibility of measures within the EEZ and beyond national jurisdiction.

35. The FAO also provides various tools and guidelines to help implement the "ecosystem approach to fisheries" (EAF), which may be considered as a sectoral application of the ecosystem approach, based on the Code of Conduct mentioned above. As such, FAO has made available an EAF Toolbox to guide the design and management of an EAF-based system. FAO produces a series of technical guidelines to assist countries with the implementation of the code of conduct. In addition, there are four International Plans of Action (IPOAs) agreed by FAO members, as well as international guidelines. In 2001, FAO developed and adopted an additional voluntary International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU). This identifies responsibilities for all States, flag States, coastal States, port States, States in applying agreed market measures and for Regional Fisheries Management Organizations (RFMOs). Developed as a voluntary instrument within the framework of the FAO Code, the IPOA-IUU aims to improve monitoring, control and surveillance and catch reporting systems, statistical systems (against non-reporting or misreporting), as well as develop and implement specific international instruments and strengthen institutions. It also calls on States to ratify and implement the international fisheries instruments.

36. In 2008, FAO adopted the International Guidelines for the Management of Deep-sea Fisheries in the High Seas. The role of the guidelines is to provide tools, including guidance on their application, to facilitate and encourage efforts towards sustainable use of marine living resources exploited by deep-sea fisheries, the prevention of significant adverse impacts on deep-sea vulnerable marine ecosystems (VMEs) and the protection of marine biodiversity that these ecosystems contain. These guidelines also contain criteria for the identification of VMEs. As yet, there is possibly limited attention to these VMEs in many countries and regional organizations. Measures should be taken in areas where VMEs are known or likely to occur to mitigate any adverse impacts.

37. Responsibility for sustainable fisheries management and protection of biodiversity based on the objectives of the above-mentioned tools lies largely with the flag States and the regional fisheries management organizations/arrangements (RFMO/As). The objective of the RFMOs is to ensure the long-term conservation and sustainable use of fishery resources. Some manage all the fish stocks found in their specific area, while others focus on highly migratory species, such as tuna, wherever they are found. The above tools and guidelines are an instrument of reference to help States and RFMO/As in formulating and implementing appropriate measures for sustainable fisheries management.

38. Under the Convention on Biological Diversity, the main framework for implementing this target is the programme of work on marine and coastal biodiversity. The programme of work on marine and coastal biodiversity identifies key operational objectives and priority activities within five key programme elements: implementation of integrated marine and coastal area management, marine and coastal living resources, marine and coastal protected areas, mariculture, and alien species and genotypes. The Convention adopted the "ecosystem approach" in 2000 (decision V/6); the approach was identified as one of the basic principles for the implementation of the programmes of work and as such is also relevant to this target. In addition, the cross-cutting issue of sustainable use is also relevant to this target. As yet, there has been limited attention, if any, to inland fisheries with regards to Target 6, although the programme of work on inland waters biodiversity addresses broader needs for maintaining ecosystem health and integrity.

39. Other instruments that have been adopted to deal specifically with biodiversity and conservation, but which have strong implications for fisheries are: (i) The IUCN Red List of Endangered Species assessment; (ii) the Ramsar Convention on Wetlands, which supports broad measures to sustain and conserve wetland habitats which support fisheries; and (ii) The 1975 Convention on International Trade in Endangered Species of Fauna and Flora (CITES), aiming at protecting species that are clearly threatened by international trade, where the trade of these species is governed by different sets of obligations depending on the severity of the threat and the type of appendix (I, II or III) in which the species is listed.

The application of existing policy support tools and methodologies

40. The translation of principles and instruments into national policies, legislation and measures has been ongoing actively at global, regional and national levels. Guidelines have been made available and new protocols are being tested (e.g. regarding EAF). The main policy orientations and plans to rationalize fisheries and effectively rebuild overfished and depleted stocks have been developed at the FAO Committee on Fisheries with significant interaction with the United Nations General Assembly. With regards to the implementation of these policy tools, it was recognized that much progress has been observed in some places, but not enough in most others, partly due to the lack of adequate capacity for effective implementation but also due to difficulties in addressing indirect drivers such as subsidies.

Obstacles to the use of existing policy support tools and methodologies

41. The major obstacles to the use of the policy support tools and methodologies include:

(a) The lack of alternative protein sources, as well as alternative livelihoods, and, in some artisanal fisheries, the inability of available resources to sustainably meet local food demand;

(b) The lack of allocation of rights appropriate to the social and economic context of the fishery – in particular ongoing difficulties with the management of common property resources;

(c) Inadequate governance, particularly lack of institutional cooperation, and coordination, both between fisheries and environmental agencies and across industry sectors;

(d) Conflicting objectives, differences in risk tolerances, and differing expectations of the diverse groups of stakeholders;

(e) The insufficient capacity in management institutions, and particularly for monitoring, control and surveillance;

(f) Incomplete knowledge about the resources and their ecosystems; and

(g) Difficulty in carrying out controlled experiments with proper replication in real-world fisheries. The latter constraint is particularly acute in relation to the implementation of the ecosystem approach to fisheries.

42. Specifically with regards to those tools related to illegal, unreported and unregulated fishing the obstacles include:

(a) The difficulty of detecting illegal, unreported and unregulated fishing;

(b) Lack of trained personnel;

(c) Limited compliance at all levels;

(d) Cost and inadequacy of monitoring, control and surveillance resources;

(e) Difficulty in the application of penalties severe enough to be an deterrent; and

(f) Inability, unwillingness, or lack of capacity, of some States to meet their regional and international obligations.

Gaps in policy support tools and methodologies

43. For Target 6, there are a number of policy support or methodology gaps to be addressed, for instance:

(a) For effective use of instruments like the United Nations Convention on the Law of the Sea (UNCLOS), the United Nations Fish Stocks Agreement or the FAO Code of Conduct, fisheries management agencies and environmental agencies need to coordinate activities;

(a) Approaches to realign subsidies and incentives to support sustainability;

(b) Mechanisms to improve stewardship of fisheries under open-access conditions;

(c) International Plans of Action (e.g., for IUU and for sharks) need to be translated into national (NPOA) and regional (RPOAs) plans of action and implemented;

(d) Fisheries governance must be modernized, adopting formally and implementing effectively the ecosystem approach to fisheries (and the precautionary approach to fisheries), adaptive management processes, participatory decision-making and implementation;

(e) For severely depleted stocks, specific rebuilding plans must be developed, and the options available for doing this in terms of science are quite well known. For all managed fisheries, formal EAF-based plans should be adopted;

(f) Lack of policy instruments specific to inland aquatic resources;

(g) Alternative tools and guidelines should be developed for data-limited and capacity-limited settings;

(h) There are also possible gaps in policies to address the interactions between fisheries management and factors related to climate change, such as ocean acidification, warming oceans, loss of Arctic sea ice and its effects on the world's fisheries. However, considerable modelling has gone into trying to answer these questions, including an upcoming report of the Intergovernmental Panel on Climate Change (IPCC), and there has been some attention to this by issue by, for example, FAO and the Arctic Council.

6.3 The adequacy of observations, and of data systems, for monitoring the biodiversity attributes addressed in Aichi Biodiversity Target 6 and the use and development of indicators for the target

Ability to assess/measure the status of progress towards the target at global, regional, national and subnational levels

44. The following operational indicators were identified in the annex to decision XI/3 A:

(a) Trends in extinction risk of target and by-catch aquatic species;

(b) Trends in population of target and by-catch aquatic species;

(c) Trends in proportion of utilized stocks outside safe biological limits;

(d) Trends in catch per unit effort;

(e) Trends in fishing effort capacity;

(f) Trends in area, frequency, and/or intensity of destructive fishing practices;

(g) Trends in proportion of depleted target and by-catch species with recovery plans.

45. Monitoring progress toward this target requires information on the status of exploited target and by-catch species as well as on the health of relevant ecosystems. The indicators identified above provide information on these different elements though they are not all available for use at the global level and for some cases information is limited or not available. Additional indicators are applied for locally managed marine areas and coastal fisheries.

46. The available data sets on status of species vary in their coverage and the quality of the underlying data. However, while they are limited, they would allow for general conclusions to be made regarding progress towards this target. Similarly, information related to catch per unit effort as well as total catch can also be used at the global scale can be used for giving a measure of abundance as one aspect of sustainability. There are significant problems with the quality, scope and utility of the available

data for inland fisheries (as acknowledged by FAO itself). For example, most of the inland harvest (itself seriously underestimated) is not recorded at a species level.

Areas where enhanced monitoring/better data/additional observations/additional indicators would make a significant difference in our ability to monitor progress in order to guide appropriate/targeted action

47. When integrating biodiversity considerations more fully into fisheries management there is a need to develop a shared and intercompatible set of indicators and reference values for use by different communities, including indicators relevant to social and ethical aspects of fisheries and the implications on local livelihoods, and an agreed process for how they are to be used in informing the public dialogue on fisheries decision-making. This in turn highlights the urgency of establishing suitable forums for these issues to be discussed between fisheries and biodiversity communities at various levels from local to global. For many fisheries, and particularly at the small scale, difficulties (and costs) with the formal collection of data through government channels can be overcome by addressing issues of governance by, for example, promoting (and empowering) better community stewardship of resources and therefore incentives for self-assessment and monitoring of resources. Directed research is needed on how to avoid deleterious ecological states and rebuild stocks where controlling access and effort in the fisheries is socioeconomically difficult and costly measures for stock enhancement and for controlling access to fisheries are not available. Particular focus should be given to natural regulatory mechanisms that maintain biodiversity, in relation to fishing patterns and practices. To understand the wider socioeconomic and political drivers and pressures on a fishery, its resources and biodiversity, assessments should extend beyond biological and ecological considerations to broader assessment of socioecological systems. This is particularly pertinent to inland, and to some extent coastal, fisheries which are highly dependent on environmental change driven by other sectors.

Limitations in making these enhancements

48. The main challenge to making these enhancements is that a large amount of information needs to be collected and therefore novel ways of achieving this are needed. Considering the size of the world's oceans, the extent of coastal and inland habitats and the number of species that make up the world's harvest, expanding the geographic and taxonomic coverage of existing data sets is not a trivial undertaking. Further, the resources available for such enhancements are limited.

6.4 Assessing the effects of the types of measures taken in accordance with the provisions of the Convention

49. Where concerted actions have been taken to ensure that stocks are managed and harvested sustainably, legally and applying ecosystem-based approaches they have generally been effective. However, the areas where progress is occurring is not uniform, and only in part due to limited capacities. Further actions have been more effective with some species than for others. The Conference of the Parties, at its eleventh meeting, recognized that fisheries management organizations are the competent bodies to manage fisheries and, depending on the situation in different regions, should have roles to play in addressing the impacts of fisheries on biodiversity. The eleventh meeting of the Conference of the Parties also noted the need for further improvement and implementation of the ecosystem approach in fisheries management by enhancing the capacity of these fisheries management organizations, constructive inter-agency collaboration, and full and meaningful participation by a wide range of experts on biodiversity, including indigenous and local communities, and relevant stakeholders in the fisheries management process. Nevertheless, determining what actions could be most effective is also hampered significantly by a lack of understanding of relevant ecological interactions, the amount of research required and the difficulty of collecting adequate data.

6.5 Conclusions from previous sections to enable identification and prioritization of scientific and technical needs related to the implementation of Target 6

Adequacy of guidance and tools in support of implementation at national level

50. A large amount of guidance exists that is relevant to this target. In particular, the guidance/guidelines developed by FAO and other relevant organizations and institutions addressing fisheries issues are highly relevant. There do not appear to be any major gaps in policy support tools or methodologies at the global level that are limiting progress towards this target, although problems remain with addressing some of the external drivers of overexploitation, such as incentives.

Adequacy of data and information for monitoring progress at different scales

51. Data for monitoring progress towards this target in general is adequate to be able to assess progress towards the attainment of some elements of the target although this is limited to marine fisheries. While there are gaps both in terms of the geographic and taxonomic coverage of datasets, and more robust data would be helpful, there is enough information to be able to draw general conclusions for the marine sector.

Effectiveness of actions taken

52. Where concerted actions have been taken they have tended to be effective to varying degrees in different places. There is a need to scale up existing efforts and for the biodiversity constituency to work more closely with the fisheries community in developing approaches to ensure that fisheries harvest is done sustainably, legally, and applying ecosystem-based approaches.

Summary conclusion

53. Current efforts will need to be scaled up and broadened if this target is to be met. The fact that the existing guidelines, policies and tools appear to be sufficient highlights that the problem is not necessarily with the existence of such guidance but in implementation and addressing the root causes of declines in fisheries. Similarly, while there are gaps in data and monitoring systems, these do not appear to be major constraints. Further research and information is still needed for effective decision-making. There is a general need for more coherent and concerted action and closer collaboration between biodiversity and fisheries communities. There is also a need for capacity-building for addressing biodiversity issues within the framework of fisheries management.

Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

7.1 Elements of Target 7

54. The increasing demand for land to grow food, fibre and fuel, and the externalities of production, currently represent the major pressures on biodiversity and ecosystem services. If issues related to sustainable management of production landscapes are not addressed, these pressures will continue to undermine environmental sustainability. The achievement of this target is essential to sustain progress in other targets, notably Targets 5 and 13. Pollution from agriculture is also a major contributor to pollution (Target 8).

55. Sustainable use is one of the three main objectives of the Convention. Article 10 of the Convention provides that, *inter alia*, each Party should integrate consideration for the sustainable use of biological resources into national decision-making, according to national legislation, and adopt measures,

as far as possible and as appropriate relating to the use of biological resources to avoid or minimize adverse impacts on biological diversity.

56. Specifically this target requires that areas under agriculture, aquaculture and forestry are managed sustainably. It is generally understood that, in this context, "agriculture" includes both plant crops and livestock (including ranching) and "forestry" includes plantations. Sustainable management includes the use of the components of biodiversity in such a way, and at a rate, that does not lead to its long-term decline. But sustainability also includes that of the other resources used by production, such as land, water fertilizers and other chemicals and the impacts of this use on biodiversity. The type of actions to achieve sustainable management will vary between ecosystems and countries. Because of the interactions between production, other land and water uses, and biodiversity within and beyond production areas, well-articulated cross-sectoral landscape scale programmes and management are required. Given projections for demands for food, timber, fibres and bioenergy, the global approach to "sustainable" production must be based on sustainable increases in productivity (that is, more production with less inputs and reduced impacts) to avoid either food insecurity or the continued expansion of production landscapes into natural areas.

7.2 Existing policy support tools and methodologies, their adequacy, impact, obstacles to their uptake, and gaps

Policy support tools and methodologies to help achieve Aichi Biodiversity Target 7

57. Under the Convention, the programme of work on the sustainable use of biodiversity provides a framework for action to achieve this target. Elements related to the sustainable use of biological resources are also contained in the programmes of work on agricultural biodiversity and forest biodiversity. A number of policy and methodological tools have also been developed. For example the Addis Ababa Principles and Guidelines for the Sustainable Use of Biodiversity, which consist of fourteen interdependent practical principles, operational guidelines and instruments for their implementation, are particularly relevant to this target. The Principles guide stakeholders on how to ensure that the use of the components of biodiversity will not lead to irreversible biodiversity loss. Further, the Secretariat has also developed a good practice guide related to sustainable forest management, biodiversity and livelihoods, and several issues of the CBD technical series address issues related to the sustainable use of biological diversity, either generally or in the context of certain ecosystems or species.[2] Further, the Convention has adopted the "ecosystem approach" as a means of sustainably developing natural resources and using biological diversity.

58. There is a substantial range of policy support tools and methodologies developed by numerous United Nations organizations and inter- and non-governmental organizations have developed tools – notably the Food and Agriculture Organization of the United Nations and CGIAR centres. For example, for forestry a range of tools have been developed by the members of the Collaborative Partnership on Forests;[3] FAO has prepared Voluntary Guidelines on Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security as well as International Guidelines on Securing Sustainable Small-Scale Fisheries; other FAO tools include "Product Certification and Ecolabelling for Fisheries Sustainability", and the "Sustainability Assessments for Food and Agriculture

[2] The following CBD technical series reports address issues related of the sustainable use of biodiversity:

CBD Technical Series 60 – Livelihood alternatives for the unsustainable use of bushmeat;
CBD Technical Series 52 – Sustainable use of biological diversity in socio-ecological production landscapes;
CBD Technical Series 39 – Cross-sectoral toolkit for the conservation and sustainable management of forest biodiversity;
CBD Technical Series 34 – Mainstreaming biodiversity issues into forestry and agriculture;
CBD Technical Series 9 – Facilitating conservation and sustainable use of biological diversity;
CBD Technical Series 6 – Sustainable management of non-timber forest resources;
CBD Technical Series 3 – Assessment, conservation and sustainable use of forest biodiversity.

[3] For more information see http://www.cpfweb.org/en/.

Systems (SAFA) Guidelines". FAO has also undertaken periodic or one-off global assessments on genetic resources for food and agriculture, soils, land degradation, water, forests, and fish. The "Save and Grow" approach developed by FAO is notable as an important new paradigm for agriculture based on sustainability and in particular using biodiversity and ecosystem services to underpin it.

59. The FAO Commission on Genetic Resources for Food and Agriculture has developed, and continues to develop, substantial guidance regarding genetic resources. The International Treaty on Plant Genetic Resources for Food and Agriculture develops policies and guidance in its subject area.

60. Criteria and indicators for sustainable agriculture have also been developed by the private sector, including by individual companies,[4] and through industry associations in cooperation with civil society organizations.[5] In fact, a multiplicity of Good Agricultural Practices (GAP) codes, standards and regulations have been developed in recent years by the food industry, producer organizations, governments, and NGOs, aiming to codify agricultural practices at farm level for a range of commodities. Environmental sustainability is one of the pillars of GAP, though biodiversity as such is not always fully reflected. Some key resources on GAP are available from FAO.[6] For aquaculture, the main guidance is that included in the FAO's Code of Conduct for Responsible Fisheries (see Target 6 above for further details).

61. There are no universally-agreed overall sustainability criteria for forestry, agriculture and aquaculture. Sustainability criteria in the production sectors should, particularly for agriculture, address the different levels, and spatial and temporal scales, in which the sectors impact the environment and biodiversity, and in the context of trade-offs with other land and resource use options. Consumption is also highly relevant since there is a wide range of environment/biodiversity footprints among the various production commodities. Owing to the diversity of production systems and environmental conditions an array of independent initiatives has emerged with their own criteria and sustainability standards. This is particularly the case for forestry, where various certification initiatives have been used by some governments especially through the private sector. In the agriculture sector, sustainability criteria and standards are perhaps advancing the most rapidly for biofuels.

The application of existing policy support tools and methodologies

62. The tools developed under the Convention have served as a resource for issues related to the sustainable management of forests, agriculture and aquaculture, but the level of uptake and impact of these tools is difficult to assess. It is probable that uptake by the relevant sectors is limited. While some tools and methods are recognized, their use has been limited as compared to the range of technical tools on forestry, agriculture and aquaculture developed by other organizations.

63. It is worth noting that the work of the Convention itself has been influential. For example, in the review of progress in the sustainable production and use of biofuels (considered by the Subsidiary Body on Scientific, Technical and Technological Advice at its sixteenth meeting; UNEP/CBD/SBSTTA/16/14) evidence was presented of the impact of the Convention in drawing attention to biodiversity in discussions on biofuels and the development of sustainable approaches. Likewise, the Secretariat reports that partners are placing much emphasis on the Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets as a framework or focus for their action. In this sense, therefore, for many stakeholders and partners, the Convention, the Strategic Plan and the Aichi Biodiversity Targets are policy guidance and tools in themselves.

[4] For example, see http://www.unilever.com/images/sd_Unilever_Sustainable_Agriculture_Code_2010_tcm13-216557.pdf.

[5] For example, see http://www.rspo.org/.

[6] http://www.fao.org/prods/gap/resources/keydocuments_en.htm.

Obstacles to the use of existing policy support tools and methodologies

64. As for some other targets, obstacles relate to resource availability with which to apply existing tools and the need to balance various and often competing interests. In addition, at the national level, it can be challenging to balance conservation and development. Further, many of the decisions regarding the sustainable management of agriculture, forestry and aquaculture are made by individuals, organizations or ministries directly working in those sectors and not necessarily by those working on biodiversity issues. As such they may not be aware of the policy support tools or methodologies developed by the Convention or other biodiversity-related organizations nor necessarily motivated or have relevant incentives to apply them. In some countries, such as in Mexico, there exist inter-ministerial committees to address these matters.

65. Particularly for agriculture, key indirect drivers of methods of production, and therefore impacts, include subsidies and other incentives and trade policies. In many cases these drivers are a key determinant of the behaviour of farmers. For example, subsidies and other incentives (including fuel targets) are a major factor accounting for biofuels expansion (UNEP/CBD/SBSTTA/16/14).

Gaps in policy support tools and methodologies

66. A major gap is lack of policy coherence, and to some extent consensus, on the most appropriate models for global sustainable agricultural development. There is an ongoing debate on this subject essentially between approaches based on further intensification and simplification of agriculture (e.g., monocultures relying on a limited number of crops, with intensive external inputs) *versus* approaches based on re-establishing ecosystem services, increasing diversity and emphasizing small-scale production systems (noting that these approaches are not necessarily mutually exclusive). Likely, a balance between the two approaches would be required, but there is limited consensus on what that balance is in practice. Interestingly, one reason why such debates continue is the lack of consensus on criteria and indicators for "sustainable agriculture". Were such to exist, competing approaches could be assessed against common criteria. Identification of key elements of sustainability related to biodiversity could help to fill this gap.

67. There is a need for improved policy guidance to support the sustainable intensification of agriculture, in practice at national level, and tools to help balance the sometimes perceived competing goals of sustainable agriculture with short-term food security. However, these do not appear to be major obstacles to the attainment of this target. Additional guidance is needed in the context of the scope and effectiveness of certification systems for sustainable forest management, agriculture (crop and livestock) and aquaculture. Applying certification systems for agriculture may be particularly challenging for least developed countries. Considering the economic values of biodiversity in decision-making will also require policy shifts to correct market failures, to capture the full cost of products and processes and to assess the merits of different development policies, programmes and projects, including economic incentives and their social and environmental foundations. Cross-sectoral policy considerations of biodiversity are also needed.

68. The importance of agriculture as the dominant use of land and water highlights the importance of Target 7 to the achievement of many of the other Aichi Biodiversity Targets. In addition, agro-biodiversity itself is a major component of biodiversity, which agriculture continues to manage. Agriculture is socio-politically important in the context of food security and therefore sustainable development, and biodiversity is often a solution for achieving sustainable production increases. For these and other reasons, the Subsidiary Body might reflect on whether the current level of attention paid to agriculture in discussions under the Convention can be considered a policy gap.

7.3 The adequacy of observations, and of data systems, for monitoring the biodiversity attributes addressed in Aichi Biodiversity Target 7 and the use and development of indicators for the target

Ability to assess/measure the status of progress towards the target at global, regional, national and subnational levels

69. The following operational indicators have been identified in the annex to decision XI/3 A:

(a) Trends in population of forest and agriculture dependent species in production systems;

(b) Trends in production per input;

(c) Trends in proportion of products derived from sustainable sources;

(d) Trends in area of forest, agricultural and aquaculture ecosystems under sustainable management.

70. These are complemented by relevant indicators for habitat quality, species trends and genetic diversity as well as a large number of indicators used at sub-global levels, including those developed through regional processes for sustainable forest management. Certain indicators for Target 8 (pollution) are also relevant, for example as pertaining to pollution sources from agriculture. Collectively, they can be used to inform assessments of progress towards this target. However, globally coherent information related to the area of forestry, agriculture (crop and livestock) and aquaculture under sustainable management is limited. For the forestry sector, the proportion of land used for production that is managed sustainably, in terms of forest certification criteria, is available and can be used to inform an assessment of progress towards this target. Similar information for agricultural lands and aquaculture is not readily available for the global level; however, some national and subnational information is available. While incomplete, this information could nonetheless be used to help inform any assessment of progress and/or could be further built upon. Population trend data and extinction risk for forest and farmland specialist species (e.g. farmland birds) are also relatively well known and could be used to help monitor progress towards this target.

Areas where enhanced monitoring/better data/additional observations/additional indicators would make a significant difference in our ability to monitor progress in order to guide appropriate/targeted action

71. The data on sustainable agriculture, forestry and aquaculture are largely limited to information on the area of systems under some form of sustainable management certification. Greater attention to monitoring biodiversity in production landscapes would help to allow a more nuanced assessment of progress towards this target and would complement monitoring efforts in protected and natural areas. In particular, there needs to be improved monitoring of ecosystem services within production landscapes, such as pollinators and those services underpinned by soil biodiversity, in order to have improved information on trends in sustainability. Indicators can be expanded to draw on data available on degraded land areas, available from assessments led by FAO. Greater efforts to develop globally consistent guidance on data needs, analyses and indicators and to establish respective observing systems at different scales would help. These could encourage regional efforts to collect these data. Since agriculture in particular is a complex sector, the development of integrated indicators which use a combination of different data sets, including natural resources, economic and social indicators, if feasible, would be particularly useful.

Limitations in making these enhancements

72. Primarily there are methodological challenges in determining what constitutes sustainable management in a quantifiable manner. While there are various regional processes for sustainable forest management and certification schemes for some agricultural products, forestry and aquaculture these are

often based on different criteria and use different sets of indicators, which are generally weak with regard to biodiversity outcomes. While combining information from these different schemes may prove useful, developing a coherent global picture will be difficult. Similarly, assessing the degree to which sustainable management is occurring in production systems which do not have any form of certification is difficult, yet these are likely to constitute the large majority.

7.4 Assessing the effects of the types of measures taken in accordance with the provisions of the Convention

73. A range of actions have been taken to help promote the sustainable management of agriculture, forestry and aquaculture. Criteria and indicators for sustainable forest management have been adopted by the forest sector at regional level and there are many efforts by governments, indigenous and local communities, NGOs and the private sector to promote good agricultural (crop and livestock), aquaculture and forestry practices and to apply law and governance mechanisms. Efforts to ensure the appropriate application of fertilizers, pesticides, or veterinary drugs as well as actions to improve nutrient and water use efficiency have been applied in many production landscapes. At sub-global scales more detailed assessments are possible, with many case studies existing for agricultural systems (including *Satoyama* and agro-forests) and commercial fisheries. However, these actions have been outpaced by the growing demand for food and other ecosystem-based commodities which have resulted in a greater emphasis on production rather than sustainable management. There is also a need for better understanding of the links between biodiversity and ecosystem functioning to help explain what constitutes sustainable systems, especially in agriculture, agro-forests and marine trophic systems. Overall it appears that the actions that have been taken need to be significantly scaled up as well as broadened to consider interrelated development issues if this target is to be achieved at the global level.

7.5 Conclusions from previous sections to enable identification and prioritization of scientific and technical needs related to the implementation of Target 7

Adequacy of guidance and tools in support of implementation at national level

74. Given the uncertainties with definitions of “sustainable” (particularly for agriculture) and the rapidly changing demands for products, not only through population growth but also rapidly changing consumption patterns, assessing whether current guidance is “adequate” is difficult. There is certainly a plethora of existing policy support tools and methodologies available to support actions for this target but not necessarily to achieve it. Much of the current guidance refers to operational management on the ground, whereas the key factors include the important indirect drivers of incentives, trade and consumption patterns. Additional guidance related to ways to sustainably intensify agriculture production could be helpful as would guidance to help balance the trade-offs between increasing production and biodiversity conservation.

Adequacy of data and information for monitoring progress at different scales

75. Information to assess progress towards this target at different scales is variable between agriculture, forestry and aquaculture as well as at different scales. At the global level, forestry data are limited to the areas of productive systems with some form of sustainable management certification and individual case studies. Such information allows for a partial assessment of progress towards this target, but a strategy for developing pressure or state indicators that directly describe aspects of sustainability is needed. There has been significant progress in monitoring through the efforts of a number of regional (or sub-global) organizations such as the OECD and the European Commission. A number of national-level advances have also been made. Rapid progress has been made in sustainability criteria, certification and monitoring for some biofuel production, which should have spin-off benefits for improving attention to these aspects in the food and fibre sectors.

Effectiveness of actions taken

76. The general types of actions that are required to address relevant biodiversity considerations at the field level to reach this target are largely known and a great many of them are currently being applied. Our ability to monitor the impact of these actions is relatively limited with the information currently available. What is less certain is whether overall policy support, and in particular implementation of policy, including addressing the major drivers, is adequate to achieve this target in a rapidly changing world.

Summary conclusion

77. Many tools, guidelines and methodologies exist to support Parties in taking actions towards this target but it remains unclear (from this assessment) whether these are necessarily adequate, effective or the priority ones. The observation and monitoring information that is currently available only allows for a partial assessment of progress to be made. To date the actions that have been taken to reach this target have had important but localized impacts and will need to be scaled up if this target is to be achieved. A priority therefore would be guidance, tools and mechanisms to scale up good practice. The central question regarding this target is how to ensure that food security, in the face of increasing and shifting demand by a growing world population and increased wealth in countries in transition and climate change, goes hand in hand with the development of more sustainable production systems.

Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

8.1 Elements of Target 8

78. Pollution refers to substances that are introduced to the environment resulting in instability or harm. Such substances may be naturally occurring in the environment in question (for example, nutrients) but occurring at undesirable or unsafe levels, or substances that are alien to the environment (such as man-made chemicals). The number of pollutants is extremely large as a variety of products can cause environmental damage depending on their properties and concentrations. The target includes specific mention of excess nutrients because excess nutrients, such as nitrogen and phosphorus, by promoting plant and algae growth, can have particularly negative and widespread effects on biodiversity and ecosystem functioning especially in aquatic environments where they can result in eutrophication and the creation of "dead zones" with severe losses of valuable ecosystem services. The main sources of excessive nutrients are sewage and agricultural runoff. Other important pollutants with significant impacts on the environment include sulphur, tropospheric ozone, volatile organic compounds (including hydrocarbons), other greenhouse gases (carbon dioxide, NOx, methane, black carbon etc.), persistent organic pollutants (including many pesticides), heavy metals, and nanoparticles, among others. The relative importance of particular substances in terms of impacts on biodiversity will vary from region to region. Overall excess nutrients is currently likely the largest problem in terms of direct impacts on biodiversity (but not necessarily for human health) although the impacts of many other substances on biodiversity remain largely unknown. Marine debris is an additional category of pollution. Marine debris includes any form of manufactured or processed material discarded. Plastic items constitute the most abundant type of marine debris. More than 260 species are already known to be affected by marine debris through entanglement or ingestion. Small particles are of concern because they may be ingested by a wide range of organisms and could have adverse physical effects, for example by disrupting feeding and digestion. There is concern that small plastic fragments might present a toxicological challenge. If the plastic particles break down into nano-sized particles, they may impact the bottom of the food web upon which the ocean and global climate depend.

79. The target specifies that pollution should be brought to levels that are not detrimental to ecosystem function and biodiversity. Therefore the target does not require that all pollutants be eliminated but does require that they are reduced to a point where they do not have a negative effect on biodiversity. The point at which pollution can be considered detrimental depends on the type of pollutant considered as well as the environment it is affecting. For a substantial number of pollutants the impacts on biodiversity are not known and therefore safe levels difficult to determine. For some types of pollutants the safe level may be very low or nil.

8.2 Existing policy support tools and methodologies, their adequacy, impact, obstacles to their uptake, and gaps

Policy support tools and methodologies to help achieve Aichi Biodiversity Target 8

80. No specific guidance related to pollution has been has been considered by the Conference of the Parties. However, references to pollution and/or related actions are mentioned in the programmes of work on agricultural biodiversity, inland waters biodiversity, and marine and coastal biodiversity, as well as in the voluntary guidelines on biodiversity-inclusive impact assessment, the ecosystem approach, the international initiative for the conservation and sustainable use of pollinators, the international initiative on biodiversity for food and nutrition, and the international initiative for the conservation and sustainable use of soils among others. Guidance is also included in CBD technical series 56 on incentive measures for the conservation and sustainable use of biological diversity and in technical series 67 on the impacts of marine debris.

81. In addition there are a number of international conventions that address issues relevant to this target. These include the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, the Stockholm Convention on Persistent Organic Pollutants, the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, and the United Nations Framework Convention on Climate Change among many others. Further, many regional instruments such as the North American Agreement on Environmental Cooperation, the Inter-Organization Programme for the Sound Management of Chemicals (IOMC), and the Cartagena Convention for the Protection of the Marine Environment of the Wider Caribbean Region are also relevant and many organizations work on managing pollution, including the United Nations Environment Programme (UNEP). Various tools and methodologies for the control of pollution have been developed or promoted by these instruments and organizations. For nutrient management and agriculture, the Food and Agriculture Organization of the United Nations Committee on Agriculture has developed a number of tools that are relevant as have member organizations of the Consultative Group on International Agricultural Research (CGIAR). Further, the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities,[7] and the protocols on land-based pollution being developed under some of the regional seas conventions, as well as the related global partnerships on nutrient management and marine litter, are also relevant.

The application of existing policy support tools and methodologies

82. While information is limited, it appears that the tools which have been developed have been used in helping to promote globally coherent approaches to addressing pollution and in providing a basis for countries to develop their own national policies. Many countries have developed regulations on a range of pollutants, particularly through air and water quality standards and waste management standards. The regulation of nutrients (nitrogen and phosphorous etc.) tends to be only partly covered by these (through clean water acts, riverine protection measures and equivalents).

[7] http://www.gpa.unep.org/.

Obstacles to the use of existing policy support tools and methodologies

83. Obstacles to put the various tools that have been developed into use include effectively involving those sectors that are directly responsible for the use or emission of the pollutants in question. There are also significant economic obstacles for many countries, particularly developing countries and countries with economies in transition, in view of the investments costs of reducing point-source pollution. Experience so far, however, suggests that countries with economies in transition are begining to invest significantly in pollution control, primarily to reduce the economic and public health burden of pollution. China is a case in point having recently announced substantial investments in reducing pollution and adopting green technologies.

84. Nutrient management remains a significant obstacle to achieving the target particularly due to the diffuse (non-point) nature of its sources, and in many countries problems with excess nutrients are yet to be resolved. Agricultural subsidies, including fertilizer subsidies, remain a significant driver of overuse of nutrients, and therefore pollution.

Gaps in policy support tools and methodologies

85. While no specific guidance on this issue has been developed under the Convention there is a wealth of guidance, tools and methodologies which have been developed by other processes and organizations. A more thorough review is required to determine if more information related to critical loads, safe ecological limits and thresholds for different pollutants in different ecosystems and on different categories of organisms is warranted. For example, there have been calls for further work on the impacts of neonicotinoids and other systemic pesticides on pollinators and other categories of biodiversity, and also on the impacts of behaviour-altering drugs. For nutrients, there needs to be a greater uptake of knowledge of nutrient management, and especially using or restoring relevant soil ecosystem services, in farming systems, and up-scaling win-win approaches between farming and other interests. There is a significant need to have a better understanding of why there continues to be a lack of sufficient action based on the knowledge that already exists. We need to better understand why the existence of tools and guidance, and in many cases actual policy, even where such are of a high quality, does not necessarily lead to significantly improved progress. Other possible gaps include: guidance to address the drivers of nutrient pollution, particularly subsidies, and policies to reduce the use of non-biodegradable plastics that constitute a major source of marine debris.

8.3 The adequacy of observations, and of data systems, for monitoring the biodiversity attributes addressed in Aichi Biodiversity Target 8 and the use and development of indicators for the target

Ability to assess/measure the status of progress towards the target at global, regional, national and subnational levels

86. The following operational indicators have been identified in the annex to decision XI/3 A:

(a) Impact of pollution on extinction risk trends;

(b) Trend in emission to the environment of pollutants relevant for biodiversity;

(c) Trend in levels of contaminants in wildlife;

(d) Trends in incidence of hypoxic zones and algal blooms;

(e) Trends in nitrogen footprint of consumption activities;

(f) Trends in ozone levels in natural ecosystems;

(g) Trends in pollution deposition rate;

(h) Trends in proportion of wastewater discharged after treatment;

(i) Trends in sediment transfer rates;

(j) Trends in UV-radiation levels;

(k) Trends in water quality in aquatic ecosystems.

87. The indicators above focus on pollution (including by nutrients) and aquatic systems. This is partly because there is a long-standing interest and data on the links between water pollution and biodiversity. However, there are also direct links between air pollution and biodiversity, for example previous experience with acid rain pollution in Western Europe. Greenhouses gases qualify as pollutants relevant to this target although this topic is monitored with regards to climate change (for example through the IPCC) and tends to be considered separately under "climate change". For other indicators, such as nitrogen deposition, there is only baseline information and as yet no global trends information. The OECD green growth core set indicators are considering indicators on nutrients. In addition there are many regional initiatives monitoring pollution. For example, the Convention on Long-range Transboundary Air Pollution (CLRTAP) has a regional indicator on critical load exceedance for nitrogen in Europe.

88. Other important pollutants with significant impacts on the environment and on biodiversity include sulphur, tropospheric ozone, volatile organic compounds (including hydrocarbons), other greenhouse gases (carbon dioxide, NOx, methane, black carbon etc.), persistent organic pollutants (including many pesticides), heavy metals, and nanoparticles, among others. For most of these data are limited and mostly there are no global indicators yet developed. Marine debris is increasingly being monitored.

89. There is limited information on the impacts of pollutants on the biodiversity in different ecosystems and on thresholds of pollution levels (safe ecological limits). The best information in that regard is available for inland waters and coastal areas (this also links to Target 10).

Areas where enhanced monitoring/better data/additional observations/additional indicators would make a significant difference in our ability to monitor progress in order to guide appropriate/targeted action

90. Enhancements of our ability to monitor pollution could potentially be made with regard to a large number of pollutants. Regulations and international agreements exist on most classes of pollutants and these are being monitored accordingly. An emphasis on nutrients, primarily nitrogen and phosphorus, helps to provide some useful focus. Plans for a global nitrogen assessment are underway and such an assessment would make an important contribution to our understanding of the underlying processes and impacts of nitrogen on biodiversity. Phosphorus runoff is detected through water quality measurements. However, the density of stations is generally insufficient. It should be noted, however, that any gaps in monitoring are not really limiting our ability to guide appropriate action, and that both from an economic and ecological perspective actions should be targeted towards an enhancement in nutrient use efficiency.

91. Trends in state (e.g. dead zones) and direct drivers (pollution loads) need to be complemented by information on trends in associated factors. In particular regarding nutrients arising from agriculture it would be useful to assess the extent to which improved fertilizer management on farms, including improved soil management, is leading to reduced off-farm impacts, including reduced water pollution downstream. The fact that soil ecosystem services have a major role to play in improved nutrient management provides further reason to emphasize nutrients (that is, although nutrients are a major driver of biodiversity loss, biodiversity and ecosystem services are also a solution). For these reasons there are strong linkages between achieving, and monitoring, Target 8 and Target 7.

92. Other emerging pollutants should be monitored, such as pharmaceutical residues and active substances contained in some personal care products, which can severely affect the reproduction of native species or promote the breakdown of energy flow in aquatic ecosystems.

Limitations in making these enhancements

93. There are scientific limitations related to the impacts of pollutants on biodiversity and thresholds for different ecosystems. Further, the lack of specialized analytical infrastructure for detection of pharmaceutical residues and active substances contained in some personal care products limits our ability to determine environmental threshold concentrations for many pollutants that can potentially affect biological systems. There are also limitations in coverage of monitoring programmes and stations. The latter would be very costly to address.

Ability to identify the actions that will be most effective (at different scales) to enable us attain the target

94. We are mostly aware about the actions that would enable us achieve the target. They are largely focused on reducing the emission of pollutants, including reducing the residual discharge of nutrients and emerging pollutants contained in municipal and industrial effluents, and enhancing the efficiency of the use of chemical compounds (particularly nutrients in agriculture), together with better use of ecosystem services to manage pollutants, through for example nutrient cycling by constructed wetlands. These can be achieved through environmental regulations and/or through economic instruments (e.g. reducing subsidies for fertilizer in some regions, in accordance with Target 3) as well as through better ability of users, for example farmers, to apply fertilizers, pesticides and herbicides in the most efficient way possible (in accordance with Target 7).

8.4 Assessing the effects of the types of measures taken in accordance with the provisions of the Convention

95. There are good examples demonstrating the effectiveness of policies and measures to reduce pollution, including:

(a) Since the 1970s measures have been taken to reduce emissions of sulphur dioxide and nitrogen oxide leading to acid rain that affects surface waters, soils, forests and other vegetation;

(b) Since the middle of the 20th century significant investments have been made in sewage treatment leading to improvements of water quality of many rivers and lakes;

(c) Efforts in accordance with the Montreal Protocol on Substances that Deplete the Ozone Layer have led to phasing out ozone-depleting substances;

(d) Reductions in subsidies for fertilizer in some parts of the world have led to increased on-farm nutrient use efficiency.

8.5 Conclusions from previous sections to enable identification and prioritization of scientific and technical needs related to the implementation of Target 8

Adequacy of guidance and tools in support of implementation at national level

96. There are generally good guidance and tools available in support of national implementation of Target 8.

Adequacy of data and information for monitoring progress at different scales

97. There are gaps in data and information available to monitor progress towards Target 8. Many pollutants are inadequately monitored and there are gaps in knowledge on the impacts of many on biodiversity. For nutrients, there are good data on consumption of fertilizers and on the production of reactive nitrogen from industrial and other processes. There is less information on quantities deposited and their impacts on natural ecosystems.

Effectiveness of actions taken

98. There is evidence that measures taken collaboratively, i.e. as part of regional or global efforts, can be effective in achieving progress towards Target 8. But in general excessive pollution remains a symptom of development and in particular industrialization. Often measures have only been put in place once severe economic impacts were detected and in particular if linked to human health. However, there are trade-offs in play between development, pollution and environment and in many cases conflicts of interest between stakeholders.

Summary conclusion

99. The limiting factors in achieving Target 8 are primarily socioeconomic and not technology-based. Technology to reduce most point-source pollution exists – the challenge is the economics of, and incentives for, its application. A critical question is what is the appropriate balance between investment in pollution management and economic development and how is such investment financed? For diffuse (non-point source) pollution, particularly nutrients from agriculture, the main challenge is to scale up good nutrient management practices on-farm, which in many cases can also deliver cost savings once subsidies are accounted for. In this respect, progress towards Target 7 (and especially rehabilitating ecosystem services in agriculture – also Target 14) will be critical. Despite some limitations there is generally sufficient information available to undertake the mid-term review of progress towards Target 8.

Target 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.

9.1 Elements of Target 9

100. Invasive alien species are one of the main direct drivers of biodiversity loss at the global level. In some ecosystems, such as many island ecosystems, invasive alien species are the leading cause of biodiversity decline. Increasing travel, trade, tourism and other factors have facilitated the movement of species beyond natural biogeographical barriers by creating new pathways for their introduction. With increasing globalization, the occurrence of invasive alien species is likely to increase unless additional measures are taken. This target focuses on two types of actions to address invasive alien species: the control or eradication of invasive alien species and the management of the pathways of movement of alien species from their native range to other areas by human activities.

101. Many organisms have the potential to become invasive in the right conditions, and many species that are invasive in some circumstances are not problematic in others. Invasiveness is not limited by taxonomic group and invasive alien species can occur in all types of ecosystems, especially after ecological disturbance. In most countries there are likely to be several invasive alien species established as well as multiple pathways for the new entry of invasive alien species, their establishment and spread.

9.2 Existing policy support tools and methodologies, their adequacy, impact, obstacles to their uptake, and gaps

Policy support tools and methodologies to help achieve Aichi Biodiversity Target 9

102. The policy support tools and methodologies related to this target can be divided into three general categories: tools for the identification of invasive alien species; tools for managing, controlling or eradicating invasive species that have already become established; and tools for managing introduction pathways.

103. Under the Convention on Biological Diversity the programme of work on invasive alien species provides the main framework for action towards this target. Specifically, the guiding principles for the prevention, introduction and mitigation of impacts of alien species that threaten ecosystems, habitats or species contained in decision VI/23* are highly relevant to this target. Given the particularly acute impact of invasive alien species on island ecosystems, the programme of work on island biodiversity is also relevant.

104. Taxonomists worldwide have produced a number of tools addressing particular species or sets of species, including on paper, digitally and, most recently, as mobile phone apps. However, such tools have to be functional for each country, to ensure that exotic species can be clearly distinguished from native species. Currently the coverage of such tools is inadequate. The Global Taxonomy Initiative[8] supports strengthening of taxonomic knowledge. Another initiative to identify species is the Barcode of Life. In addition a number of issues of the CBD technical series also contain relevant information.[9]

105. There are a number of international agreements, standards, regulatory frameworks and processes that have developed policy support tools or methodologies which are relevant to this target. These include the International Convention for the Control and Management of Ships' Ballast Water and Sediments,[10] the International Plant Protection Convention, the World Organisation for Animal Health (OIE), the World Trade Organization's Committee on the Agreement for the Application of Sanitary and Phytosanitary Measures and its Standards and Trade Development Facility, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the FAO Code of Conduct for Responsible Fisheries.

106. There are a variety of non-governmental and intergovernmental organizations that have also prepared tools and methodologies related to invasive alien species. These include tools developed by IUCN's Invasive Species Specialist Group such as their online information sources – the Global Invasive Species Database (GISD), Island Biodiversity and Invasive Species Database (IBIS) and the newly developed Invasive Alien Species Pathway Management Toolbox. Several Guides, Guidelines and Codes of Conduct have been developed to support decision makers and invasive species practitioners. Some examples of these are the Guide to Designing Legal and Institutional Frameworks on Alien Invasive Species, and the European Code of Conduct for Zoological Gardens and Aquaria on Invasive Alien Species. A number of regional organizations have developed relevant tools as well. Examples of these include tools developed by the Delivering Alien Invasive Species Inventories for Europe (DAISIE) project, the European Network on Invasive Alien Species (NOBANIS), and the Inter-American

* One representative entered a formal objection during the process leading to the adoption of this decision and underlined that he did not believe that the Conference of the Parties could legitimately adopt a motion or a text with a formal objection in place. A few representatives expressed reservations regarding the procedure leading to the adoption of this decision (see UNEP/CBD/COP/6/20, paras. 294-324).

[8] Partners for the Global Taxonomy Initiative, see http://www.cbd.int/gti/partner.shtml.

[9] CBD Technical Series 48 - Pets, aquarium, and terrarium species: best practices for addressing risks to biodiversity,
CBD Technical Series 2 – Review of the efficiency and efficacy of existing legal instruments applicable to invasive alien species,
CBD Technical Series 1 - assessment and management of alien species that threaten ecosystems, habitats and species.

[10] As of August 2013 37 countries (30.32% tonnage) had ratified the Convention, not yet enacted.

Biodiversity Information Network's (IABIN) Invasive Information Network (I3N). Many national governments have databases of known invasive species found within their borders. Further, to improve free and open access as well as implement the interoperability among the existing invasive alien species information resources, the Global Invasive Alien Species Information Partnership[11] was launched in 2012. Further policy tools are the invasive species policy frameworks set out in some national biodiversity strategy and action plans (NBSAPs) or in national invasive species strategy and action plans (NISSAPs).

The application of existing policy support tools and methodologies

107. There are numerous examples where successful actions have been taken to control or eradicate invasive alien species. While some of the tools and methodologies identified above may have assisted with these actions it is not possible to come to any clear conclusions regarding their use.

Obstacles to the use of existing policy support tools and methodologies

108. Data, information and resources with which to conduct risk analysis or assessments are limited in many countries and in many countries there is limited taxonomic capacity. This makes it challenging to identify alien species or the ecological risks they may pose. A key obstacle is the interaction between invasive alien species and other drivers of change, such as habitat alteration, pollution, overexploitation and climate change. These other drivers affect the mechanisms of transport and introduction of invasive species, their dispersion, the magnitude of their impacts and particularly the efficiency of control strategies. Currently most of the focus of the work on invasive alien species within the conservation community has tended to be on their eradication and control once they have become established. As such, other than for plant pests or animal diseases, there is limited awareness of the importance of border control measures and/or assessment of species before they are imported to a country. Eradication efforts often need to be tailored to the species concerned and the ecosystem in which they are found. This can make it difficult to apply general guidelines related to invasive alien species as they need to be adapted to conform to national circumstances. In addition the costs of controlling or eradicating an alien species once it has become invasive or of setting up national phytosanitary measures are often high and require sustained efforts over several years. There is evidence that eradication is often difficult and sometimes not possible and that when possible, tends to be very costly. Prevention of introduction is often the more effective approach.

109. There is often a substantial problem in terms of degree of cooperation at national level between departments with overlapping jurisdiction on invasive alien species. This situation differs from one country to another.

Gaps in policy support tools and methodologies

110. The Conference of the Parties, at its eleventh meeting, requested the development of tools to strengthen the capacity of border control authorities and other competent authorities to identify invasive alien species or potentially invasive alien species, to assess risks and take steps to manage or minimize those risks and to control and eradicate prioritized invasive alien species (decision XI/28). Also under risk analysis are taxonomic tools (e.g. field guides, online tools such as virtual herbaria, genetic and DNA sequence-based identification tools such as barcoding) and risk-analysis tools in the context of invasive alien species and biosafety (decision XI/29, annex, Action 4).

111. Potential gaps in the international regulatory framework related to invasive alien species have been reviewed under the Convention. Possible gaps include animals introduced as pets, aquarium and terrarium species, and as live bait and live food, and introductions resulting from the international web-based marketplace. While there are few gaps in the international regulatory framework, there are

[11] http://www.cbd.int/invasive/giasipartnership/.

significant gaps in the delivery of policy tools. To take actions under the existing international regulatory framework and apply its standards and guidance at national level needs coordination among the relevant ministries. Materials to explain how to achieve the implementation of international standards are currently lacking. Such materials would help to avoid conflicts overlapping jurisdiction, and confusion of terminology, and would facilitate coordination of work among the relevant government sectors.

112. Methodology gaps may also include: (i) how to develop strategies to prevent potential alien species from becoming invasive to a country; (ii) pathway analysis; (iii) prevention of aquatic invasive invertebrates; and (iv) cost benefit analysis of eradicating or controlling invasive alien species. In particular, better tools to assess the potential impact of alien species are need. This is important to trigger management activity. Currently users in most cases can assess potential impact only through seeking information about a species (once identified) to understand its biology and ecology and then create an impact assessment/risk analysis. There are few tools to support this activity, and none are developed as a standard approach across countries/regions.

113. Information provision and sharing is a key tool to enable policy implementation. The Convention has entered into a partnership with a number of organiations and initiatives in order to address this problem, set out in UNEP/CBD/SBSTTA/15/INF/14 and UNEP/CBD/COP/11/INF/34. The Global Invasive Alien Species Information Partnership (http://giasipartnership.myspecies.info/) is still developing in this role (decision XI/28, paragraphs 21 and 22), but the issue of accessibility to, and dissemination of, information remains.

114. Other limitations include lack of import control, early warning systems, and resources for eradication.

9.3 The adequacy of observations, and of data systems, for monitoring the biodiversity attributes addressed in Aichi Biodiversity Target 9 and the use and development of indicators for the target

Ability to assess/measure the status of progress towards the target at global, regional, national and subnational levels

115. The following operational indicators have been identified in the annex to decision XI/3 A:

(a) Trends in invasive alien species pathways management;

(b) Trends in policy responses, legislation and management plans to control and prevent spread of invasive alien species;

(c) Trends in incidence of wildlife diseases caused by invasive alien species;

(d) Trends in number of invasive alien species;

(e) Trends in the economic impacts of selected invasive alien species;

(f) Trends in the impact of invasive alien species on extinction risk trends.

116. Measuring progress towards this target will require information on the actions taken to identify invasive alien species, on the actions taken to control or eradicate them and on the actions taken to manage their introduction pathways. Currently, global indicators or datasets which contain these types of information are underdeveloped. There is a relatively large amount of national and regional information which could perhaps be aggregated to provide a global picture. However, this information is scattered and

would need to be compiled in a coherent way. Information is possibly the most advanced for islands, where the Database of Island Invasive Species Eradications (DIISE) provides a good starting point.[12]

117. The existing information on invasive alien species largely relates to their impact on extinction rates on some groups of birds, mammals, amphibians and fish and is reported through the IUCN Red List and the related Red List Index. This information provides a strong indicator of the impact of progress towards this target, but is not amenable to rapid updates given the level of analysis required. The interlink between the IUCN Red List and the IUCN Global Invasive Species Database, once completed, will allow the assessment of similar impacts and trends for all taxonomic groups of threatened species. Further, there are a number of global, regional and national databases, such as the Global Invasive Species Database (GISD), the DIISE (above) and the Invasive Species Compendium from CAB International, which contain information on identified alien species which can also provide information on progress towards this target.

118. Invasive alien species indicator partners, led by the IUCN SSC Invasive Species Specialist Group, have developed plans for the further development of these indicators. In the case of the operational indicator "Trends in number of invasive alien species" future development will include increasing the number of countries and taxa for the invasion pressure indicator (and expression of trends therein). Updates of the operational indicators "Trends in the impact of invasive alien species on extinction risk trends" and "Trends in policy responses, legislation and management plans to control and prevent spread of invasive alien species" are planned. Response indicators that directly reflect on-the-ground action against invasive alien species (management effectiveness) are also being planned (e.g. control of pathways, operational management plans, numbers of vertebrate eradications, and extent of invasion). In addition, two other operational indicators "Trends in the economic impacts of selected invasive alien species" and "Trends in incidence of wildlife diseases caused by invasive alien species" are being considered for development.

Areas where enhanced monitoring/better data/additional observations/additional indicators would make a significant difference in our ability to monitor progress in order to guide appropriate/targeted action

119. Enhanced information on the occurrence of biological invasions and on the impacts of invasive alien species would facilitate action towards this target by allowing countries to prioritize their actions. Existing information on the distribution and impacts of invasive alien species has geographic and taxonomic limitations. For example, relatively little is known about invasive marine and terrestrial invertebrates, with the exception of plant pests. There is also an increasing amount of knowledge (including several databases) on aquatic organisms being transported through ballast water and hull fouling. The further development of invasive alien species data sets at national and regional levels would greatly enhance our ability to monitor progress towards this target. Similarly, more comprehensive information on the actions that Parties are taking to control invasive alien species and to manage their introduction pathways would enhance our ability to monitor progress towards this target. Additional indicators could also include enhanced direct assessments of the economic impacts of invasive alien species and trends in policy responses, legislation and management plans to control and prevent the spread of invasive alien species. Furthermore, it is important to improve information on biological invasions in protected areas and on islands, as well as information on the pathways of introduction on threatened species.

[12] Veitch, C. R., M. N. Clout, and D. R. Towns (Eds.). (2011). Island Invasives: Eradication and Management. Proceedings of the International Conference on Island Invasives. Occasional Paper of the IUCN Species Survival Commission No. 42. Gland, Switzerland: IUCN and Auckland, New Zealand: CBB.

Limitations in making these enhancements

120. The identification of invasive alien species requires taxonomic expertise and funding. Such expertise is weak in many countries, especially for marine and terrestrial invertebrates. Similarly, the amount of resources for research on issues related to invasive alien species is generally limited. The taxonomic identification of invertebrates often requires genetic analyses which can be costly. Efforts are also needed to better harmonize and integrate the different invasive alien species databases. In some databases, different or incorrect information can be misleading.

Ability to identify the actions that will be most effective (at different scales) to enable us attain the target

121. Indicators to monitor progress towards this target are relatively limited. While information exists on the number of countries with national invasive alien species policies, information on the effectiveness of these is generally limited. The information available on the effects of invasive alien species on the extinction risk for certain species provides limited indication as to the effectiveness of the actions that have been taken. Information on: (i) economic impact of invasive alien species on some industrial or commercial activities; (ii) control of pathways; (iii) operational management plans; (iv) number of vertebrate eradications; and (v) extent of invasion would be useful to monitor progress towards this target. The planned response indicators noted earlier will help to reflect on-the-ground action against invasive alien species as well as management effectiveness, e.g. control of pathways, operational management plans, numbers of vertebrate eradications, and extent of invasion.

9.4 Assessing the effects of the types of measures taken in accordance with the provisions of the Convention

122. Various actions have been taken by Parties and other stakeholders to address the issue of invasive alien species. These include control and eradication programmes for already established invasive species. Further, increasingly a number of countries have programmes in place to identify invasive alien species before they enter a country through risk assessment prior to introduction, border controls and improved surveillance to prevent them from becoming established. Where actions have been taken to control or eradicate invasive alien species these measures have tended to have a positive effect on biodiversity. There are numerous examples where such actions have improved the conservation status of species. For example an assessment based on the Red List Index concluded that eleven bird species (since 1988), five mammal species (since 1996) and one amphibian (since 1980) have had their risk of extinction substantially reduced due primarily to the successful control or eradication of alien invasive species.[13] However, the assessment also found that three times as many birds, almost twice as many mammals, and more than 200 times the number of amphibian species have deteriorated in conservation status, due largely to increased threats from invasive animals, plants or microorganisms. Overall, birds, mammals, amphibian and fish species have on average become more threatened due to invasive alien species. Thus where actions to control invasive alien species have been taken they have had positive effects but such actions need to be significantly scaled up if this target is to be met.

9.5 Conclusions from previous sections to enable identification and prioritization of scientific and technical needs related to the implementation of Target 9

Adequacy of guidance and tools in support of implementation at national level

123. The existing guidance and policy-related tools for this target appear to be adequate for achieving the target, although difficulties remain with their implementation. The improvement and further

[13] McGeoch, M. A., Butchart, S. H. M., Spear, D., Marais, E., Kleynhans, E. J., Symes, A., Chanson, J., Hoffman, M. (2010). Global indicators of biological invasion: species numbers, biodiversity impact and policy responses. Diversity and Distributions, 16(1), 95-108. http://www3.interscience.wiley.com/journal/123243506/abstract.

development of tools for the identification of potential invasive species, pathway analysis and assessment of economic impact of invasive alien species may facilitate attainment of this target.

Adequacy of data and information for monitoring progress at different scales

124. Data and information to monitor progress towards this target at the global level is limited. Information on the effects of invasive alien species on the extinction risk for species is known for some species but could be enhanced to cover more species. Information is also available on the types of policies that countries have put in place to control invasive alien species, though information on the impacts of these policies is generally limited. Information on the trends in occurrence of biological invasion, and their impacts on native biodiversity is also limited.

Effectiveness of actions taken

125. Where actions have been taken to control or eradicate invasive alien species they can be effective. Eradication efforts have often required concerted efforts over several years and have been relatively costly. Actions to prevent the introduction of invasive alien species are more effective than trying to control or eradicate them once they have become established. There is growing evidence that the prevention of introduction of some invasive alien species can be achieved with sanitary and phytosanitary systems at the borders.

Summary conclusion

126. While indicators and observation systems related to invasive alien species have gaps and limitations, the information available can be used to assess progress towards this target. Information systems to enable stakeholders to easily find invasive alien species information need to be strengthened.

Target 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.

10.1 Elements of Target 10

127. While this target specifically mentions coral reefs, it applies to all vulnerable ecosystems impacted by climate change or ocean acidification. Arguably, all ecosystems are vulnerable to climate change to some extent. National criteria and assessments need to identify how ecosystems might be prioritized with regards to this target. Where guidance is needed, robust assessments of the impacts of climate change on various ecosystem types have been provided by the assessment reports of the Intergovernmental Panel on Climate Change. While other policy measures also address directly the need to mitigate climate change itself, this target aims to reduce the other pressures on these ecosystems so that they can better adapt. Because of ecological and policy inertias, the impacts of the action taken to reduce these pressures will take time to take effect. As such, urgently reducing those anthropogenic pressures over which we have greater control, or are in a position to meaningfully address, over the time frame of the Strategic Plan for Biodiversity 2011-2020 will help to give those ecosystems affected by climate change or ocean acidification greater opportunities to adapt. These pressures include such things as land-based pollution/sedimentation, unsustainable harvesting and other direct pressures which result in ecosystem loss and/or degradation. Ultimately the aim of this target is to provide ecosystems with the greatest probability of maintaining their integrity and functioning in the face of the effects of climate change and/or ocean acidification.

10.2 Existing policy support tools and methodologies, their adequacy, impact, obstacles to their uptake, and gaps

Policy support tools and methodologies to help achieve Aichi Biodiversity Target 10

128. The programme of work on marine and coastal biodiversity, and the tools and methodologies[14] under that programme, are extremely useful for helping countries to achieve this target. In addition, the cross-cutting issue on climate change and the work under the Convention on this issue are also useful to help countries to address this target. The Conference of Parties has provided guidance to Parties on mitigating and adapting to climate change through its decision X/33. Furthermore, given that the target relates to various ecosystems and different types of pressures, there are a number of policy support tools and methodologies under the other thematic programmes that are relevant to it as they delineate the types of actions which can be taken to conserve and sustainably use biodiversity. Similarly, many of the cross-cutting programmes are also relevant as they contain guidance related to the various direct and indirect causes of biodiversity loss. The ecosystem approach is a particularly relevant tool for the attainment of this target. A number of volumes of the CBD technical series provide useful tools as well.[15] Of particular importance is CBD Technical Series 41, which provides guidance on the impacts of climate change on biodiversity, reducing the impacts of climate change on biodiversity, ecosystem-based approaches to adaptation, REDD+, and reducing the impacts of response measures on biodiversity. There are also a number of organizations that have developed guidance relevant to this target.[16] For example, the vulnerability of wetland ecosystems and guidance on their management regarding climate change is provided, *inter alia*, by the Ramsar Convention. Many international organizations work on issues related to coral reefs and other ecosystems which are vulnerable to climate change and have prepared relevant policy support tools and methodologies. For example the International Coral Reef Initiative, with a number of partners, has prepared guidance on catchment management and coral reef conservation. There is considerable information on, and guidance for, managing climate change in agricultural landscapes, provided by FAO and other organizations. Further guidance related to development of national adaptation plans as well as mitigation activities has been developed under the United Nations Framework Convention on Climate Change (UNFCCC). Integrated approaches, such as ecosystem-based approaches to adaptation and integrated "ridges-to reef" management, are also key tools.

The application of existing policy support tools and methodologies

129. The anthropogenic pressures on ecosystems referred to are largely addressed through the other Aichi Biodiversity Targets, including the direct pressures (Targets 5 to 9), underlying causes (Goal A), improving the status of biodiversity and safeguarding ecosystems (Goal C), enhancing benefits (Goal D) and planning, knowledge management and capacity-building (Goal E). Comments on these targets provided in other documents before the Subsidiary Body are therefore relevant.

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[14] For example the specific work plan on coral bleaching.

[15] CBD Technical series 46: Scientific Synthesis of the Impacts of Ocean Acidification on Marine Biodiversity;
CBD Technical series 43: Forest Resilience, Biodiversity, and Climate Change - A Synthesis of the Biodiversity/Resilience/Stability Relationship in Forest Ecosystems;
CBD Technical Series 42: Review of the Literature on the Links between Biodiversity and Climate Change – Impacts, Adaptation and Mitigation;
CBD Technical Series 41: Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change;
CBD Technical Series 29: Emerging Issues for Biodiversity Conservation in a Changing Climate;
CBD Technical Series 26: Guidance for Promoting Synergy Among Activities Addressing Biological Diversity, Desertification, Land Degradation and Climate Change;
CBD Technical Series 10: Interlinkages between biological diversity and climate change;
CBD Technical Series 8: Status and trends of, and threats to, mountain biodiversity, marine, coastal and inland water ecosystems.

[16] Nairobi Work Programme of the United Nations Framework Convention on Climate Change (UNFCCC); UNFCCC Technical Guidelines for the National Adaptation Plans Process; UNEP Ecosystem-based Adaptation Decision Support Framework.

130. Many of the other policy support tools which are relevant to this target have been used by Parties to the Convention and other organizations. However, it is unclear if they have been used in the specific context of this target. Further, many national adaptation programmes of action (NAPAs) developed in relation to the United Nations Framework Convention on Climate Change identify vulnerable ecosystems and identify the different pressures on them, though the extent to which these make use of the guidance and tools which have been developed is not known.

Obstacles to the use of existing policy support tools and methodologies

131. Managing multiple pressures collectively, with coordinated actions, is challenging even for the best resourced Parties. However, the largest obstacles relate to addressing the underlying causes of the pressures (indirect drivers) such as unsustainable consumption and production.

132. A difficulty in using existing policy tools can be in making refinements at national level regarding priority ecosystems and the identification of pressures which can be effectively managed. Capacity is also an obstacle in many developing countries, particularly small island developing States and least developed countries, including landlocked and in particular mountainous countries, which are expected to be the most impacted by climate change. A further obstacle is that climate change and biodiversity issues are often handled by different government departments. Similarly, responsibility for addressing the anthropogenic pressures on biodiversity usually lies in many different ministries or departments and there can be significant constraints to interdepartmental coordination/cooperation.

Gaps in policy support tools and methodologies

133. The main policy gap is that there is frequently no unifying guidance or tool which amalgamates the existing guidance, in various fields, at the landscape scale, and presents this in a way that can be easily applied. Landscape- and/or ecosystem-based approaches need to be applied, and planning and organization at such scales is often a significant weakness. An additional gap is policy support tools for the identification of priority ecosystems which are vulnerable to the impacts of climate change or ocean acidification.

10.3 The adequacy of observations, and of data systems, for monitoring the biodiversity attributes addressed in Aichi Biodiversity Target 10 and the use and development of indicators for the target

Ability to assess/measure the status of progress towards the target at global, regional, national and subnational levels

134. The following operational indicators have been identified in the annex to decision XI/3 A:

(a) Extinction risk trends of coral and reef fish;

(b) Trends in climate change impacts on extinction risk;

(c) Trends in climatic impacts on community composition;

(d) Trends in climatic impacts on population trends;

(e) Trends in coral reef condition;

(f) Trends in extent, and rate of shifts of boundaries, of vulnerable ecosystems.

However, as already noted above, indicators related to other Aichi Biodiversity Targets are also relevant to Target 10.

135. There is no single global indicator that can be used to assess progress towards this target. Given that this target can apply to several ecosystems and relates to various pressures, a range of indicators may

be needed to assess progress towards it. The indicators noted above, and others in use for other targets, can be used to inform any assessment of progress towards the attainment of this target. However, the information derived from these indicators would not necessarily cover all elements of the target and there are geographic gaps in their coverage. There are a number of regional and national organizations and programmes which monitor ecosystem conditions. Information from these organizations could be used to inform any global assessment. There are many relevant indicators in use, or development, at regional level; for example, impact of climate change on bird populations in Europe (SEBI 11).

Areas where enhanced monitoring/better data/additional observations/additional indicators would make a significant difference in our ability to monitor progress in order to guide appropriate/targeted action

136. In general, increased monitoring of those ecosystems particularly vulnerable to climate change is required, using indicators in use, or under development, for those areas and/or pressures. In particular, better trend information on the main threats to in these ecosystems would assist with measuring progress towards this target. Focusing efforts on compiling this information at national level would help address this need.

Limitations in making these enhancements

137. A limitation to making these enhancements is determining which ecosystems on which to focus monitoring efforts at the national level.

Ability to identify the actions that will be most effective (at different scales) to enable us attain the target

138. The main anthropogenic threats to biodiversity are known. Further, for many of these, there are fairly strong observations and datasets. However, threats vary considerably in terms of the difficulty in addressing them. A central problem is identifying the most appropriate, feasible and cost-effective strategies for achieving this target. There are also some remaining difficulties in the science underpinning the assessment of the interactions of multiple drivers on biodiversity loss.

10.4 Assessing the effects of the types of measures taken in accordance with the provisions of the Convention

139. Possible actions that could be taken to reach this target include activities such as reducing pollution, overexploitation, the impacts of tourism, and infrastructure development and operations which have negative consequences on ecosystems, together with improved land and water use planning and management. Similarly, efforts to control or eradicate invasive alien species could also help to achieve this target. These types of actions are being taken by most Parties to some degree, though not necessarily in response to this target or in light of the anticipated impacts of climate change and/or ocean acidification. Numerous examples illustrate that where actions have been taken to reduce the direct causes of biodiversity loss they have often had a positive effect. However, there is limited information on whether these actions have had an effect on reducing the pressures on those ecosystems which are being particularly impacted by climate change and or ocean acidification.

10.5 Conclusions from previous sections to enable identification and prioritization of scientific and technical needs related to the implementation of Target 10

Adequacy of guidance and tools in support of implementation at national level

140. There is a range of guidance available to help Parties make progress towards this target, including much of that available for other targets, for example, the guidance developed to reduce direct causes of biodiversity loss as well as guidance related to climate change adaptation and mitigation. While additional

guidance to assist countries in identifying those ecosystems which are particularly vulnerable to climate change could be helpful, such guidance is likely best developed at the national level. Generally there do not appear to be any major policy gaps which are hindering progress towards this target, other than as identified for actions towards related targets. Target 10 does, however, highlight the need for approaches which implement all of the Aichi Biodiversity Targets collectively, in particular at the landscape level, and the need for monitoring and indicators to assess progress at this scale.

Adequacy of data and information for monitoring progress at different scales

141. Data and information on the main causes of biodiversity loss are generally available; however, it cannot always be disaggregated to provide information specific to those ecosystems most vulnerable to the effects of climate change and/or ocean acidification. While greater monitoring of ecosystems would allow for a more detailed assessment of progress towards this target, the absence of such information does not appear to be a limiting factor in making progress towards the attainment of this target, other than as identified for related indicator/monitoring areas.

Effectiveness of actions taken

142. Many actions have and are being taken to reduce the direct pressures on ecosystems. The general types of actions that are needed are known and where coherent actions have been taken, they have generally had positive effects.

Summary conclusion

143. Overall, existing policy support tools, methodologies and guidance, as well as the existing indicators and observations systems, are largely dependent on the adequacy of indicators and monitoring for most of the other Aichi Biodiversity Targets. While there are gaps and limitations, particularly in relation to identifying ecosystems vulnerable to climate change or ocean acidification and monitoring the pressures on them, these do not represent major obstacles to the implementation of this target, other than as identified for other targets. Given that what constitutes a particularly vulnerable ecosystem will be dependent, to a large degree, on national circumstances, many gaps are likely to be best addressed at the national or regional level. One opportunity to help accelerate progress towards this target is through the development of, and sharing knowledge regarding, effective landscape-scale approaches to managing multiple drivers of ecosystem loss and degradation, including, where appropriate, the integration of effective actions to support ecosystem restoration.
